



Working Report 2008-35

# GPS Operations at Olkiluoto, Kivetty and Romuvaara in 2007

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## GPS Operations at Olkiluoto, Kivetty and Romuvaara in 2007

### ABSTRACT

The GPS based deformation studies have been made at the investigation areas of Posiva since 1995, when the network of ten GPS pillars was established at Olkiluoto. The network of seven GPS pillars was built at Kivetty and Romuvaara during the year 1996. One pillar in each investigation area belongs to the Finnish permanent GPS network, FinnRef<sup>®</sup>.

24 GPS measurement campaigns have been carried out at Olkiluoto since 1995, and 16 campaigns at Kivetty and Romuvaara. According to the time series of the GPS results 1/3 of the baselines at Olkiluoto have statistically significant change rates. However, the observed movements are smaller than  $\pm 0.20$  mm/a. The networks of Kivetty and Romuvaara are quite stable except one pillar at Romuvaara.

There are five pillars, which have statistically significant horizontal velocities at Olkiluoto. These local velocity components are small but taking into account the standard deviations the largest velocity components seems to be reliably determined (maximum velocity is  $-0.22$  mm/a  $\pm 0.02$  mm/a).

The uniform scale for the GPS measurements made in different years is the basic condition for reliable results in the deformation analyses. At Olkiluoto a baseline for electronic distance measurements (EDM) was built in 2002. The baseline has been measured using EDM instruments simultaneously with the GPS observations. The comparison between the GPS and EDM results can solve a possible scale error of the GPS.

The GPS network at Olkiluoto was extended in 2003. The new pillars were built close to Kuivalahti village and on a small island of Iso Pyrekari. According to the geological evidence it is expected that a fracture zone is located between the new stations, thus enabling the determination of possible deformations along the fracture zone. The new pillars have been observed since 2003, but the time series are still too short for reliable deformation studies.

The local crustal deformations have been studied in GeoSatakunta project, too. This GPS network is located in Cities of Pori and Rauma and their neighbour municipalities. Two new pillars have been established near Olkiluoto investigation area in October 2005. The repeated measurements at these pillars connect the Olkiluoto and GeoSatakunta studies.

Including the new pillars the local GPS network at Olkiluoto consists of 14 stations. The whole network will be measured twice a year. The EDM measurements will be done simultaneously with the GPS observations. Even if the studies are concentrated at Olkiluoto, the GPS observations at Kivetty and Romuvaara investigation areas will be made once per year. Because the stability of these networks has been confirmed by GPS observations in previous years, we may regard the observations at Kivetty and Romuvaara as a reference for the stability of our GPS determinations.

**Keywords:** Deformation studies, GPS measurements, crustal movements.

## Olkiluodon, Kivetyn ja Romuvaaran tutkimusalueilla vuonna 2007 tehtyjen GPS-mittausten tulokset

### TIIVISTELMÄ

GPS-satelliittipaikannukseen perustuvaa deformaatiotutkimusta on tehty Posivan tutkimusalueilla vuodesta 1995 lähtien, jolloin Olkiluotoon perustettiin kymmenen pilaria käsittävä paikallisverkko. Romuvaaralle ja Kivettyyn rakennettiin seuraavana vuonna seitsemän pilarin GPS-verkot. Kaikista tutkimusalueista yksi pilari kuuluu Suomen pysyvään GPS-verkkoon (FinnRef<sup>®</sup>), jossa rekisteröintiä tehdään jatkuvasti.

Olkiluodon verkko on mitattu 24 kertaa vuodesta 1995 lähtien. Romuvaaralla ja Kivetyssä mittauksia on kertynyt 16. Mittauksista lasketut pilarien väliset etäisyydet muodostavat aikasarjan, jonka mukaan kolmanneksella Olkiluodon verkon pilaripareilla on tilastollisesti merkittävä etäisyyden muutosnopeus. Kaikki havaitut liikkeet ovat kuitenkin alle  $\pm 0.20$  mm/a. Mittaustulosten mukaan liikkeet Kivetyn ja Romuvaaran verkoissa ovat erittäin pieniä yhtä Romuvaaran pilaria lukuunottamatta.

Viidellä Olkiluodon asemalla on havaittu tilastollisesti merkittävä vaakaliike. Paikalliset liikenopeedet ovat pieniä, mutta niitä voidaan keskivirheiden perusteella pitää luotettavina (maksimi liikenopeus  $-0.22$  mm/a  $\pm 0.02$  mm/a).

Olkiluodon tutkimusalueelle rakennettiin v. 2002 perusviiva, jonka pituus on mitattu elektronisilla etäisyydenmittauslaitteilla (EDM) GPS-mittauskampanjoiden yhteydessä. Perusviivalla tehtävien EDM-mittausten tarkoituksena on varmistaa GPS:n avulla tehtyjen mittausten mittakaavan yhdenmukaisuus vuodesta toiseen.

Olkiluodon tutkimusalueelle rakennettiin v. 2003 kaksi uutta GPS-mittauspilaria ja uuden ydinvoimalan rakennustyömaan alle jäävän aseman tilalle rakennettiin uusi GPS-havaintopilari. Uudet pilarit sijaitsevat Eurajoensalmen ruhjevyöhykkeellä ja niiden sijaintien muutoksien avulla voidaan seurata mahdollisia ruhjevyöhykkeen liikkeitä. Uudet pilarit on mitattu syksystä 2003 lähtien, mutta aikasarja on vielä liian lyhyt luotettavien deformaatioanalyysien tekemiseen.

Kallioperän deformaatioita on tutkittu myös GeoSatakunta-projektissa, jonka GPS-verkko kattaa Porin ja Rauman kaupunkien ja niiden lähikuntien alueen. Verkon kaksi pilaria sijaitsevat lähellä Olkiluotoa. Näillä syksyllä 2005 perustetuilla pilareilla tehtävät mittaukset yhdistävät Posivan ja GeoSatakunnan tutkimukset yhdeksi kokonaisuudeksi.

Uusien pilarien rakentamisen jälkeen Olkiluodon tutkimusalueella on 14 GPS-pilaria, joiden sijainti mitataan kahdesti vuodessa. Samanaikaisesti GPS-mittausten kanssa tehdään EDM-mittaukset perusviivalla. Vaikka tutkimukset ovat keskittyneet Olkiluotoon, Kivetyn ja Romuvaaran GPS-verkot mitataan edelleen kerran vuodessa. Aikaisempien GPS-mittausten perusteella voidaan Kivetyn ja Romuvaaran paikallisverkkoja pitää erittäin stabiileina. Nyt näitä pisteverkkoja voidaan käyttää GPS-mittausten ja laskennan testikenttinä.

**Avainsanat:** Deformaatiotutkimus, GPS-mittaukset, maankuoren liikkeet.

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## 1. INTRODUCTION

The Finnish Geodetic Institute (FGI) has studied crustal deformations in co-operation with the Posiva Ltd. (previously Teollisuuden Voima, TVO). The studies have been made at the investigation areas, which were selected as candidates for the final disposal sites of spent nuclear fuel. The studies started in 1994, when a network of ten pillars for GPS observations was established at Olkiluoto. In 1995 the GPS networks of seven pillars were built at Kivetty and at Romuvaara. One pillar at each investigation area belongs to the Finnish permanent GPS network FinnRef<sup>®</sup> and are used for continuous GPS observations.

The measurements started at Olkiluoto in 1995, while the first observations were carried out at Romuvaara and at Kivetty in 1996. The baselines between GPS pillars (0.5-3.5 km) have been observed twice a year except the year 2000 because of high ionospheric activity. The studies are now concentrated at Olkiluoto, because the Government and the Parliament have ratified the decision, which enables to establish the final disposal site close to Olkiluoto nuclear power stations. After the decision, since 2002, observations were carried out at Kivetty and at Romuvaara once per year only. We have not finished the studies at these investigation areas, because those areas are the reference networks for Olkiluoto. The time series of the GPS observations provide the relative movements of the GPS pillars, which are then used to determine the local deformations.

Every GPS pillar has two control markers. We determine regularly the distances and angles between the pillars and their control markers in order to check the stability of the concrete pillars. The measurements have been made using tacheometer in 2001, 2004 and 2007.

According to the GPS analysis the lengths of all vectors deviate in some sessions systematically from the mean of all observations. The scale difference is mainly caused by errors in the ionosphere modelling. Because of this scaling problem we have established a 511 m long baseline for electronic distance measurement (EDM) between the pillars GPS7 and GPS8 at Olkiluoto. The distance has been measured with Kern ME5000 mekometer, which is the most accurate EDM instrument. The owner of the mekometer is the Department of Surveying, Helsinki University of Technology. The Mekometer has been calibrated at the Nummela Standard Baseline every year to ensure the quality of the results. The electronic distance measurements have been performed during the GPS observations since 2002. The EDM observations can be used to reduce the GPS results to the traceable scale.

The pillar GPS10 was destroyed when Teollisuuden Voima Oy started to build a new nuclear power station at Olkiluoto in the end of year 2003. The pillar GPS10 was replaced with a new one (GPS13), locating about 300 m to the west from the original pillar.

In 2003 Posiva decided to expand the Olkiluoto GPS network to the north. The purpose is to monitor possible crustal movements at an old fracture zone, which is passing from NW to SE along Eurajoensalmi. Two new pillars were established in August 2003 at

Kuivalahti and at Iso Pyrekari. The distances to the permanent GPS station are about 8.5 and 4.8 km, respectively.

Local crustal deformations have been studied also in the GeoSatakunta project. The GeoSatakunta GPS network is located in the Cities of Pori and Rauma and their neighbour municipalities. Two new pillars have been established near Olkiluoto investigation area in October 2005. They are located at Hankkila and at Taipalmaa. The distances from the Olkiluoto permanent GPS station are about 7.9 and 5.7 km. Measurements at these pillars connect the Olkiluoto and GeoSatakunta networks.

GPS measurements are suitable to determine horizontal deformations, but the accuracy of height determination is not adequate. The FGI started to determine possible vertical deformations at Olkiluoto with precise levelling in 2003. Levelling campaigns will be performed every second year and they will be reported in a separate working report (Lehmuskoski 2004, 2006 and 2008).



## 2. OPERATIONS AT THE PERMANENT GPS STATIONS IN 2007

Permanent GPS stations at Olkiluoto, Romuvaara, and Kivetty collect continuously GPS data (Figure 2-1). Seven observables (L1, L2, C/A, P1, P2, D1 and D2) are collected with 30 s sampling interval. At the end of 2007 the data from all three stations were downloaded hourly using different connection scheme (Table 2-1). At Olkiluoto a similar ADSL based connection has been used as at the other FinnRef GPS stations. Both Romuvaara and Kivetty have been challenging places for data transfer. ADSL connections were not available so other means of data transfer had to be implemented. At Romuvaara a WiMAX connection is used. Since November 22 we are using GPRS with a local Linux computer at Kivetty. GPRS replaced the old daily downloading routines using dial up modem.



*Figure 2-1. The permanent GPS station at Olkiluoto. (Photograph H. Koivula 2007.)*

**Table 2-1.** Receivers and connection type at the GPS stations in 2007.

Site	Date	Receiver	S/N	Connection type	Data transfer
OLKI	Jan - Dec	Z-XII3	168	ADSL	hourly
KIVE	Jan -	Z-XII3	108	modem	Daily
	Nov 22 -	Z-XII3	174	GPRS	hourly
ROMU	Jan -	Z-XII3	175	WiMAX	hourly
	Jul 25 -	Z-XII3	832	WiMAX	hourly

**Table 2-2.** Breaks longer than 3 days at GPS stations in 2007.

OLKI	KIVE	ROMU
	Aug 14 – 19	Jul 8-13
	Oct 10 – Nov 26	Jul 17-24

**Table 2-3.** The relative movements with respect to Metsähovi IGS station.

Station	North component (mm/a)	East component (mm/a)	Height component (mm/a)	Baseline length (km)
Olkiluoto	-0.41 ± 0.02	-0.43 ± 0.02	+2.19 ± 0.05	105.9
Kivetty	+0.20 ± 0.02	-0.60 ± 0.01	+1.40 ± 0.06	298.2
Romuvaara	+0.90 ± 0.04	-0.88 ± 0.02	-0.71 ± 0.07	573.8

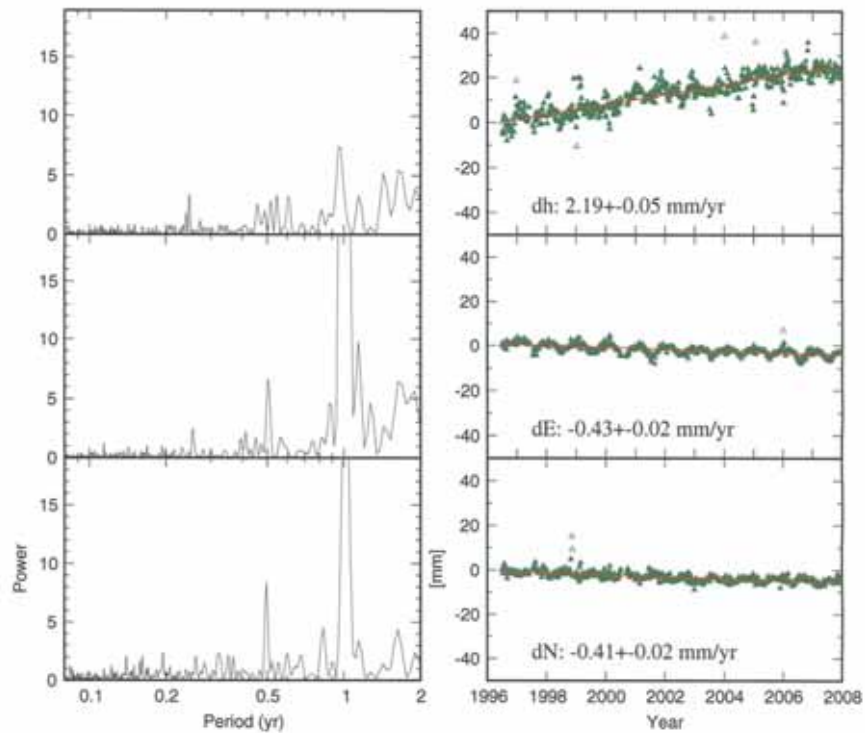
Our GPS database shows that there are a few days with no data. Data gaps longer than three days are summarized in Table 2-2. In most cases these gaps are caused by broken receiver, modem or telecommunication line. This year the latter gap at Kivetty originate from the problems with electricity supplier.

The GPS data are processed with Bernese 4.2 Software in a same manner as described in Ollikainen *et al.* 2004. The major processing models and parameters are summarized in Ahola *et al.* 2007. The data are used in 24-hour sessions together with the IGS final orbits. Finally the daily solutions are combined into weekly solution.

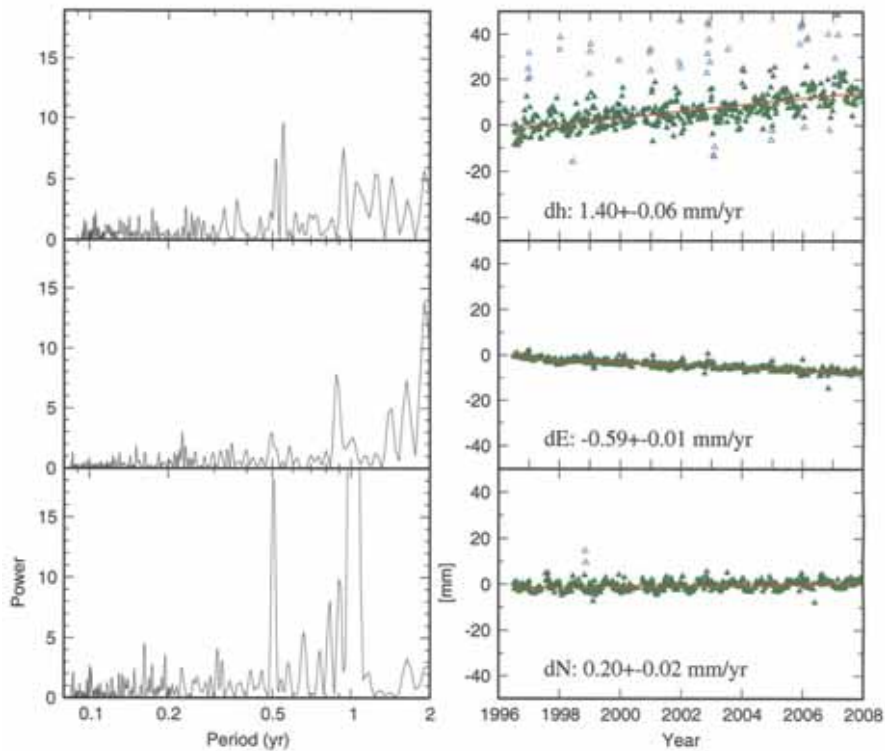
In Figures 2-2, 2-3 and 2-4 we show time series of Olkiluoto, Kivetty and Romuvaara relative to Metsähovi. In the figures one triangle indicates one weekly solution. We solved for trends from the coordinate time series by fitting iteratively for the trend with least squares. Open triangles in the figures shows the solutions that were rejected as outliers during this process. They are mostly caused by the biased troposphere estimates when a layer of snow has covered the antennas in the wintertime. Time series have an annual periodicity, which can be seen on the periodograms on the left columns of the Figures 2-2, 2-3 and 2-4. This behaviour was discussed more detailed in Ollikainen *et al.* 2004.

The velocity components for Olkiluoto, Kivetty and Romuvaara are summarized in the Table 2-3. We have nearly 12 years long GPS time series. Additional year of measurements did not influence much on the velocity estimates. At Olkiluoto and Kivetty the velocity estimates of North and East components changed from last year less than 0.01 mm/year. At Romuvaara the values changed 0.02 mm/year for East component and 0.04 mm/year for North component. All these changes are within the

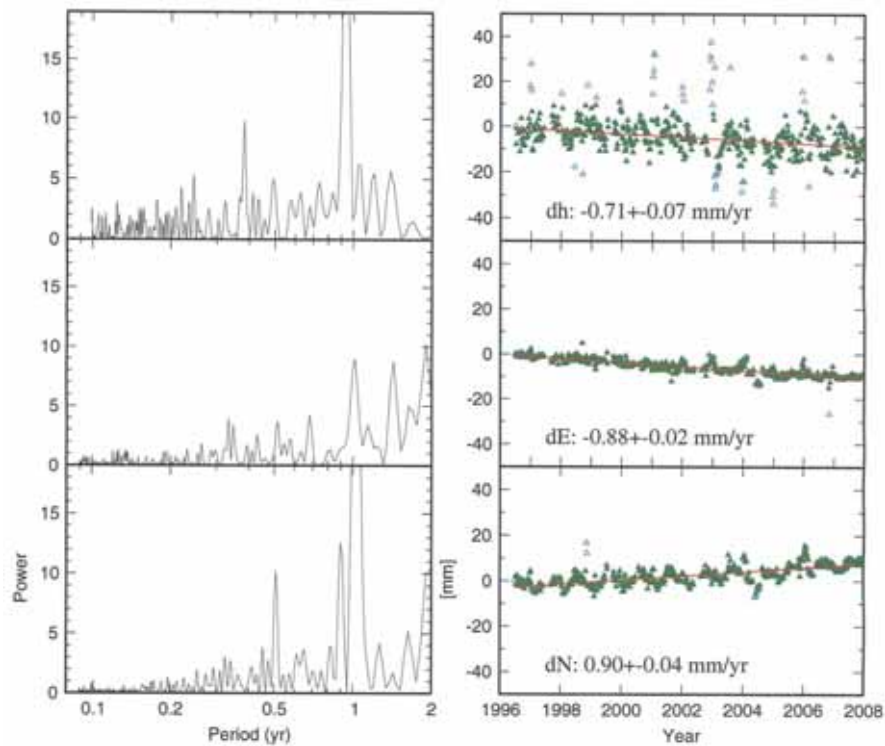
formal error of the velocity estimation. Changes in the height estimates are less than 0.1 mm/year. In GPS solutions the height component is known to be weaker than horizontal ones. This can be explained with modelling of atmosphere and satellite geometry. Any biases in atmospheric estimates or modelling are mainly seen in the height component. Also for height determination we have satellites only above the point leading to poorer observation geometry and therefore weaker solution. In Horizontal estimates the geometry is better since it covers full 360 degrees around the point. In differential GPS the result tend to include so-called ppm-effect. This means that when the baseline length is longer the expected accuracy is worse. Typically the vendors give values like  $5\text{-}10\text{ mm} \pm 0.5\text{-}1\text{ ppm}$ , where ppm refers to parts per million from the baseline length ( $1\text{ ppm} = 1\text{ cm} / 10\text{ km}$ ). With scientific software like Bernese this effect is not nearly that strong but it still exists. This explains partly a slightly larger formal error in Romuvaara solution.



**Figure 2-2.** Time series of Metsähovi-Olkiluoto vector components. Right: Series of height, East and North components. Left: Periodograms of the time series.



**Figure 2-3.** Time series of Metsähovi-Kivetty vector components. Right: Series of height, East and North components. Left: Periodograms of the time series.



**Figure 2-4.** Time series of Metsähovi-Romuvaara vector components. Right: Series of height, East and North components. Left: Periodograms of the time series.

### 3. GPS OPERATIONS AT THE LOCAL NETWORKS

#### 3.1 The local networks

##### 3.1.1 Olkiluoto network

The Olkiluoto GPS monitoring network was established in 1994 (Chen and Kakkuri, 1995). The original network (Figure 3-2) includes ten reinforced concrete pillars (GPS1-GPS10). The pillars stand on solid bedrock and according to geological studies they are located on different geological blocks (Figure 3-1). The distances between pillars are from 0.5 to 3.5 km. The station GPS1 belongs to the Finnish permanent GPS network, FinnRef<sup>®</sup> (Koivula *et al.* 1999), in which the abbreviation OLKI is used for the station.

In 2003 Posiva decided to expand the Olkiluoto GPS network to the north for monitoring possible crustal movements at an old fracture zone, which is passing from NW to SE along Eurajoensalmi. Two new pillars (Figure 3-1) were established in August 2003. They are located at Kuivalahti (GPS11) and at Iso Pyrekari (GPS12) 8.5 and 4.8 km away from the Olkiluoto GPS station.



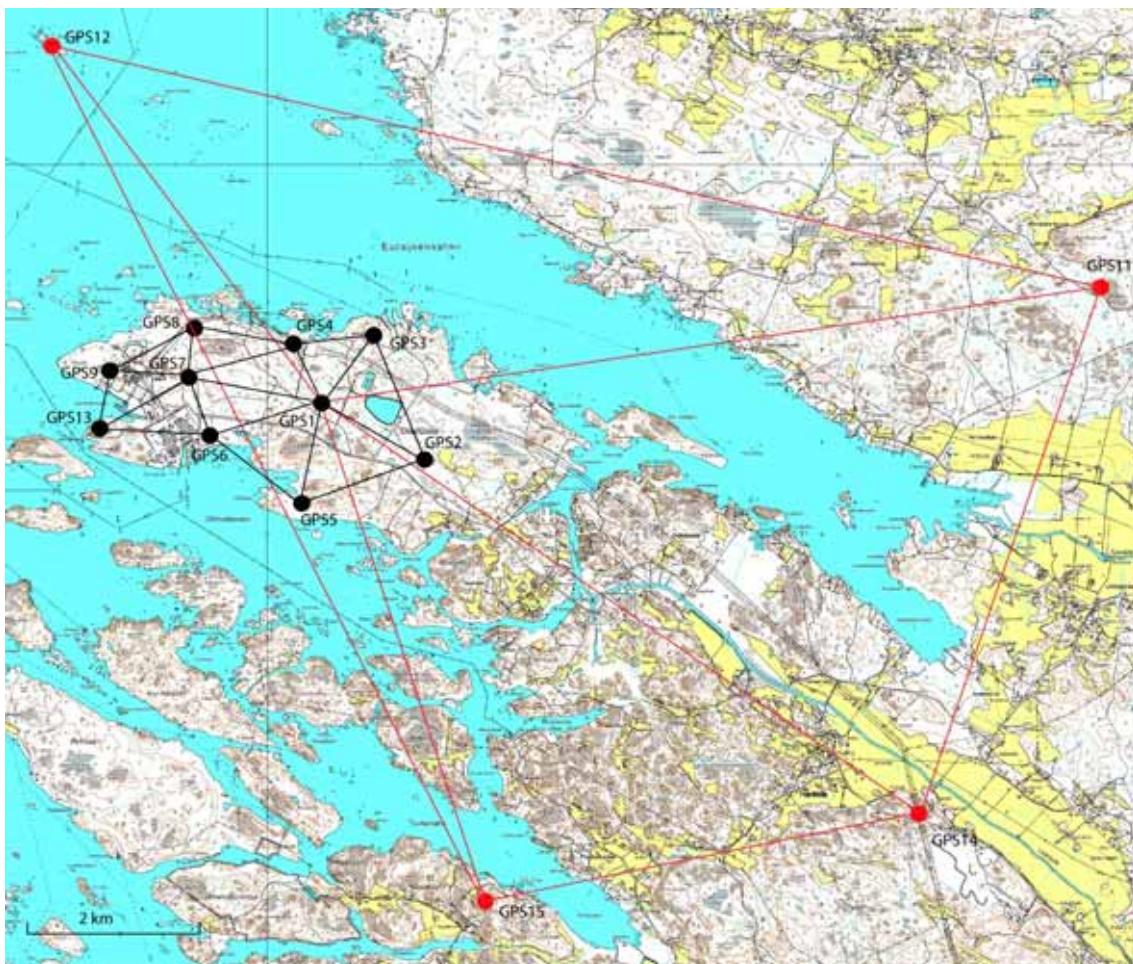
**Figure 3-1.** *Left: The original GPS pillars are two meter high concrete platforms, which have metal layers for solar radiation. Right: New observation pillars are smaller than original ones. They have been established at the observation sites, but the original pillars have been made in a factory and then those pillars have been carried to the observation sites. (Photographs J. Ahola 2007.)*



The local crustal deformations have been studied in GeoSatakunta project, too (Ahola and Poutanen 2006). That GPS network is located in Cities of Pori and Rauma and their neighbour municipalities. Two new pillars, GPS14 and GPS15, have been established near Olkiluoto investigation area in October 2005. They are located to the east and to the south from Olkiluoto at Hankkila and at Taipalmaa villages (Figure 3-2). The distances from the permanent GPS station of Olkiluoto are about 7.9 and 5.7 km. The construction of the pillars is same as the pillars established in 2003. The repeated measurement campaigns at the new pillars connect the Olkiluoto investigations and GeoSatakunta studies.

The pillar GPS10 was destroyed in the end of year 2003 when Teollisuuden Voima Oy started to build a new nuclear power station at Olkiluoto. A new pillar GPS13 was established about 300 m west from the pillar GPS10 in August 2003. Previously the name GPS10B was used for the pillar (Ollikainen *et al.* 2004), but according to the recommendation by Posiva it was renamed in 2005.

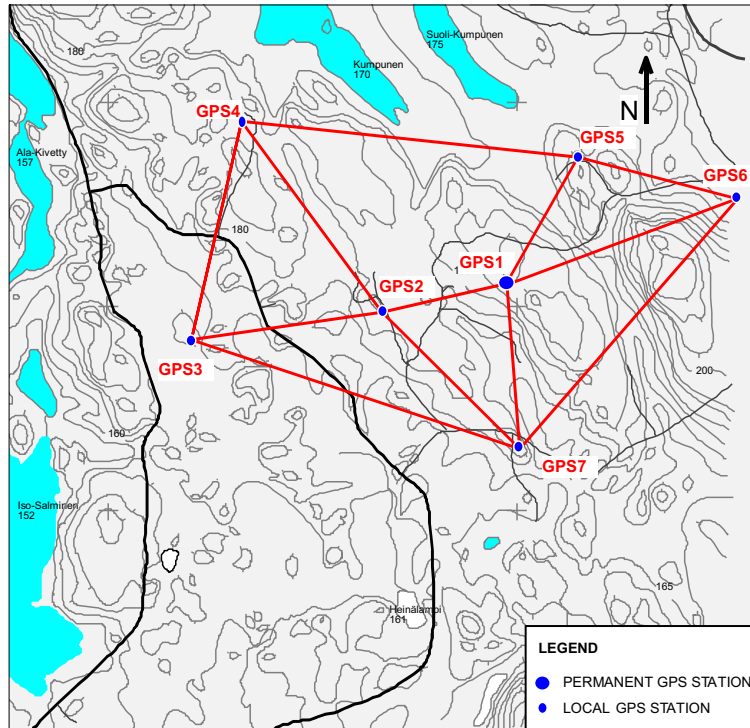
The construction work and different pillar types were described in Ollikainen *et al.* 2004.



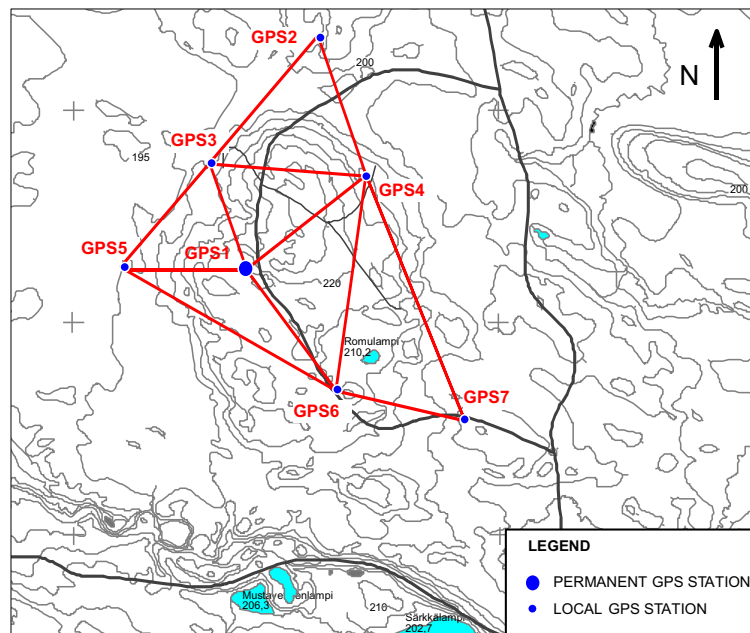
**Figure 3-2.** The local GPS monitoring network at the investigation area of Olkiluoto. Black: Original network has been established in 1994 (GPS13 in 2003). Red: Pillars have been established in 2003 and 2005.

### 3.1.2 Kivetty and Romuvaara networks

The networks at Kivetty and Romuvaara were established in 1995 (Chen and Kakkuri, 1996). There are seven pillars at both Kivetty (Figure 3-3) and Romuvaara (Figure 3-4). They were built using the same principles than at Olkiluoto. One of the stations (GPS1) at both of the investigation areas belongs to the Finnish permanent GPS network, FinnRef<sup>®</sup>.



*Figure 3-3. The local GPS network at Kivetty.*



*Figure 3-4. The local GPS network at Romuvaara.*

## 3.2 The measurement campaigns in 2007

### 3.2.1 The measurements at Olkiluoto

The local GPS monitoring network at Olkiluoto has been observed twice a year since 1995 with the exception of year 2000 (Chen and Kakkuri, 1996, 1997 and 1998, Ollikainen and Kakkuri, 1999 and 2000, Ollikainen *et al.* 2001, 2002 and 2004, Ahola *et al.* 2005, 2006 and 2007).

As in the previous years two GPS measurement campaigns were carried out at Olkiluoto in 2007. The first measurements were performed on April 10-16 (Table 3-1) and the second one on September 27 - October 2 (Figure 3-5).

The session I includes observations at the pillars GPS1, GPS4, GPS5, GPS6, GPS7, GPS8, GPS9 and GPS13 in both campaigns. The GPS equipments were moved from the pillars GPS4 and GPS7 to the pillars GPS2 and GPS3 for the session II.



**Figure 3-5.** The GPS measurement at Olkiluoto (GPS6). (Photograph J. Puupponen 2007.)



**Table 3-1.** Observation sessions for the GPS measurements at Olkiluoto in 2007.

Campaign	Session	Observation day		Observation windows (UT)	
		Calendar day	GPS day		
I / 2007	I	13 April	103	9.00-24.00	
		14 April	104	0.00-12.00	
	II	15 April	105	9.00-24.00	
		16 April	106	0.00-10.00	
	III*	10 April	100	13.00-24.00	
		11 April	101	0.00-24.00	
		12 April	102	0.00-11.00	
	II / 2007	I	30 September	273	8.00-24.00
			1 October	274	0.00-8.00
II		1 October	274	9.00-24.00	
		2 October	275	0.00-10.00	
III		27 September	270	13.00-24.00	
		28 September	271	0.00-24.00	
		29 September	272	0.00-11.00	

\*GPS12 has been observed from 13 April to 16 April, because of transportation problems to the Iso Pyrekari island.

The session III includes the observations at the permanent station GPS1 and pillars GPS11, GPS12, GPS14 and GPS15. We had difficulties to reach Iso Pyrekari in spring 2007, because of stormy weather. That is the reason, why we did not make observations at the pillar GPS12 at the same time than at the other stations.

The observations were made using Ashtech Z-12 and Ashtech  $\mu$ Z GPS receivers equipped with Dorne Margolin-type choke ring antennas (Table 3-2). Same antennas were used at the stations as in previous campaigns.

**Table 3-2.** The GPS equipments used at Olkiluoto in 2007.

Station	I / 2007 Receiver S/N	II / 2007 Receiver S/N	Antenna S/N
GPS1*	LP00168	LP00168	321
GPS2	03398	04098	11761
GPS3	04293	03175	11959
GPS4	03398	03398	11761
GPS5	LP01084U	LP00174	11988
GPS6	LP00164U	GP10273	11772
GPS7	04293	04293	11959
GPS8	LP01087	LP00164U	11963
GPS9	LP00167U	LP00167U	11770
GPS11	LP00184U	LP00167U	11754
GPS12	ZR20000701	ZR20000701	11194
GPS13	LP00174	LP00184U	11754
GPS14	LP01087	GP10273	11772
GPS15	LP00174	LP00164U	11988

\*Permanent station

### 3.2.2 The measurements at Kivetty and Romuvaara

The observations of the local GPS monitoring networks at Kivetty and Romuvaara were started in 1996. Until 2001 the networks were measured twice a year. Posiva concentrates now all studies on Olkiluoto, because the Government and Parliament have ratified the decision that makes possible to establish the final disposal of nuclear waste near Olkiluoto nuclear power stations. However, Posiva and FGI decided to continue measurements also at Kivetty and Romuvaara, because those form good reference networks for Olkiluoto studies. In both networks one measurement campaign a year will be done for reference studies. The observation dates in 2007 are shown in Table 3-3. The length of the observation sessions was 24 hours.

The observations were made using Ashtech Z-12 receivers equipped with Dorne Margolin-type choke ring antennas (Table 3-4). Same antennas were used as in previous campaigns.

**Table 3-3.** Observation sessions for the GPS measurements at Kivetty and Romuvaara in 2007.

Year	Network	Observation day		Observation windows (UT)
		Calendar day	GPS day	
2007	Romuvaara	12 Sept	255	11.00-24.00
		13 Sept	256	0.00-12.00
	Kivetty	16 Sept	259	8.00-24.00
		17 Sept	260	0.00-9.00

**Table 3-4.** The GPS equipments used at Kivetty and Romuvaara in 2007.

Station	Romuvaara		Kivetty	
	Receiver S/N	Antenna S/N	Receiver S/N	Antenna S/N
GPS1*	LP082832	11987	04108	11203
GPS2	LP00167U	11959	LP00184U	11963
GPS3	03175	11754	04293	11959
GPS4	04293	11770	03175	11988
GPS5	LP00184	11988	LP00164U	11772
GPS6	LP00164U	11963	LP00167U	11754
GPS7	04098	11772	04098	11770

\*Permanent station

## 4. DATA ANALYSIS OF THE LOCAL NETWORKS

### 4.1 GPS computation

The GPS computation has been made using Bernese software version 5.0 (Hugentobler *et al.* 2004). The observations were processed using the same principles as in the previous computations:

- Observations were processed using independent L1 and L2 observations, rather than any linear-combinations, in order to obtain lower measurement noises and smaller effects of multipath errors.
- The ionospheric refraction was modelled and L1 and L2 observations were corrected with the estimated ionospheric models in order to remove the absolute scale errors resulting from the ionospheric refraction.
- A global standard atmospheric model, which approximately represents the atmospheric conditions at the observation time, was used to correct the tropospheric refraction in order to remove the scale errors. Local tropospheric parameters were solved in the final solution in order to obtain an unbiased estimation of the height component.

The results of the GPS computation of campaigns in 2007 are given in Appendices I-III and VI-IX.

### 4.2 Change rates of the baselines

The local networks at each investigation area were measured several times since 1995: we have had 24 campaigns at Olkiluoto and 16 campaigns at Kivetty and Romuvaara. The time series enable to determine the change rates for the baselines. The change rates were computed as in previous campaigns (Ollikainen *et al.* 2004).

The accuracy of the GPS determinations depends on how well affecting in scale factors have been eliminated. In some cases the estimation of ionosphere model can be difficult, or even impossible. The errors in the ionosphere modelling affect to the resulting baseline lengths, like a scale error, which was explained in Ollikainen and Kakkuri, 1999. Because of a possible scale bias the observations were scaled with a scale factor, which is computed comparing the results to the mean of all observations. The determination of the scale factor was explained in detail in Ollikainen *et al.* 2004.

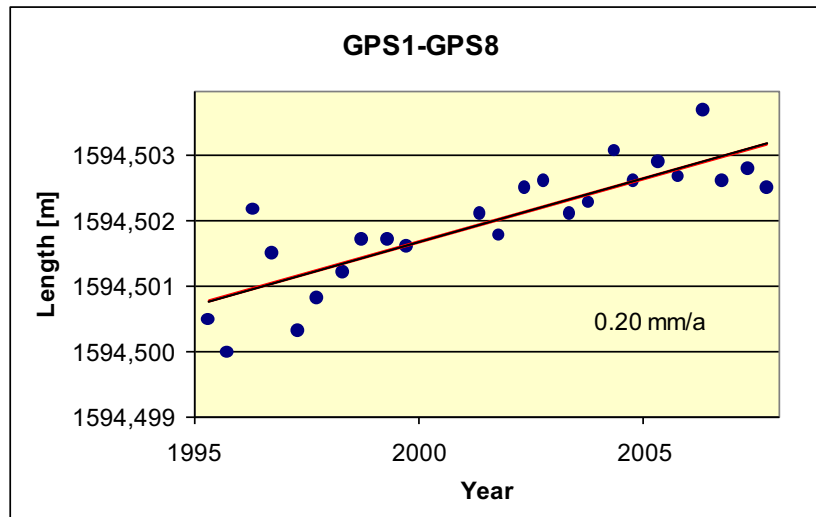
The results are given in Tables 4-1, 4-2, 4-3 and 4-4.

**Table 4-1.** Change rates of 36 baselines at Olkiluoto. The change rates and estimated errors are obtained from least squares solutions from the results of 24 measurements performed in 1995-2007. The change rates were computed using both unscaled and scaled vector lengths. Baselines with statistically significant change rates are highlighted.

Baseline	No scale correction				Scale correction added			
	Change rate (mm/a)	St. dev. (mm/a)	Length of the baseline at zero epoch (1995.0)	St. dev. (mm)	Change rate (mm/a)	St. dev. (mm/a)	Length of the baseline at zero epoch (1995.0)	St. dev. (mm)
<b>GPS1-GPS2</b>	<b>-0.17</b>	<b>±0.04</b>	1355862.91	±0.27	<b>-0.19</b>	<b>±0.03</b>	1355863.04	±0.23
GPS1-GPS3	-0.01	0.04	1006191.88	0.31	-0.02	0.04	1006191.98	0.28
<b>GPS1-GPS4</b>	<b>0.15</b>	<b>0.04</b>	643447.04	0.28	<b>0.14</b>	<b>0.04</b>	643447.09	0.30
GPS1-GPS5	0.01	0.05	1131621.35	0.37	-0.01	0.04	1131621.47	0.31
GPS1-GPS6	0.07	0.03	1264824.72	0.19	0.05	0.03	1264824.84	0.22
<b>GPS1-GPS7</b>	<b>0.10</b>	<b>0.02</b>	1482992.59	0.17	0.08	0.03	1482992.74	0.23
<b>GPS1-GPS8</b>	<b>0.20</b>	<b>0.03</b>	1594500.70	0.21	<b>0.17</b>	<b>0.03</b>	1594500.84	0.25
<b>GPS1-GPS9</b>	<b>0.11</b>	<b>0.02</b>	2343595.24	0.19	0.07	0.03	2343595.47	0.25
GPS2-GPS3	-0.07	0.05	1609847.64	0.38	-0.09	0.04	1609847.78	0.32
GPS2-GPS4	0.05	0.03	1856923.62	0.25	0.02	0.03	1856923.80	0.22
<b>GPS2-GPS5</b>	<b>-0.10</b>	<b>0.04</b>	1477355.67	0.32	<b>-0.12</b>	<b>0.03</b>	1477355.82	0.27
<b>GPS2-GPS6</b>	<b>-0.09</b>	<b>0.03</b>	2436724.43	0.21	<b>-0.13</b>	<b>0.03</b>	2436724.68	0.24
<b>GPS2-GPS7</b>	<b>-0.06</b>	<b>0.03</b>	2811673.60	0.21	<b>-0.11</b>	<b>0.03</b>	2811673.89	0.24
GPS2-GPS8	0.03	0.04	2949496.40	0.28	-0.02	0.03	2949496.68	0.26
<b>GPS2-GPS9</b>	<b>-0.05</b>	<b>0.04</b>	3649885.54	0.29	<b>-0.11</b>	<b>0.03</b>	3649885.89	0.25
<b>GPS3-GPS4</b>	<b>0.12</b>	<b>0.04</b>	756323.96	0.33	0.11	0.04	756324.04	0.31
GPS3-GPS5	0.02	0.07	2094204.06	0.56	-0.01	0.06	2094204.26	0.45
GPS3-GPS6	0.02	0.04	2126842.94	0.34	-0.01	0.04	2126843.17	0.28
GPS3-GPS7	-0.01	0.03	2073048.65	0.23	-0.04	0.03	2073048.85	0.22
<b>GPS3-GPS8</b>	<b>0.12</b>	<b>0.04</b>	1924578.58	0.31	0.10	0.04	1924578.78	0.30
GPS3-GPS9	0.00	0.03	2914435.26	0.26	-0.04	0.03	2914435.54	0.23
GPS4-GPS5	0.10	0.05	1734652.18	0.40	0.07	0.04	1734652.35	0.33
GPS4-GPS6	-0.05	0.03	1418664.29	0.24	-0.07	0.03	1418664.40	0.24
<b>GPS4-GPS7</b>	<b>-0.13</b>	<b>0.02</b>	1317485.72	0.18	<b>-0.15</b>	<b>0.03</b>	1317485.85	0.23
GPS4-GPS8	-0.02	0.03	1216240.05	0.25	-0.04	0.03	1216240.17	0.26
<b>GPS4-GPS9</b>	<b>-0.12</b>	<b>0.03</b>	2165877.28	0.23	<b>-0.16</b>	<b>0.04</b>	2165877.51	0.27
GPS5-GPS6	0.06	0.02	1284565.75	0.18	0.04	0.03	1284565.88	0.19
<b>GPS5-GPS7</b>	<b>0.13</b>	<b>0.04</b>	1894752.57	0.27	<b>0.10</b>	<b>0.03</b>	1894752.77	0.22
<b>GPS5-GPS8</b>	<b>0.15</b>	<b>0.04</b>	2256070.43	0.32	<b>0.11</b>	<b>0.03</b>	2256070.65	0.21
<b>GPS5-GPS9</b>	<b>0.13</b>	<b>0.04</b>	2571611.22	0.28	<b>0.09</b>	<b>0.02</b>	2571611.47	0.19
GPS6-GPS7	0.08	0.03	683009.66	0.24	0.07	0.03	683009.71	0.22
GPS6-GPS8	0.06	0.04	1157815.04	0.27	0.04	0.03	1157815.15	0.23
GPS6-GPS9	0.06	0.03	1290279.54	0.26	0.04	0.03	1290279.67	0.20
GPS7-GPS8	-0.07	0.03	511257.26	0.20	-0.07	0.03	511257.31	0.20
GPS7-GPS9	0.01	0.02	868575.45	0.16	0.00	0.02	868575.53	0.14
<b>GPS8-GPS9</b>	<b>-0.12</b>	<b>0.03</b>	1057915.44	0.23	<b>-0.13</b>	<b>0.03</b>	1057915.54	0.23
RMS:		±0.04		±0.28		±0.03		±0.26

One third of the baselines at Olkiluoto have statistically significant change rates at the confidence level of 95% (Table 4-1). However, all rates are smaller than  $\pm 0.20$  mm/a. The rates have diminished year after year when the time series has grown longer and the determination of the change rates has become more reliable. The scaled change rates indicate that the pillar GPS2 is moving, which is not clear according to the unscaled change rates. The most significant change rate is between the pillars GPS1 and GPS8 (Figure 4-1).

The results of measurement campaigns performed in 1995 and 1996 at Olkiluoto were not so reliable than later ones, because of poor satellite geometry and short observation times. During last campaigns we have observed at least 24 hours, but observation window was just few hours in 1995 and 1996. We computed new change rates without the first four campaigns. The results are given in Table 4-2. Comparison between the original and new change rates shows that time series is so long that few uncertain results have just a minimal effect on the change rates.



**Figure 4-1.** The most significant change rate ( $0.20$  mm/a  $\pm 0.03$  mm/a) at Olkiluoto is between the pillars GPS1 and GPS8.

**Table 4-2.** The change rates at Olkiluoto and estimated errors are obtained from least squares solutions from the results of 24 measurements performed in 1995-2007 and 20 measurements carried out in 1997-2007. First measurements campaigns (1995-1996) were not so reliable than later ones, because of poor satellite geometry and short observation times. However, differences between the change rates are just few tenth of millimetre per year. Baselines with statistically significant change rates are highlighted.

Baseline	Change rate 95-07 (mm/a)	St. dev. 95-07 (mm/a)	Change rate 97-07 (mm/a)	St. dev. 97-07 (mm/a)	Difference between change rates (mm/a)
<b>GPS1-GPS2</b>	<b>-0.17</b>	<b>±0.04</b>	<b>-0.12</b>	<b>0.04</b>	0.05
GPS1-GPS3	-0.01	0.04	0.00	0.05	0.01
<b>GPS1-GPS4</b>	<b>0.15</b>	<b>0.04</b>	0.12	0.05	0.03
GPS1-GPS5	0.01	0.05	0.04	0.05	0.03
GPS1-GPS6	0.07	0.03	0.03	0.02	0.04
<b>GPS1-GPS7</b>	<b>0.10</b>	<b>0.02</b>	<b>0.09</b>	<b>0.03</b>	0.01
<b>GPS1-GPS8</b>	<b>0.20</b>	<b>0.03</b>	<b>0.21</b>	<b>0.03</b>	0.01
<b>GPS1-GPS9</b>	<b>0.11</b>	<b>0.02</b>	<b>0.13</b>	<b>0.02</b>	0.02
GPS2-GPS3	-0.07	0.05	-0.05	0.06	0.02
GPS2-GPS4	0.05	0.03	0.05	0.05	0.00
GPS2-GPS5	-0.10	0.04	-0.06	0.05	0.04
<b>GPS2-GPS6</b>	<b>-0.09</b>	<b>0.03</b>	-0.08	0.04	0.01
GPS2-GPS7	-0.06	0.03	-0.03	0.04	0.03
GPS2-GPS8	0.03	0.04	0.09	0.05	0.06
GPS2-GPS9	-0.05	0.04	0.02	0.05	0.03
<b>GPS3-GPS4</b>	<b>0.12</b>	<b>0.04</b>	0.10	0.06	0.02
GPS3-GPS5	0.02	0.07	0.05	0.08	0.03
GPS3-GPS6	0.02	0.04	0.00	0.06	0.02
GPS3-GPS7	-0.01	0.03	0.00	0.04	0.01
<b>GPS3-GPS8</b>	<b>0.12</b>	<b>0.04</b>	<b>0.16</b>	<b>0.05</b>	0.04
GPS3-GPS9	0.00	0.03	0.03	0.04	0.03
GPS4-GPS5	0.10	0.05	0.10	0.07	0.00
GPS4-GPS6	-0.05	0.03	-0.06	0.04	0.01
<b>GPS4-GPS7</b>	<b>-0.13</b>	<b>0.02</b>	<b>-0.11</b>	<b>0.03</b>	0.02
GPS4-GPS8	-0.02	0.03	0.04	0.04	0.02
<b>GPS4-GPS9</b>	<b>-0.12</b>	<b>0.03</b>	-0.07	0.03	0.05
GPS5-GPS6	0.06	0.02	0.06	0.03	0.00
<b>GPS5-GPS7</b>	<b>0.13</b>	<b>0.04</b>	<b>0.14</b>	<b>0.04</b>	0.01
<b>GPS5-GPS8</b>	<b>0.15</b>	<b>0.04</b>	<b>0.19</b>	<b>0.05</b>	0.04
<b>GPS5-GPS9</b>	<b>0.13</b>	<b>0.04</b>	<b>0.17</b>	<b>0.04</b>	0.04
GPS6-GPS7	0.08	0.03	0.09	0.04	0.01
GPS6-GPS8	0.06	0.04	0.07	0.05	0.01
<b>GPS6-GPS9</b>	0.06	0.03	<b>0.12</b>	<b>0.04</b>	0.06
GPS7-GPS8	-0.07	0.03	-0.06	0.03	0.01
GPS7-GPS9	0.01	0.02	0.04	0.02	0.03
<b>GPS8-GPS9</b>	<b>-0.12</b>	<b>0.03</b>	<b>-0.13</b>	<b>0.04</b>	0.01
RMS:		±0.04		±0.04	

**Table 4-3.** Change rates of 21 baselines for the local GPS network at Kivetty. The change rates and estimated errors are obtained from least squares solutions of 16 measurements performed in 1996-2007. The change rates were computed using both unscaled and scaled vector lengths. Baselines with statistically significant change rates are highlighted.

Baseline	No scale correction				Scale correction added			
	Change rate (mm/a)	St. dev. (mm/a)	Length of the baseline at zero epoch (1996.0)	St. dev. (mm)	Change rate (mm/a)	St. dev. (mm/a)	Length of the baseline at zero epoch (1996.0)	St. dev. (mm)
GPS1-GPS2	-0.01	±0.05	659084.27	±0.29	-0.03	±0.04	659084.35	±0.28
GPS1-GPS3	-0.05	0.03	1613486.16	0.22	-0.09	0.03	1613486.38	0.19
GPS1-GPS4	0.06	0.04	1591096.23	0.25	0.02	0.03	1591096.45	0.21
GPS1-GPS5	0.00	0.04	672046.67	0.24	-0.02	0.04	672046.75	0.24
<b>GPS1-GPS6</b>	<b>0.19</b>	<b>0.03</b>	1180587.97	0.19	<b>0.15</b>	<b>0.04</b>	1180588.14	0.22
GPS1-GPS7	-0.03	0.05	735563.59	0.31	-0.05	0.04	735563.69	0.26
GPS2-GPS3	-0.03	0.04	955938.61	0.28	-0.06	0.04	955938.75	0.28
GPS2-GPS4	0.07	0.05	1198883.99	0.33	0.04	0.05	1198884.15	0.31
GPS2-GPS5	-0.08	0.05	1167284.16	0.30	-0.11	0.04	1167284.32	0.27
GPS2-GPS6	0.11	0.05	1829810.53	0.31	0.06	0.05	1829810.78	0.30
GPS2-GPS7	0.05	0.04	901317.59	0.26	0.03	0.03	901317.72	0.21
GPS3-GPS4	0.17	0.08	1102331.38	0.50	0.15	0.07	1102331.50	0.46
<b>GPS3-GPS5</b>	<b>-0.08</b>	<b>0.05</b>	2031115.38	<b>0.32</b>	<b>-0.12</b>	<b>0.04</b>	2031115.63	0.25
GPS3-GPS6	0.08	0.04	2770064.65	0.28	0.01	0.04	2770065.02	0.27
GPS3-GPS7	0.01	0.05	1693397.80	0.28	-0.03	0.04	1693398.01	0.24
<b>GPS4-GPS5</b>	<b>-0.07</b>	<b>0.03</b>	1608741.91	<b>0.21</b>	<b>-0.11</b>	<b>0.03</b>	1608742.13	0.18
GPS4-GPS6	0.01	0.04	2462388.51	0.25	-0.05	0.05	2462388.82	0.30
GPS4-GPS7	0.11	0.07	2089326.18	0.42	0.06	0.05	2089326.45	0.30
<b>GPS5-GPS6</b>	<b>0.11</b>	<b>0.03</b>	854744.95	0.20	0.09	0.04	854745.07	0.24
GPS5-GPS7	-0.06	0.05	1379384.80	0.34	-0.09	0.04	1379384.97	0.25
GPS6-GPS7	0.12	0.05	1604962.50	0.30	0.08	0.04	1604962.72	0.23
RMS:		±0.05		±0.30		±0.04		±0.27

The GPS network at Kivetty is quite stable. There are just a few baselines, which have statistically significant change rate. The pillar GPS6 is moving according to the unscaled change rates, and scaled results indicates that the pillar GPS5 has statistically significant change rate. However, all movements are smaller than 0.19 mm/a (Table 4-3).

The investigation area at Romuvaara is also quite stable. There are only three baselines with statistically significant change rates (Table 4-4). Two of these vectors are connected to the pillar GPS4. According to the results the pillar GPS4 is moving to the east. A probable explanation for the movement is the instability of pillar GPS4. We will measure the distances and angles between the pillar and control markers during the next years to ensure the reason of the movement.

**Table 4-4.** Change rates of 21 baselines for the local GPS network at Romuvaara. The change rates and the estimated errors are obtained from least squares solutions of 16 measurements performed in 1996-2007. The change rates were computed using both unscaled and scaled vector lengths. Baselines with statistically significant change rates are highlighted.

Baseline	No scale correction				Scale correction added			
	Change rate (mm/a)	St. dev. (mm/a)	Length of the baseline at zero epoch (1996.0)	St. dev. (mm)	Change Rate (mm/a)	St. dev. (mm/a)	Length of the baseline at zero epoch (1996.0)	St. dev. (mm)
GPS1-GPS2	-0.05	±0.08	1176417.84	±0.51	-0.07	±0.04	1176417.95	±0.26
GPS1-GPS3	-0.08	0.05	541205.31	0.29	-0.09	0.04	541205.36	0.24
GPS1-GPS4	0.18	0.07	731896.07	0.46	0.17	0.06	731896.12	0.37
GPS1-GPS5	0.01	0.03	614734.37	0.16	0.00	0.04	614734.45	0.23
GPS1-GPS6	-0.05	0.05	678196.48	0.32	-0.06	0.04	678196.54	0.23
GPS1-GPS7	0.00	0.05	1222388.71	0.33	-0.02	0.03	1222388.83	0.18
GPS2-GPS3	0.06	0.05	783976.14	0.32	0.04	0.04	783976.22	0.25
GPS2-GPS4	0.02	0.08	692374.89	0.51	0.01	0.05	692374.94	0.34
GPS2-GPS5	0.05	0.07	1397223.36	0.42	0.02	0.03	1397223.49	0.21
GPS2-GPS6	-0.11	0.12	1686682.12	0.77	-0.14	0.05	1686682.28	0.33
GPS2-GPS7	-0.09	0.13	1940414.40	0.84	-0.12	0.05	1940414.60	0.32
<b>GPS3-GPS4</b>	<b>0.26</b>	<b>0.08</b>	717506.57	0.52	<b>0.24</b>	<b>0.07</b>	717506.63	0.44
GPS3-GPS5	0.00	0.04	616536.12	0.26	-0.01	0.03	616536.18	0.22
<b>GPS3-GPS6</b>	<b>-0.14</b>	0.08	1204805.44	0.48	<b>-0.17</b>	<b>0.04</b>	1204805.55	0.24
GPS3-GPS7	-0.08	0.08	1679302.42	0.51	-0.12	0.03	1679302.58	0.20
<b>GPS4-GPS5</b>	<b>0.29</b>	<b>0.08</b>	1225010.81	0.53	<b>0.27</b>	<b>0.07</b>	1225010.93	0.43
GPS4-GPS6	-0.02	0.07	1045309.68	0.44	-0.04	0.03	1045309.78	0.22
GPS4-GPS7	-0.11	0.07	1248362.98	0.46	-0.13	0.05	1248363.10	0.29
GPS5-GPS6	-0.08	0.04	1188022.49	0.28	-0.10	0.04	1188022.61	0.27
GPS5-GPS7	-0.02	0.05	1795940.02	0.31	-0.06	0.05	1795940.18	0.33
GPS6-GPS7	0.05	0.03	636487.70	0.19	0.04	0.03	636487.75	0.20
RMS:		±0.07		±0.46		±0.05		±0.28

### 4.3 Change rates of the baselines from the pillar GPS13 at Oikiluoto

The pillar GPS13 (earlier GPS10B) was established at in 2003 (Ollikainen *et al.* 2004). We have observed it twice a year during sessions I and II since autumn 2003 (Tables 3-1 and 3-2) and have made the computation together with other pillars (GPS1-GPS9). However, seven measurements are not enough for reliable deformation studies. That is why we have studied the baselines from the pillar GPS13 separately.

The determination of the change rates has been made using same principles as in the previous chapter, but it is not possible to determine scale corrections using only seven observations. The results are given in the Table 4-5. The most of the standard deviations are higher than the change rates.



**Table 4-5.** Change rates of 9 baselines from the pillar GPS13 at Olkiluoto. The change rates and the estimated errors are obtained from least squares solutions of 9 measurements performed in 2003-2007.

Baseline	No scale correction			
	Change rate (mm/a)	St. dev. (mm/a)	Length of the baseline at zero epoch (2003.0)	St. dev. (mm)
GPS1-GPS13	0.03	±0.04	2407027.78	±0.12
GPS2-GPS13	0.06	0.17	3597907.81	0.44
GPS3-GPS13	0.10	0.16	3159423.37	0.43
GPS4-GPS13	-0.06	0.03	2406325.54	0.08
GPS5-GPS13	0.00	0.09	2326729.57	0.25
GPS6-GPS13	0.04	0.09	1166023.98	0.24
GPS7-GPS13	0.13	0.09	1126412.85	0.23
GPS8-GPS13	-0.01	0.14	1520688.93	0.36
GPS9-GPS13	0.09	0.05	665040.41	0.14
RMS:		±0.11		±0.28

#### 4.4 Horizontal velocities of the GPS stations at Olkiluoto

The analysis of the change rates is based on the vectors lengths, which have been computed using 3-dimensional coordinates of each measurement campaigns. The change rates represent only deformations between pillar pairs. If we want to know how the different GPS stations are moving relative to each other, we have to study the plane coordinates of the campaigns and confirm that all coordinates are located in a common coordinate system.

At first we selected the coordinates of the stations obtained in autumn 2007 as a reference session. All other coordinate sets were transformed to this session using 7-parameter *Helmert* transformation. The transformation parameters of the coordinate differences of the origins and the rotation angles around the coordinate axes were solved by the least squares method from the coordinates obtained in different sessions. The scale factor was not solved. This means that the results represent the same situation as the change rates in Table 4-1, which were obtained with unscaled observations.

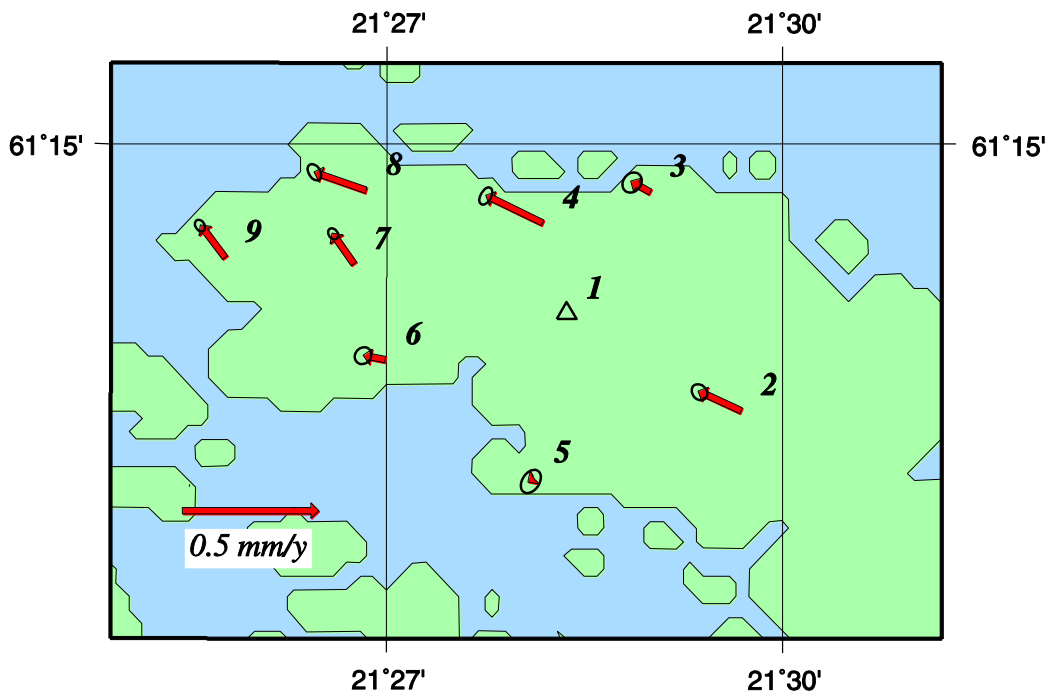
Because the horizontal movements are the main interest, the 3-dimensional Cartesian coordinates in common coordinate system were transformed into ellipsoidal coordinates, which were projected to plane coordinates using Gauss-Krüger projection. The conversion from ellipsoidal coordinates to plane coordinates was done using the GRS80 ellipsoidal parameters. In order to minimize the projection errors the 21° central meridian was used in the projections.

The components of the station velocities according to the permanent station (GPS1) were computed by linear regression from the plane coordinates obtained from the different sessions. The linear regressions were made separately for the N- and E-coordinates of the pillars. The results are given in Table 4-6 and illustrated in Figure 4-2.

According to deformation analysis there are five stations, which have statistically significant velocities at Olkiluoto. The pillars GPS2, GPS4 and GPS8 are mainly moving to the west with respect to the permanent GPS station (GPS1). The pillar GPS7 and GPS9 have the velocity to the north-west. The local velocity components are small but taking into account the standard deviations, the largest velocity components seems to be reliable (max. velocity  $-0.21 \text{ mm/a} \pm 0.02 \text{ mm/a}$ ).

**Table 4-6.** The horizontal velocities of the GPS stations in mm/a with respect to the permanent GPS station (GPS1) at Olkiluoto. The velocities and the estimated errors are obtained from least squares solutions of 24 measurements performed in 1995-2007. The stations with statistically significant velocities are highlighted.

Station	North component		East component	
	Velocity [mm/a]	St.dev. [mm/a]	Velocity [mm/a]	St.dev. [mm/a]
GPS1	0.000	0.000	0.000	0.000
<b>GPS2</b>	0.073	0.027	<b>-0.159</b>	<b>0.033</b>
GPS3	0.040	0.040	-0.071	0.032
<b>GPS4</b>	0.102	0.036	<b>-0.210</b>	<b>0.020</b>
GPS5	-0.014	0.048	-0.021	0.032
GPS6	0.015	0.033	-0.080	0.029
<b>GPS7</b>	<b>0.113</b>	<b>0.017</b>	<b>-0.079</b>	<b>0.023</b>
<b>GPS8</b>	<b>0.067</b>	<b>0.021</b>	<b>-0.191</b>	<b>0.033</b>
<b>GPS9</b>	<b>0.120</b>	<b>0.017</b>	<b>-0.091</b>	<b>0.024</b>
RMS:		$\pm 0.030$		$\pm 0.027$



**Figure 4-2.** The horizontal velocities of the GPS stations at Olkiluoto relative to the permanent GPS station (1).

#### 4.5 Computation and results of the new stations at Olkiluoto

The pillars GPS11 at Kuivalahti and GPS12 at Iso Pyrekari were established at in 2003 (Ollikainen *et al.* 2004) and the pillars GPS14 at Hankkila and GPS15 at Taipalmaa were established in 2005 (Figure 3-1). The stations GPS11 and GPS12 were measured twice a year since autumn 2003. However, the stations GPS14 and GPS15 have just been observed in 2006 and 2007. The station GPS12 has been observed just once in 2005 and 2006, because it was impossible to reach Iso Pyrekari by boat during bad ice conditions.

Previously the measurements have been computed using the same principles as in the computation of the original network (Ahola *et al.* 2005). We decided to change a computation strategy and compute all measurement again, because we have also other deformation measurements at Satakunta (Ahola and Poutanen 2006). We will combine the observations at the same pillars in both campaigns, what is why we have to use the same computation strategy.

The observations have been processed using Bernese software version 5.0. The main difference between earlier computations and a new strategy is the ionosphere modelling. The new computation has been made without ionosphere models. The ambiguities have been solved baseline by baseline using QIF method. Previously resolved ambiguities are introduced to the final solution using ionosphere free L3 linear combination.

The results of the measurement in 2007 are given in Appendixes IV-V.

The pillar GPS11 has been measured nine times, while the pillar GPS12 only seven times (not in spring 2005 and 2006). The lengths of the observed vectors are between 4.8 and 11.6 km. The time series is still too short for reliable deformation studies. However, the change rates of the vectors are given in Table 4-7. The standard deviations are almost same size as the change rates.

The pillars GPS14 and GPS15 have been measured just four times, which is not enough to make any deformation analysis. The observed distances between the new stations and the permanent GPS station in 2006 and 2007 are given in Table 4-8.

**Table 4-7.** Change rates of the baselines from the pillars GPS11 and GPS12 at Olkiluoto. The change rates and the estimated errors are obtained from least squares solutions of only 9 or 7 (GPS12) measurements performed in 2003-2007.

Baseline	No scale correction			
	Change rate (mm/a)	St. dev. (mm/a)	Length of the baseline at zero epoch 2003.0 (mm)	St. dev. (mm)
GPS1-GPS11	-0.57	0.38	8478268.39	±1.00
GPS1-GPS12	-0.13	0.11	4817826.18	0.29
GPS11-GPS12	-0.42	0.39	11574238.99	1.07
RMS:		±0.32		±0.86

**Table 4-8.** *The observed distances between the new stations and permanent GPS station in 2006 and 2007.*

Baseline	Length of the baseline 1/2006 (mm)	Length of the baseline 2/2006 (mm)	Length of the baseline 1/2007 (mm)	Length of the baseline 2/2007 (mm)
GPS1-GPS11	8478263.4	8478266.6	8478266.6	8478267.3
GPS1-GPS12	-	4817825.7	4817826.1	4817825.6
GPS1-GPS14	7852377.7	7852377.9	7852375.3	7852375.8
GPS1-GPS15	5704060.8	5704060.9	5704054.6	5704054.9
GPS11-GPS12	-	11574239.0	11574237.7	11574237.3
GPS11-GPS14	6005975.3	6005975.3	6005973.0	6005973.8
GPS11-GPS15	9358363.3	9358365.7	9358363.2	9358363.4
GPS12-GPS14	-	12512520.9	12512518.0	12512518.1
GPS12-GPS15	-	10387700.4	10387694.9	10387695.0
GPS14-GPS15	4762657.3	4762658.3	4762658.8	4762658.3

## 5. EDM BASELINE AT OLKILUOTO

### 5.1 Background

We have noticed that GPS solutions may be significantly biased by scale errors (Ollikainen and Kakkuri, 1999). This systematic scale error is mainly caused by errors in ionosphere modelling. The scale error has varied from -0.7 to +0.8 ppm at Olkiluoto (Appendix Ia). However in 2002 measurements at Romuvaara it was as large as +2.1 ppm (Appendix VIIa).

The FGI and Posiva have established a baseline for electronic distance measurements (EDM), because of this scaling problem of GPS observations. The baseline was established between pillars GPS7 and GPS8 in 2002.

Accuracy of high precision EDM is about  $\pm(0.2 \text{ mm} + 0.2 \text{ ppm})$  ( $1\sigma$ ). The estimated accuracy for GPS is about  $\pm 0.8 \text{ mm}$  ( $1\sigma$ ) obtained at the micronetworks of Posiva (Appendix Ia). According to these figures EDM is more accurate than GPS when the baselines are as short as at Olkiluoto. We measure the EDM baseline simultaneously with the GPS measurement. The scale factor problem is expected to be solved by deriving the uniform scale for the GPS observations using the EDM results.

### 5.2 Electronic distance measurements

A Kern ME5000 mekometer is the most accurate EDM instrument, which is suitable for fieldwork. The mekometer of the Department of Surveying, Helsinki University of Technology was used in the baseline measurements. We have calibrated the mekometer at the Nummela Standard Baseline at least once a year and the results are given in Certificates of Calibration of the National Standards Laboratory of the Finnish Geodetic Institute (Table 5-1).

*Table 5-1. Mekometer calibrations at Nummela Standard Baseline in 2007.*

Year	Date	Certificate of Calibration
2007	May 8-11	7 / 2007
	July 25-30 and August 20-23	22 / 2007

The EDM baseline at Olkiluoto has been measured twice a year during the both GPS measurement campaigns since 2002 except in spring 2006, when it was impossible to perform EDM measurements. A soil depot near the station GPS7 blocked visibility between the observation pillars, but the soil was moved before the next measurements campaign. The measurements in 2007 were performed on April 11-12 and September 28-29. We observed three times ten single distances from both observation pillars during the campaigns as in the previous years (Figure 5-1).

The weather observations were made with calibrated instruments at the mekometer site and at the reflector site. Dry and wet temperatures have been observed with psychrometers and air pressure with aneroids (Table 5-2).



**Figure 5-1.** The mekometer Kern ME5000 at the pillar GPS7 during baseline observation on September 2007. (Photograph J. Puupponen 2007.)

**Table 5-2.** The equipments at the mekometer and at the reflector sites.

	Equipment at the mekometer site	Equipment at the reflector site
Kern Mekometer ME5000	S/N 357094	-
Kern prism reflector	-	S/N 374414
Thies Clima psychrometer	S/N 6530 / 6540	S/N 6544 / 6527
Thommen Hoehenmesser aneroid	S/N 164610 / 126533	S/N 126533 / 120413

### 5.3 Computation

The results of mekometer measurements depend on weather conditions. Therefore, a computation strategy is to compute first velocity corrections according to weather conditions for observed distances. The result is a mean of corrected distances with standard error. The computation and used formulas were given in Ollikainen *et al.* 2004.

## 5.4 Results

The results of electronic distance measurements at the baseline GPS7-GPS8 are the means of observed distances after the first velocity corrections. These values with standard errors ( $1\sigma$ ) are given in the Table 5-3. In addition to the standard deviation, the standard uncertainty includes errors of centring and adjusting of the instruments ( $\pm 0.1$  mm), the calibration of the instruments ( $\pm 0.1$  mm) and determination of the refraction correction ( $\pm 0.1$  mm).

**Table 5-3.** The space distances between the pillars GPS7-GPS8 measured by the GPS and the Kern Mekometer ME5000. The mean of the GPS observations includes 22 measurement campaigns since 1995.

Measurement	Distance (mm)	Standard deviation (mm)	Total standard uncertainty (mm)	Certificate of Calibration
Mean of GPS obs.	511256.9	$\pm 0.5$	-	-
Apr 28 2002	511256.4	$\pm 0.3$	$\pm 0.3$	5 / 2002
Oct 12-13 2002	511255.7	$\pm 0.1$	$\pm 0.2$	9 / 2002
Apr 26-27 2003	511256.1	$\pm 0.1$	$\pm 0.2$	5 / 2003
Oct 11-12 2003	511256.6	$\pm 0.1$	$\pm 0.2$	19 / 2003
Apr 4-5 2004	511256.5	$\pm 0.1$	$\pm 0.3$	19 / 2004
Oct 9-10 2004	511255.9	$\pm 0.1$	$\pm 0.2$	20 / 2004
Apr 10-11 2005	511256.1	$\pm 0.3$	$\pm 0.3$	20 / 2005
Oct 5-6 2005	511256.1	$\pm 0.2$	$\pm 0.3$	32 / 2005
Oct 15-16 2006	511255.5	$\pm 0.2$	$\pm 0.3$	16 / 2006
May 11-12 2007	511255.9	$\pm 0.3$	$\pm 0.3$	8 / 2007
Sept 28-29 2007	511255.9	$\pm 0.3$	$\pm 0.3$	28 / 2007

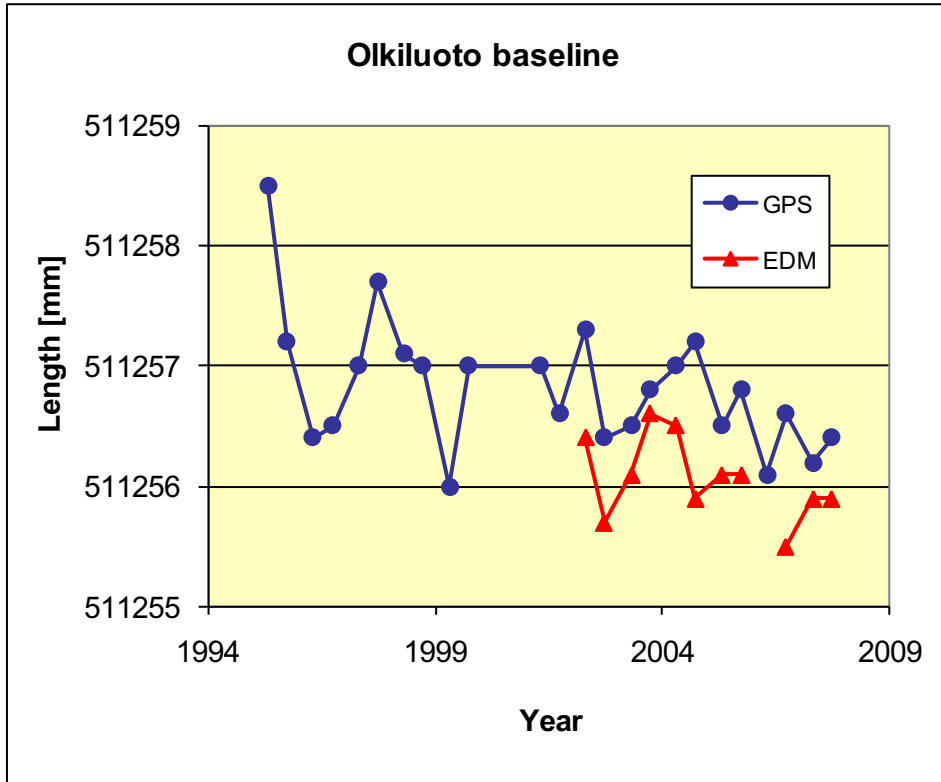
The electronic distance measurements are traceable to the definition of the metre through the Nummela Standard Baseline, which has been measured with the Väisälä light interference method. The latest interference measurements were performed in 2005 and 2007 (Jokela and Häkli, 2006). Latest mekometer calibrations in Nummela have been performed in 2007. Procedures meet the requirements of the standards ISO 9001 and ISO 17025. The results are given also in Certificates of Calibration of the National Standards Laboratory of the Finnish Geodetic Institute. Since 2003 the results are given with extended uncertainty ( $2\text{-}\sigma$ ), which is two times total standard uncertainty.

The comparison of the EDM and GPS results is given in Figure 5-2. Each EDM distance is shorter than the GPS result from same campaign. According to the five years period GPS gives on an average 0.64 mm longer distances between pillars GPS7 and GPS8 than EDM. That is over 1 ppm scale difference.

The scale difference between GPS and Mekometer measurements is obvious, but we do not yet know, what is the reason for this behaviour. At first we thought that the different phase centre offsets of the GPS antennas can be an explanation. In fact that is why we use the same antennas at the pillars in every GPS campaign. We tested the effect of the phase centre offsets to the GPS results in autumn 2005. However, we have shown in Ahola *et al.* 2006, that the reason of the scale difference must be elsewhere.

According to eleven measurements the shapes of the time series, which are computed with different methods, are quite similar. This is very interesting, because it should

mean that the obtained deformation is real, even if the distance changes back and forth. However, it is too early to make any specific conclusion. We need more studies and observations at the baseline and it is obvious that we will continue the electronic distance measurements simultaneously with GPS measurements.



*Figure 5-2. The GPS and the EDM results from the baseline GPS7-GPS8.*



## 6. CONTROL MARKERS

### 6.1 Control markers at Olkiluoto

Each GPS pillar has two control markers. The benchmarks are founded in solid bedrock near the station. Because the benchmarks are used to determine the possible horizontal displacements of the pillars, the ideal location is such that the lines between the concrete pillar and the markers intersect in 90 degrees angle. The distances between pillars and control markers are from 4.5 m to 12.5 m.

The Olkiluoto GPS network was extended in 2003, when three new GPS pillars were built. In autumn 2004 we established control markers for pillars GPS11 and GPS13 (Ahola *et al.* 2005).

We established and measured the control markers for the pillar GPS12 at Iso Pyrekari in 2005. The height of the pillar is only 0.5 m and because of that, it should be very stable. However, we founded two benchmarks in solid bedrock near the pillar, because pack ice can cause damage for the concrete pillar during hard winter.

Control markers for pillars GPS14 and GPS15 have been established during GeoSatakunta measurement campaign in 2006.

The distances and angles between pillars and control markers at Olkiluoto were observed earlier in 2001 and 2004 (Ahola *et al.* 2005). We made a new observation campaign on July 3-10, 2007 at Olkiluoto (Figure 6-1). The distances were measured using the Distomat Wild DI2002 EDM instrument, S/N 180206. The horizontal and vertical angles were observed with the theodolite Theomat Wild T2002, S/N 346317.

We didn't measure the pillar GPS4, because the other control marker has been damaged. It was impossible to make observations at the pillar GPS14 also, because is situated under a high voltage electric line, which has damaged our instruments earlier.

The horizontal angles, distances and high differences between the control markers measured in 2001, 2004 and 2007 are given in Appendix X. The small differences between the campaigns prove that the concrete pillars have been stable during the measurement period.

We will continue the measurements at the reserve markers in three years intervals. The next measurement will be carried out at Olkiluoto in 2010.

### 6.2 Control measurements of the pillar GPS4 at Romuvaara

According to deformation results the pillar GPS4 is moving to the east at Romuvaara (Table 4-3). A probable explanation for the movement is the instability of pillar GPS4.

We have measured the distances and angles between the pillar and control markers to ensure the reason of the movement. The observations have been made during the GPS campaigns in 2005, 2006 and 2007.

The angles, distances and height differences in the triangle between the pillar GPS4 and the two control benchmarks (A and B) are presented in Table 6-1. The distances between the concrete pillar and control markers were measured using the Distomat Wild DI2002 EDM instrument, S/N 180206 and the horizontal and vertical angles were observed with the theodolite Theomat Wild T2002, S/N 346317 in 2005 and 2006. The observations were measured using Leica TC2003 tacheometer, S/N 439351 in 2007. The both instruments should have same accuracy, but the observations in 2007 have larger deviation than in earlier campaigns.

The standard errors of unit weight (observed horizontal angle) from least-squares adjustments of six observation sets were 1.6 mgon in 2005 and 1.3 mgon in 2006, but even 7.6 mgon in 2007. The standard uncertainty of 3D-position in the local topocentric system is about 0.3–0.4 mm in 2005 and 2006, but 0.8-1.5 mm in 2007. However, all results are pretty close each other. Only high differences from control markers to GPS pillar are larger in 2007 than in earlier campaigns.

From the three measurements we cannot yet make conclusions of possible movements. We will measure the distances and angles between the pillar and control markers during the next years to ensure the reason of the movement.

**Table 6-1.** *The horizontal angles and distances and height differences from tacheometer measurement between the control markers (A,B) and the pillar GPS4 at Romuvaara.*

	September 14, 2005	September 21, 2006	September 14, 2007
Horizontal angle GPS4–A–B	31.1078 gon	31.1092 gon	31.1103 gon
Horizontal angle A–B–GPS4	70.7799 gon	70.7711 gon	70.7723 gon
Horizontal angle B–GPS4–A	98.1123 gon	98.1197 gon	98.1174 gon
Horizontal distance A–B	10.8597 m	10.8605 m	10.8608 m
Horizontal distance A–GPS	9.7400 m	9.7401 m	9.7404 m
Horizontal distance B–GPS	5.1001 m	5.1007 m	5.1009 m
Height difference from A to B	–0.0139 m	–0.0148 m	–0.0142 m
Height difference from A to GPS	+2.6659 m	+2.6652 m	+2.6685 m
Height difference from B to GPS	+2.6798 m	+2.6801 m	+2.2627 m



**Figure 6-1.** *The distances between pillars and control markers were measured using the Distomat Wild DI2002 EDM instrument. The horizontal and vertical angles were observed with the theodolite Theomat Wild T2002. (Photograph T. Ahola 2007.)*



## 7. FUTURE PLANS

According to our quality manual (Ahola 2008) and the consultations between Posiva and the FGI we will continue geodetic observations at Olkiluoto, Kivetty and Romuvaara annually. The studies of each year will be reported in Posiva working report series.

The permanent GPS stations continue observations at the investigation areas. The Olkiluoto local GPS network will be measured twice a year. Even if the studies are concentrated at Olkiluoto, one measurement campaign will be carried out at Kivetty and Romuvaara annually. The observations at Kivetty and Romuvaara are important reference investigations for the studies at Olkiluoto.

The EDM baseline GPS7-GPS8 at Olkiluoto will be measured with the mekometer during every GPS campaign to improve the reliability of the GPS results. The mekometer will be calibrated at the Nummela Standard Baseline at least once a year to ensure the quality of the results.

Every GPS station has two control markers. We will determine the distances and the angles between the stations and the control markers in order to check the stability of the concrete pillars at Olkiluoto in three years interval. Next measurements will be carried out in 2010.

The heights of Olkiluoto GPS network have been measured with precise levelling in 2003, 2005 and 2007 (Lehmuskoski 2004, 2006 and 2008). The levelling is the most accurate method to observe the possible vertical deformations at the investigation area. The levelling campaigns will be performed every second year and results will be published in a separate working report of Posiva. We established two levelling networks at Olkiluoto in 2006 for specific deformation studies. The networks are located above the excavation area of the ONKALO and the repository for low- and medium-level waste (the VLJ repository). We will observe these micronetworks annually.

We have planned to establish new GPS pillars and levelling benchmarks around an area between Olkiluoto island and mainland in 2008.



## 8. SUMMARY

24 GPS observation campaigns have been carried out at Olkiluoto since 1995 and 16 campaigns at Kivetty and Romuvaara since 1996. Two measurements were performed at Olkiluoto in 2007. The networks of Kivetty and Romuvaara were observed once during 2007.

The computation was made with Bernese version 5.0. According to the GPS deformation analysis one third of the baselines at Olkiluoto have statistically significant change rates at the confidence level of 95%. However, all of these change rates are smaller than  $\pm 0.20$  mm/a. The change rates have diminished year after year when the time series has grown longer and the determination of the change rates has become more reliable.

There are five stations at Olkiluoto, which have statistically significant horizontal velocities. The local velocity components are small, but taking into account the standard deviations, the largest velocity components seem to be reliable (max. velocity  $-0.21$  mm/a  $\pm 0.02$  mm/a).

The GPS networks at Kivetty and Romuvaara are quite stable. At Romuvaara the station GPS4 is moving to the east. A probable explanation for the movement is the instability of the pillar GPS4. We have measured the angles and distances between the pillar and the control markers to ensure the reason of the movement, but from the two measurements we cannot yet make conclusions of possible movements.

Electronic distance measurements were performed at Olkiluoto at the baseline GPS7-GPS8 using the mekometer since 2002. The measurements have been made simultaneously with GPS campaigns to improve the reliability of the GPS results. According to five years period GPS gives us on an average 0.64 mm longer distances between pillars GPS7 and GPS8 than EDM. That is over 1 ppm scale difference. The similarity of the GPS and EDM time series is very interesting, but it is too early to make specific conclusion. The results are promising, but more studies are needed before we can use the EDM results to scale the GPS observations.





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**APPENDICES**

**Appendix Ia. Results of 24 measurements at Olkiluoto. Deviations of the vector lengths from their mean in millimeters. Unscaled observations.**

Vector	Mean length [mm]	Time [a]																								RMS
		95.3	95.8	96.3	96.8	97.3	97.8	98.3	98.8	99.3	99.8	1.3	1.8	2.3	2.8	3.3	3.8	4.3	4.8	5.3	5.8	6.3	6.8	7.3	7.8	
GPS1-GPS2	1355861.8	2.0	2.1	0.1	0.9	0.2	0.6	-0.3	1.1	-0.3	0.3	-0.9	-0.3	0.8	-0.1	-1.1	-0.2	-1.1	0.1	-1.3	-0.3	-1.3	0.1	-1.3	-0.7	±0.9
GPS1-GPS3	1006191.8	-0.6	1.7	-0.1	-0.5	-0.5	-0.4	0.6	-0.3	-0.3	0.3	0.5	1.3	0.8	-1.9	-0.2	0.4	-0.4	0.9	-0.6	-0.3	-0.6	0.4	0.3	-0.2	0.7
GPS1-GPS4	643448.0	-1.6	-1.9	-0.2	-0.3	-0.5	-0.3	0.3	-1.4	-1.1	-0.1	0.3	0.1	-0.1	2.2	0.7	0.6	0.8	-0.2	0.4	0.2	1.0	-0.2	0.9	0.4	0.9
GPS1-GPS5	1131621.4	-1.3	2.2	-0.6	0.4	0.2	0.1	-1.2	0.1	-1.2	0.5	-0.2	1.3	-0.8	-0.3	0.1	0.4	-0.4	1.4	-0.9	1.3	-0.7	0.3	-0.7	0.5	0.9
GPS1-GPS6	1264825.2	-1.8	-1.0	0.2	0.3	-0.1	-0.6	-0.5	0.3	0.5	-0.4	0.4	0.3	0.7	-0.3	0.5	0.3	0.6	0.3	0.2	0.2	0.4	-0.4	0.3	0.1	0.5
GPS1-GPS7	1482993.3	-1.1	-1.2	-0.2	-0.2	0.5	-0.2	-0.7	-0.6	0.1	-0.8	0.1	-0.4	0.2	0.1	0.1	-0.1	0.9	0.3	0.8	0.3	1.2	0.1	0.8	0.2	0.6
GPS1-GPS8	1594502.0	-1.5	-2.0	0.2	-0.5	-1.7	-1.2	-0.8	-0.3	-0.3	-0.4	0.1	-0.2	0.5	0.6	0.1	0.3	1.1	0.6	0.9	0.7	1.7	0.6	0.8	0.5	0.9
GPS1-GPS9	2343596.0	-1.4	-0.9	0.8	-0.3	-0.2	-0.2	-0.7	-0.6	-0.3	-0.5	-0.4	-0.7	0.0	-0.1	-0.2	0.1	0.4	0.5	0.2	0.6	1.4	0.4	0.4	0.7	0.6
GPS2-GPS3	1609847.2	-0.1	2.7	-0.3	-0.3	-0.3	-0.3	1.4	0.2	-1.0	-0.7	0.1	0.4	0.9	-0.7	-1.2	0.1	-0.1	2.0	-0.7	-0.3	-0.6	-0.2	-0.5	-1.3	0.9
GPS2-GPS4	1856924.0	-0.3	-0.3	-0.8	0.2	-0.5	0.1	-0.3	-0.6	-1.3	-0.1	-0.3	0.2	1.4	1.9	-0.5	0.4	0.1	0.7	-0.5	0.6	0.1	0.4	-0.4	-0.2	0.6
GPS2-GPS5	1477355.0	-0.2	1.3	1.2	1.3	1.1	0.8	-0.3	0.7	-1.0	0.0	-0.8	0.1	0.1	-1.7	-0.2	0.2	-0.9	-0.1	-1.1	0.5	-1.3	0.6	-0.8	0.5	0.9
GPS2-GPS6	2436723.8	0.5	0.6	0.5	1.0	0.5	0.2	-0.6	1.3	0.4	-0.2	-0.3	-0.3	1.4	-0.8	-0.2	-0.1	-0.4	-0.1	-0.8	-0.5	-0.5	0.1	-0.4	-0.3	0.6
GPS2-GPS7	2811673.2	0.9	0.8	0.0	0.8	0.6	0.5	-0.9	0.6	-0.3	-0.4	-0.9	-0.6	0.8	0.0	-0.9	-0.2	-0.3	0.2	-0.5	-0.1	0.0	0.3	-0.4	-0.4	0.6
GPS2-GPS8	2949496.6	0.4	0.2	0.3	0.5	-1.5	-0.6	-1.2	0.7	-0.5	-0.1	-0.7	-0.5	1.3	0.6	-1.0	0.1	-0.1	0.8	-0.3	0.4	0.5	0.7	-0.5	-0.2	0.7
GPS2-GPS9	3649885.2	0.5	1.2	1.0	0.7	0.0	0.5	-1.1	0.5	-0.5	-0.1	-1.3	-0.9	0.8	-0.2	-1.0	0.0	-0.7	0.5	-1.0	0.2	0.2	0.7	-0.6	0.2	0.7
GPS3-GPS4	756324.8	-1.1	-0.2	-1.1	-1.0	-0.9	-0.6	-1.1	-0.7	0.2	0.3	0.3	1.7	2.0	-1.7	-0.2	0.3	-0.3	0.7	-0.2	0.8	-0.4	1.3	0.2	0.7	0.9
GPS3-GPS5	2094204.2	-2.4	3.4	-0.5	-0.2	-0.2	-0.4	-0.2	-0.3	-1.6	0.4	0.4	2.5	0.0	-2.3	-0.1	0.8	-0.5	2.3	-1.3	1.0	-1.1	0.6	-0.2	0.3	1.3
GPS3-GPS6	2126843.1	-1.8	0.8	-0.1	0.2	-0.7	-0.7	-0.5	0.2	0.3	0.5	0.4	1.6	1.4	-1.8	0.1	0.8	-0.4	0.8	-0.8	0.1	-0.8	0.2	-0.1	0.0	0.8
GPS3-GPS7	2073048.6	-0.1	0.5	0.0	0.0	0.4	0.1	-1.2	-0.2	0.4	0.2	0.2	0.5	1.2	-1.6	-0.4	0.0	-0.2	0.2	-0.3	0.1	-0.1	0.5	-0.2	-0.1	0.5
GPS3-GPS8	1924579.4	-1.3	-0.9	0.6	0.1	-1.7	-1.4	-2.0	0.0	0.8	0.6	0.1	0.6	1.4	-0.5	-0.1	0.2	0.0	0.2	0.1	0.7	1.0	1.1	0.1	0.6	0.9
GPS3-GPS9	2914435.3	-0.5	0.5	1.0	-0.1	-0.2	0.0	-1.0	-0.3	0.2	0.5	-0.1	0.3	0.9	-1.5	-0.6	0.1	-0.7	0.4	-0.9	0.5	0.2	0.8	-0.4	0.5	0.6
GPS4-GPS5	1734652.8	-2.2	0.9	-0.8	0.3	-0.2	-0.1	-0.8	-1.0	-2.2	0.6	0.0	1.4	-1.2	2.1	0.7	0.9	0.2	1.0	-0.7	1.1	0.1	-0.2	-0.1	0.6	1.0
GPS4-GPS6	1418664.0	-1.1	0.1	0.7	1.2	-0.1	-0.1	0.1	0.3	-0.4	0.4	-0.1	0.0	-0.7	1.2	0.5	0.7	0.0	-0.3	-0.6	-0.4	-0.3	-1.2	-0.4	-0.5	0.6
GPS4-GPS7	1317484.9	1.0	0.9	1.1	1.0	1.3	0.7	-0.2	0.5	0.2	-0.2	-0.2	-1.2	-0.9	-0.1	-0.3	-0.4	0.1	-0.5	-0.2	-0.8	0.3	-0.9	-0.5	-0.9	0.7
GPS4-GPS8	1216239.9	0.0	0.3	1.5	0.7	-0.9	-0.9	-0.7	1.0	0.6	0.0	-0.2	-0.8	-0.5	-0.1	-0.3	-0.2	0.1	0.0	0.2	-0.2	0.9	-0.1	-0.2	-0.3	0.6
GPS4-GPS9	2165876.5	0.5	1.0	2.1	0.7	0.6	0.5	0.1	0.5	0.0	0.0	-0.5	-1.3	-1.1	-0.4	-0.5	-0.3	-0.5	-0.2	-0.8	-0.4	0.4	-0.5	-0.6	-0.3	0.7

GPS5-GPS6	1284566.2	-0.4	0.4	-1.2	-0.5	-0.2	-0.7	-1.2	0.3	0.4	-0.1	0.5	0.6	0.1	0.2	0.4	-0.3	0.5	0.5	-0.2	-0.3	0.7	0.1	0.5	0.2	0.5
GPS5-GPS7	1894753.4	-1.1	0.8	-1.7	-0.3	-0.5	-0.5	-1.7	-0.4	-0.7	0.2	-0.3	1.1	-0.8	1.3	0.2	0.3	0.3	1.1	0.0	0.7	0.7	0.4	0.6	0.5	0.8
GPS5-GPS8	2256071.4	-0.8	0.8	-1.5	-0.6	-1.8	-0.7	-1.7	-0.1	-1.5	0.5	-0.2	1.3	-0.4	1.2	0.0	0.6	0.4	1.7	-0.2	1.1	0.5	0.7	0.2	0.6	1.0
GPS5-GPS9	2571612.1	-1.0	1.1	-1.0	-0.5	-1.1	-0.4	-2.1	-0.5	-0.7	0.4	-0.8	0.5	-0.4	1.2	-0.1	0.5	0.2	1.3	-0.3	0.6	1.2	0.6	0.5	0.9	0.8
GPS6-GPS7	683010.2	-1.2	0.3	-0.7	0.2	-1.0	-0.3	-0.5	-0.4	-0.8	0.4	-0.8	0.8	-0.7	1.5	0.0	0.9	-0.2	0.5	0.0	0.7	-0.2	0.1	0.2	0.3	0.7
GPS6-GPS8	1157815.4	-0.3	0.1	-0.7	0.0	-1.5	0.2	-0.2	0.0	-1.4	0.7	-0.5	0.8	0.0	1.2	-0.1	1.2	0.1	1.0	-0.1	0.9	-0.6	0.2	-0.2	0.2	0.7
GPS6-GPS9	1290279.9	-0.5	0.9	0.3	0.0	-0.8	0.3	-0.9	-0.7	-1.0	0.4	-1.2	-0.1	-0.5	1.0	-0.4	0.7	-0.3	0.8	-0.1	0.8	0.5	0.6	-0.1	0.7	0.7
GPS7-GPS8	511256.8	1.7	0.4	-0.4	-0.3	0.2	0.9	0.3	0.2	-0.8	0.2	0.2	-0.2	0.5	-0.4	-0.3	0.0	0.2	0.4	-0.3	0.0	-0.7	-0.1	-0.6	-0.4	0.5
GPS7-GPS9	868575.5	-0.4	0.3	1.0	-0.1	-0.6	0.0	0.1	-0.1	-0.2	0.3	-0.3	-0.2	-0.1	-0.1	-0.2	0.2	-0.5	0.4	-0.5	0.4	0.3	0.4	-0.2	0.6	0.4
GPS8-GPS9	1057914.7	1.4	0.9	0.4	-0.3	1.4	1.6	1.1	-0.1	-0.8	0.1	-0.2	-0.4	-0.6	-0.7	-0.5	-0.3	-0.6	0.2	-1.0	0.1	-0.9	-0.2	-0.6	-0.2	0.7
Mean:		0.8	0.5	0.5	0.5	-0.3	-0.1	-0.6	0.0	-0.5	0.1	-0.2	0.3	0.2	0.0	-0.2	0.3	-0.1	0.6	-0.4	0.3	-0.7	-0.2	0.4	0.1	
St.dev.:		±0.1	0.1	0.1	0.1	0.8	0.6	0.8	0.6	0.7	0.4	0.5	0.9	0.8	1.2	0.5	0.4	0.5	0.6	0.5	0.5	0.8	0.5	0.5	0.5	
RMS:		±1.2	1.2	0.9	0.6	0.9	0.6	1.0	0.6	0.8	0.4	0.5	0.9	0.9	1.2	0.5	0.5	0.5	0.8	0.6	0.6	0.7	0.5	0.5	0.5	±0.8

**Appendix Ib. Results of 24 measurements at Olkiluoto. Deviations of the vector lengths from their mean in millimeters. Scaled observations.**

Vector	Mean length [mm]	Time [a]																								RMS
		95.3	95.8	96.3	96.8	97.3	97.8	98.3	98.8	99.3	99.8	1.3	1.8	2.3	2.8	3.3	3.8	4.3	4.8	5.3	5.8	6.3	6.8	7.3	7.8	
GPS1-GPS2	1355861.8	2.4	1.7	0.1	0.9	0.5	0.6	0.1	1.2	0.2	0.2	-0.8	-0.6	0.6	-0.1	-1.0	-0.5	-1.1	-0.4	-1.0	-0.6	-1.3	-0.1	-1.2	-0.8	±0.9
GPS1-GPS3	1006191.8	-0.3	1.4	-0.1	-0.5	-0.3	-0.4	0.9	-0.2	0.1	0.2	0.6	1.1	0.7	-1.9	-0.1	0.2	-0.4	0.5	-0.4	-0.5	-0.6	0.3	0.4	-0.3	0.7
GPS1-GPS4	643448.0	-1.4	-2.1	-0.2	-0.3	-0.4	-0.3	0.5	-1.4	-0.9	-0.2	0.4	0.0	-0.2	2.2	0.8	0.5	0.8	-0.4	0.5	0.1	1.0	-0.3	0.9	0.4	0.9
GPS1-GPS5	1131621.4	-0.9	1.9	-0.6	0.4	0.4	0.1	-0.9	0.2	-0.8	0.4	-0.1	1.1	-0.9	-0.3	0.2	0.2	-0.4	1.0	-0.6	1.1	-0.7	0.2	-0.6	0.4	0.7
GPS1-GPS6	1264825.2	-1.4	-1.4	0.2	0.3	0.3	-0.6	-0.1	0.4	0.9	-0.5	0.5	-0.1	0.5	-0.3	0.6	-0.1	0.6	-0.3	0.5	-0.2	0.4	-0.6	0.4	-0.1	0.5
GPS1-GPS7	1482993.3	-0.6	-1.6	-0.2	-0.3	0.8	-0.1	-0.3	-0.5	0.6	-0.9	0.3	-0.7	-0.1	0.1	0.2	-0.4	0.9	-0.3	1.1	-0.1	1.2	-0.2	0.9	0.1	0.6
GPS1-GPS8	1594502.0	-1.0	-2.5	0.2	-0.6	-1.4	-1.1	-0.3	-0.2	0.3	-0.6	0.3	-0.5	0.3	0.6	0.3	0.0	1.1	0.0	1.3	0.4	1.7	0.4	0.9	0.4	0.9
GPS1-GPS9	2343596.0	-0.7	-1.6	1.0	-0.4	0.4	-0.1	0.1	-0.5	0.6	-0.7	-0.2	-1.2	-0.3	-0.2	0.1	-0.4	0.6	-0.4	0.8	0.2	1.5	0.2	0.6	0.6	0.7
GPS2-GPS3	1609847.2	0.4	2.2	-0.3	-0.4	0.0	-0.2	1.9	0.3	-0.4	-0.9	0.3	0.1	0.7	-0.7	-1.0	-0.2	-0.1	1.4	-0.3	-0.6	-0.6	-0.4	-0.4	-1.4	0.8
GPS2-GPS4	1856924.0	0.3	-0.9	-0.7	0.0	-0.1	0.1	0.2	-0.5	-0.6	-0.3	-0.1	-0.3	1.1	1.8	-0.3	-0.1	0.1	-0.1	-0.1	0.1	0.0	0.1	-0.3	-0.3	0.5
GPS2-GPS5	1477355.0	0.3	0.9	1.2	1.2	1.4	0.9	0.1	0.8	-0.5	-0.1	-0.6	-0.2	-0.1	-1.7	-0.1	-0.1	-0.9	-0.6	-0.8	0.2	-1.3	0.4	-0.7	0.4	0.8
GPS2-GPS6	2436723.9	1.3	-0.2	0.6	0.9	1.0	0.3	0.1	1.4	1.3	-0.5	-0.1	-0.9	1.1	-1.0	-0.1	-0.7	-0.4	-1.1	-0.4	-1.1	-0.6	-0.3	-0.3	-0.6	0.8
GPS2-GPS7	2811673.2	1.8	0.0	0.1	0.7	1.2	0.6	-0.1	0.8	0.7	-0.7	-0.6	-1.2	0.4	-0.1	-0.6	-0.8	-0.2	-0.8	0.1	-0.7	0.0	-0.1	-0.2	-0.6	0.7
GPS2-GPS8	2949496.6	1.3	-0.7	0.4	0.4	-0.9	-0.5	-0.3	0.9	0.5	-0.4	-0.4	-1.1	0.9	0.5	-0.7	-0.5	0.0	-0.3	0.4	-0.2	0.5	0.3	-0.3	-0.4	0.6
GPS2-GPS9	3649885.2	1.6	0.1	1.1	0.6	0.8	0.6	0.0	0.7	0.8	-0.5	-0.9	-1.7	0.3	-0.3	-0.6	-0.7	-0.6	-0.8	-0.2	-0.6	0.2	0.2	-0.4	-0.1	0.7
GPS3-GPS4	756324.8	-0.9	-0.4	-1.1	-1.0	-0.7	-0.6	-0.9	-0.7	0.6	0.3	0.5	1.6	2.0	-1.7	-0.1	0.2	-0.3	0.5	0.1	0.7	-0.4	1.3	0.3	0.7	0.8
GPS3-GPS5	2094204.2	-1.8	2.8	-0.4	-0.3	0.2	-0.3	0.4	-0.2	-0.9	0.2	0.6	2.1	-0.3	-2.4	0.1	0.4	-0.4	1.5	-0.8	0.5	-1.1	0.3	-0.1	0.1	1.1
GPS3-GPS6	2126843.1	-1.1	0.2	0.0	0.1	-0.2	-0.6	0.1	0.3	1.0	0.3	0.6	1.1	1.1	-1.9	0.3	0.4	-0.3	0.0	-0.3	-0.4	-0.8	-0.1	0.0	-0.2	0.7
GPS3-GPS7	2073048.6	0.5	-0.1	0.1	-0.1	0.8	0.2	-0.6	-0.1	1.1	0.0	0.4	0.1	0.9	-1.7	-0.2	-0.4	-0.1	-0.6	0.2	-0.3	-0.1	0.2	-0.1	-0.3	0.6
GPS3-GPS8	1924579.4	-0.7	-1.5	0.7	0.0	-1.3	-1.3	-1.4	0.1	1.5	0.4	0.3	0.2	1.1	-0.5	0.1	-0.2	0.1	-0.5	0.5	0.3	1.0	0.8	0.2	0.5	0.8
GPS3-GPS9	2914435.3	0.4	-0.4	1.1	-0.2	0.4	0.1	-0.1	-0.1	1.2	0.2	0.2	-0.3	0.5	-1.6	-0.3	-0.5	-0.6	-0.7	-0.2	-0.1	0.2	0.4	-0.2	0.3	0.6
GPS4-GPS5	1734652.8	-1.7	0.4	-0.7	0.2	0.2	0.0	-0.3	-0.9	-1.6	0.4	0.2	1.0	-1.4	2.1	0.9	0.5	0.3	0.4	-0.3	0.7	0.1	-0.4	0.0	0.5	0.8
GPS4-GPS6	1418664.0	-0.7	-0.3	0.8	1.2	0.3	-0.1	0.6	0.5	0.2	0.4	0.1	-0.3	-0.9	1.3	0.7	0.5	0.1	-0.8	-0.3	-0.7	-0.3	-1.4	-0.3	-0.6	0.6
GPS4-GPS7	1317484.9	1.4	0.5	1.1	1.0	1.6	0.7	0.3	0.6	0.7	-0.3	-0.1	-1.5	-1.1	-0.1	-0.2	-0.7	0.1	-1.0	0.2	-1.1	0.3	-1.1	-0.4	-1.0	0.8
GPS4-GPS8	1216239.9	0.4	-0.1	1.5	0.7	-0.6	-0.9	-0.3	1.1	1.0	-0.1	-0.1	-1.1	-0.7	-0.1	-0.2	-0.4	0.1	-0.4	0.5	-0.5	0.9	-0.3	-0.1	-0.4	0.7
GPS4-GPS9	2165876.5	1.2	0.4	2.2	0.6	1.1	0.6	0.7	0.6	0.8	-0.2	-0.3	-1.8	-1.4	-0.5	-0.3	-0.7	-0.4	-1.0	-0.3	-0.9	0.4	-0.8	-0.5	-0.5	0.9



GPS5-GPS6	1284566.2	0.1	-0.1	-1.2	-0.5	0.2	-0.7	-0.8	0.4	0.9	-0.2	0.6	0.3	-0.2	0.2	0.5	-0.6	0.5	-0.1	0.2	-0.6	0.7	-0.2	0.6	0.1	0.5
GPS5-GPS7	1894753.4	-0.5	0.2	-1.6	-0.4	-0.1	-0.4	-1.1	-0.3	0.0	0.0	-0.1	0.7	-1.1	1.3	0.4	-0.1	0.4	0.4	0.4	0.3	0.7	0.1	0.7	0.4	0.6
GPS5-GPS8	2256071.4	-0.1	0.1	-1.4	-0.7	-1.3	-0.6	-1.0	0.0	-0.7	0.3	0.0	0.8	-0.7	1.1	0.2	0.1	0.5	0.9	0.3	0.6	0.5	0.4	0.3	0.4	0.7
GPS5-GPS9	2571612.1	-0.2	0.2	-0.9	-0.6	-0.6	-0.3	-1.3	-0.4	0.2	0.1	-0.5	-0.2	-0.7	1.0	0.1	-0.1	0.2	0.3	0.3	-0.1	1.1	0.2	0.6	0.6	0.6
GPS6-GPS7	683010.2	-1.0	0.1	-0.7	0.2	-0.9	-0.3	-0.3	-0.4	-0.6	0.3	-0.7	0.7	-0.8	1.5	0.1	0.8	-0.2	0.2	0.2	0.6	-0.2	0.0	0.2	0.2	0.6
GPS6-GPS8	1157815.5	0.1	-0.3	-0.8	-0.1	-1.4	0.2	0.1	0.1	-1.1	0.6	-0.5	0.6	-0.3	1.2	-0.1	1.0	0.1	0.6	0.2	0.7	-0.7	-0.1	-0.2	0.1	0.6
GPS6-GPS9	1290279.9	-0.1	0.5	0.3	0.0	-0.5	0.3	-0.5	-0.6	-0.5	0.3	-1.1	-0.4	-0.7	1.0	-0.3	0.4	-0.3	0.3	0.2	0.5	0.5	0.4	0.0	0.6	0.5
GPS7-GPS8	511256.8	1.9	0.2	-0.4	-0.3	0.3	0.9	0.4	0.2	-0.6	0.2	0.3	-0.3	0.4	-0.4	-0.3	-0.1	0.2	0.2	-0.2	-0.1	-0.7	-0.2	-0.6	-0.4	0.6
GPS7-GPS9	868575.5	-0.1	0.0	1.0	-0.1	-0.4	0.0	0.4	-0.1	0.1	0.2	-0.2	-0.4	-0.2	-0.1	-0.1	0.0	-0.5	0.1	-0.3	0.2	0.3	0.3	-0.1	0.5	0.3
GPS8-GPS9	1057914.7	1.6	0.5	0.3	-0.3	1.5	1.5	1.3	0.0	-0.4	-0.1	-0.1	-0.6	-0.7	-0.7	-0.4	-0.5	-0.6	-0.3	-0.8	-0.2	-0.9	-0.3	-0.5	-0.3	0.8
Mean:		0.8	0.5	0.5	0.5	0.1	0.0	-0.1	0.1	0.2	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.1	-0.8	-0.3	0.4	0.0	
St.dev.:		±0.1	0.1	0.1	0.1	0.8	0.6	0.7	0.6	0.8	0.4	0.5	0.9	0.8	1.2	0.4	0.4	0.5	0.6	0.5	0.5	0.8	0.5	0.5	0.5	
RMS:		±1.1	1.1	0.9	0.6	0.8	0.6	0.7	0.6	0.8	0.4	0.4	0.9	0.8	1.2	0.4	0.4	0.5	0.6	0.5	0.5	0.7	0.5	0.5	0.5	±0.7

## Appendix II. Results of the first measurements at Olkiluoto in 2007.

```
=====
Program : GPSEST                               Bernese GPS Software Version 5.0
Purpose : Parameter estimation
Campaign: ${P}/OLKI07K                         Default session: 1060 year 2007
Date    : 12-Feb-2008 13:53                   User name      : ja
=====
```

OLKI07K

-----

```
1${P}/OLKI07K                                PROGRAM GPSEST 12-FEB-08 13:53
OLKI07K                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

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-----

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14. RESULTS (PART 2)

```
1${P}/OLKI07K                                PROGRAM GPSEST 12-FEB-08 13:53
OLKI07K                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

### INPUT AND OUTPUT FILENAMES

-----

-----

```
Session table          : ${P}/OLKI07K\STA\SESSIONS.SES
```

```

General constants      : ${X}/GEN\CONST.
Geodetic datum        : ${X}/GEN\DATUM.
Station information    : ${P}/OLKI07K\STA\OLKI07K.STA
Earth rotation parameters : ${P}/OLKI07K\ORB\C04_2007.ERP
Subdaily pole model   : ${X}/GEN\IERS2000.SUB
Nutation model        : ${X}/GEN\IAU2000.NUT
Satellite information  : ${X}/GEN\SATELLIT.
Receiver information   : ${X}/GEN\RECEIVER.
Satellite problems    : ${X}/GEN\SAT_2007.CRX
Phase center eccentricities : ${X}/GEN\PHAS_IGS.REL
SINEX general input file : ${X}/GEN\SINEX.
IONEX control file    : ${X}/GEN\IONEX.
Difference GPS-UTC    : ---
A priori station coordinates: ${P}/OLKI07K\STA\OLKI.CRD
GNSS standard orbits  : ${P}/OLKI07K\ORB\OLKI07K.STD
GNSS orbit partials  : ---
Ionosphere models     : ${P}/OLKI07K\ATM\OLKI07K.ION
Troposphere estimates : ---
Station sigma factors : ---
Station eccentricities : ---
Ocean loading tables  : ---
GNSS clock corrections : ---
Differential code biases : ---
Receiver antenna orientation: ---
Kinematic coordinates : ---
Kinematic velocities  : ---
Standard orbit(s)     : ---
Orbit partials        : ---
Attitude data          : ---
Precise orbit(s)       : ---
LEO orbital elements  : ---
Station coordinates   : ${P}/OLKI07K\STA\TOLKI07K.CRD
GNSS orbital elements : ---
Troposphere estimates : ---
Troposphere SINEX     : ---
Ionosphere models     : ---
IONEX                  : ---
Residuals              : ---
Coordinate covariance matrix: ---
Full covariance matrix : ---
Normal equations       : ---
Bernese ERP file       : ---
IERS ERP file          : ---
GNSS clock corrections : ---
Clock RINEX            : ---
Kinematic coordinates : ---
Differential code biases : ---
Phase center variations (gri: ---
Phase center variations (har: ---
Scratch file           : ${U}/WORK\GPSEST.SCR
Scratch files          : ${U}/WORK\GPSEST.SC1
Program output         : ${P}/OLKI07K\OUT\GPSEST.L28
Error message          : ${U}/WORK\ERROR.MSG

```

1\${P}/OLKI07K  
OLKI07K

PROGRAM GPSEST 12-FEB-08 13:53  
BERNESE GPS SOFTWARE VERSION 5.0

1. CAMPAIGNS

CAMPAIGN NAME	NUM STATION NAME	NUM STATION NAME	NUM STATION NAME	NUM STATION NAME	NUM STATION NAME
\${P}/OLKI07K :	1 GPS1	2 GPS2	3 GPS3	4 GPS4	5 GPS5
	6 GPS6	7 GPS7	8 GPS8	9 GPS9	10 GP13

2. OBSERVATION FILES

\${P}/OLKI07K

MAIN CHARACTERISTICS:

FILE	OBSERVATION FILE HEADER	OBSERVATION FILE	SESS	RECEIVER 1	RECEIVER 2
1	\${P}/OLKI07K/OBS/01021050.PSH	\${P}/OLKI07K/OBS/01021050.PSO	1050	ASHTECH Z-XII3	ASHTECH Z-XII3
2	\${P}/OLKI07K/OBS/01021060.PSH	\${P}/OLKI07K/OBS/01021060.PSO	1060	ASHTECH Z-XII3	ASHTECH Z-XII3
3	\${P}/OLKI07K/OBS/01031050.PSH	\${P}/OLKI07K/OBS/01031050.PSO	1050	ASHTECH Z-XII3	ASHTECH Z-XII3
4	\${P}/OLKI07K/OBS/01031060.PSH	\${P}/OLKI07K/OBS/01031060.PSO	1060	ASHTECH Z-XII3	ASHTECH Z-XII3
5	\${P}/OLKI07K/OBS/01041030.PSH	\${P}/OLKI07K/OBS/01041030.PSO	1030	ASHTECH Z-XII3	ASHTECH Z-XII3
6	\${P}/OLKI07K/OBS/01041040.PSH	\${P}/OLKI07K/OBS/01041040.PSO	1040	ASHTECH Z-XII3	ASHTECH Z-XII3
7	\${P}/OLKI07K/OBS/01051030.PSH	\${P}/OLKI07K/OBS/01051030.PSO	1030	ASHTECH Z-XII3	ASHTECH Z-XII3
8	\${P}/OLKI07K/OBS/01051040.PSH	\${P}/OLKI07K/OBS/01051040.PSO	1040	ASHTECH Z-XII3	ASHTECH Z-XII3
9	\${P}/OLKI07K/OBS/01051050.PSH	\${P}/OLKI07K/OBS/01051050.PSO	1050	ASHTECH Z-XII3	ASHTECH Z-XII3
10	\${P}/OLKI07K/OBS/01051060.PSH	\${P}/OLKI07K/OBS/01051060.PSO	1060	ASHTECH Z-XII3	ASHTECH Z-XII3
11	\${P}/OLKI07K/OBS/01061030.PSH	\${P}/OLKI07K/OBS/01061030.PSO	1030	ASHTECH Z-XII3	ASHTECH Z-XII3
12	\${P}/OLKI07K/OBS/01061040.PSH	\${P}/OLKI07K/OBS/01061040.PSO	1040	ASHTECH Z-XII3	ASHTECH Z-XII3
13	\${P}/OLKI07K/OBS/01061050.PSH	\${P}/OLKI07K/OBS/01061050.PSO	1050	ASHTECH Z-XII3	ASHTECH Z-XII3
14	\${P}/OLKI07K/OBS/01061060.PSH	\${P}/OLKI07K/OBS/01061060.PSO	1060	ASHTECH Z-XII3	ASHTECH Z-XII3
15	\${P}/OLKI07K/OBS/01071030.PSH	\${P}/OLKI07K/OBS/01071030.PSO	1030	ASHTECH Z-XII3	ASHTECH Z-XII3
16	\${P}/OLKI07K/OBS/01071040.PSH	\${P}/OLKI07K/OBS/01071040.PSO	1040	ASHTECH Z-XII3	ASHTECH Z-XII3
17	\${P}/OLKI07K/OBS/01081050.PSH	\${P}/OLKI07K/OBS/01081050.PSO	1050	ASHTECH Z-XII3	ASHTECH Z-XII3
18	\${P}/OLKI07K/OBS/01081060.PSH	\${P}/OLKI07K/OBS/01081060.PSO	1060	ASHTECH Z-XII3	ASHTECH Z-XII3
19	\${P}/OLKI07K/OBS/06091050.PSH	\${P}/OLKI07K/OBS/06091050.PSO	1050	ASHTECH Z-XII3	ASHTECH Z-XII3
20	\${P}/OLKI07K/OBS/06091060.PSH	\${P}/OLKI07K/OBS/06091060.PSO	1060	ASHTECH Z-XII3	ASHTECH Z-XII3

21	{P}/OLKI07K/OBS/06131050.PSH	{P}/OLKI07K/OBS/06131050.PSO	1050	ASHTECH Z-XII3	ASHTECH Z-XII3
22	{P}/OLKI07K/OBS/06131060.PSH	{P}/OLKI07K/OBS/06131060.PSO	1060	ASHTECH Z-XII3	ASHTECH Z-XII3
23	{P}/OLKI07K/OBS/07081030.PSH	{P}/OLKI07K/OBS/07081030.PSO	1030	ASHTECH Z-XII3	ASHTECH Z-XII3
24	{P}/OLKI07K/OBS/07081040.PSH	{P}/OLKI07K/OBS/07081040.PSO	1040	ASHTECH Z-XII3	ASHTECH Z-XII3
25	{P}/OLKI07K/OBS/07091030.PSH	{P}/OLKI07K/OBS/07091030.PSO	1030	ASHTECH Z-XII3	ASHTECH Z-XII3
26	{P}/OLKI07K/OBS/07091040.PSH	{P}/OLKI07K/OBS/07091040.PSO	1040	ASHTECH Z-XII3	ASHTECH Z-XII3
27	{P}/OLKI07K/OBS/07131030.PSH	{P}/OLKI07K/OBS/07131030.PSO	1030	ASHTECH Z-XII3	ASHTECH Z-XII3
28	{P}/OLKI07K/OBS/07131040.PSH	{P}/OLKI07K/OBS/07131040.PSO	1040	ASHTECH Z-XII3	ASHTECH Z-XII3

FILE	TYP	FREQ.	STATION 1	STATION 2	SESS	FIRST	OBSERV.TIME	#EPO	DT	#EF	#CLK	ARC	#SAT	AMB.I.+S.			#CLUSTERS				RM
														W	12	#AMB	L1	L2	L5		
1	P	L1,L2	GPS1	GPS2	1050	7-04-15	8:23:30	1873	30	0	E E	1	28	N	Y	Y	46	11	11	46	0
2	P	L1,L2	GPS1	GPS2	1060	7-04-16	0:00:30	1593	30	0	E E	1	30	N	Y	Y	43	11	11	43	0
3	P	L1,L2	GPS1	GPS3	1050	7-04-15	8:45:00	1830	30	0	E E	1	30	N	Y	Y	53	18	18	53	0
4	P	L1,L2	GPS1	GPS3	1060	7-04-16	0:00:30	1552	30	0	E E	1	30	N	Y	Y	45	13	13	45	0
5	P	L1,L2	GPS1	GPS4	1030	7-04-13	8:28:00	1864	30	0	E E	1	29	N	Y	Y	60	26	26	60	0
6	P	L1,L2	GPS1	GPS4	1040	7-04-14	0:00:30	1587	30	0	E E	1	30	N	Y	Y	55	23	23	55	0
7	P	L1,L2	GPS1	GPS5	1030	7-04-13	11:04:30	1551	30	0	E E	1	29	N	Y	Y	50	20	20	50	0
8	P	L1,L2	GPS1	GPS5	1040	7-04-14	0:00:30	1380	30	0	E E	1	30	N	Y	Y	45	14	14	45	0
9	P	L1,L2	GPS1	GPS5	1050	7-04-15	7:56:30	1927	30	0	E E	1	30	N	Y	Y	53	16	16	53	0
10	P	L1,L2	GPS1	GPS5	1060	7-04-16	0:00:30	1646	30	0	E E	1	30	N	Y	Y	53	19	19	53	0
11	P	L1,L2	GPS1	GPS6	1030	7-04-13	9:00:30	1799	30	0	E E	1	29	N	Y	Y	55	23	23	55	0
12	P	L1,L2	GPS1	GPS6	1040	7-04-14	0:00:30	1431	30	0	E E	1	30	N	Y	Y	39	10	10	39	0
13	P	L1,L2	GPS1	GPS6	1050	7-04-15	9:13:00	1774	30	0	E E	1	30	N	Y	Y	52	18	19	52	0
14	P	L1,L2	GPS1	GPS6	1060	7-04-16	0:00:30	1244	30	0	E E	1	30	N	Y	Y	38	11	11	38	0
15	P	L1,L2	GPS1	GPS7	1030	7-04-13	9:32:00	1736	30	0	E E	1	29	N	Y	Y	53	21	21	53	0
16	P	L1,L2	GPS1	GPS7	1040	7-04-14	0:00:30	1508	30	0	E E	1	30	N	Y	Y	44	14	14	44	0
17	P	L1,L2	GPS1	GPS8	1050	7-04-15	9:01:30	1797	30	0	E E	1	30	N	Y	Y	69	31	31	69	0
18	P	L1,L2	GPS1	GPS8	1060	7-04-16	0:00:30	1501	30	0	E E	1	30	N	Y	Y	62	28	28	62	0
19	P	L1,L2	GPS6	GPS9	1050	7-04-15	9:23:30	1753	30	0	E E	1	30	N	Y	Y	53	20	20	53	0
20	P	L1,L2	GPS6	GPS9	1060	7-04-16	0:00:30	1244	30	0	E E	1	30	N	Y	Y	37	10	10	37	0
21	P	L1,L2	GPS6	GP13	1050	7-04-15	9:39:00	1722	30	0	E E	1	30	N	Y	Y	54	22	22	54	0
22	P	L1,L2	GPS6	GP13	1060	7-04-16	0:00:30	1219	30	0	E E	1	30	N	Y	Y	36	9	9	36	0
23	P	L1,L2	GPS7	GPS8	1030	7-04-13	9:32:00	1736	30	0	E E	1	29	N	Y	Y	66	34	33	66	0
24	P	L1,L2	GPS7	GPS8	1040	7-04-14	0:00:30	1508	30	0	E E	1	30	N	Y	Y	57	26	25	57	0
25	P	L1,L2	GPS7	GPS9	1030	7-04-13	9:32:00	1736	30	0	E E	1	29	N	Y	Y	49	18	18	49	0
26	P	L1,L2	GPS7	GPS9	1040	7-04-14	0:00:30	1451	30	0	E E	1	30	N	Y	Y	43	14	14	43	0
27	P	L1,L2	GPS7	GP13	1030	7-04-13	9:47:30	1705	30	0	E E	1	29	N	Y	Y	47	16	16	47	0
28	P	L1,L2	GPS7	GP13	1040	7-04-14	0:00:30	1508	30	0	E E	1	30	N	Y	Y	48	18	18	48	0

SATELLITES:

-----  
FILE #SAT SATELLITES

1	28	1	2	3	4	5	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
2	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
3	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
4	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

5	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	30	31	
6	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
7	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	30	31	
8	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
9	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
10	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
11	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	30	31	
12	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
13	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
14	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
15	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	30	31	
16	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
17	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
18	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
19	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
20	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
21	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
22	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
23	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	30	31	
24	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
25	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	30	31	
26	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
27	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	30	31	
28	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

OBSERVATION SELECTION:

-----

SAMPLING RATE : 30 SEC  
 ELEVATION CUT-OFF ANGLE : 20 DEGREES  
 SATELLITE SYSTEM : GPS  
 SPECIAL DATA SELECTION : NO

1\${P}/OLKI07K  
 OLKI07K

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3. GENERAL OPTIONS

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TIDAL CORRECTION OF STATION COORDINATES : IERS CONVENTIONS 2000

A PRIORI SIGMA OF UNIT WEIGHT:

-----

A PRIORI SIGMA OF UNIT WEIGHT : 0.001 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)

MODEL FOR ELEVATION-DEPENDENT WEIGHTING : 1/COS(Z)

CORRELATIONS AND SESSIONS:

-----

STRATEGY : CORRELATIONS CORRECTLY MODELLED  
 TIME INTERVAL : 0.10000 SEC (TO IDENTIFY EPOCH)

SESS #FILE FILE NUMBERS

-----

1050 7 1 3 9 13 17 19 21  
 1060 7 2 4 10 14 18 20 22  
 1030 7 5 7 11 15 23 25 27  
 1040 7 6 8 12 16 24 26 28

AMBIGUITY RESOLUTION STRATEGY:

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AMBIGUITIES PRE-ELIMINATED EVERY 30 SECONDS

SYNCHRONIZATION ERRORS:

-----

STRATEGY : SYNCHRONIZATION ERRORS NOT APPLIED

4. STATIONS

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Local geodetic datum: \${X}/GEN\DATUM.

Datum name	Ell. param./ Scale	Shifts to WGS-84	Rotations to WGS-84
WGS - 84	A = 6378137.000 m 1/F= 298.2572236 SC = 0.00000D+00	DX = 0.0000 m DY = 0.0000 m DZ = 0.0000 m	RX = 0.00000 arcsec RY = 0.00000 arcsec RZ = 0.00000 arcsec

A priori station coordinates: \${P}/OLKI07K\STA\OLKI.CRD

A priori station coordinates WGS-84                      A priori station coordinates Ellipsoidal in local geodetic datum

num	Station name	obs e/f/h	X (m)	Y (m)	Z (m)	Latitude	Longitude	Height (m)
1	GPS1	Y ESTIM	2863210.1067	1126271.4390	5568267.2990	61 14 22.754183	21 28 21.633926	30.5520
2	GPS2	Y ESTIM	2863312.4876	1127586.4513	5567953.2561	61 14 1.535088	21 29 41.145601	32.8443
3	GPS3	Y ESTIM	2862323.4428	1126533.7706	5568664.0772	61 14 49.568852	21 28 59.767954	27.6613
4	GPS4	Y ESTIM	2862758.9415	1125923.2376	5568566.0154	61 14 42.897724	21 28 10.980705	29.1133
5	GPS5	Y ESTIM	2864192.3764	1126421.6871	5567725.8796	61 13 46.892454	21 28 6.906786	22.2982
6	GPS6	Y ESTIM	2863910.3892	1125229.5963	5568112.5408	61 14 12.686451	21 26 59.459035	25.0654

7	GPS7	Y	ESTIM	2863465.8530	1124819.7828	5568430.2557	61 14 33.586772	21 26 44.784815	32.4126
8	GPS8	Y	ESTIM	2863019.7046	1124739.5538	5568666.6848	61 14 49.853077	21 26 50.715669	25.8084
9	GPS9	Y	ESTIM	2863742.0387	1123996.6145	5568453.4720	61 14 35.187574	21 25 46.644762	31.7025
10	GP13	Y	ESTIM	2864309.0028	1124134.0361	5568134.1930	61 14 13.855835	21 25 41.334054	29.8962

A priori sigma:

Station coordinates a priori sigma  
in local geodetic datum

num	Station name	N (m)	E (m)	U (m)
1	GPS1	0.00001	0.00001	0.00001

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5. SATELLITE ORBITS

ARC CHARACTERISTICS:

ARC	START OF ARC	END OF ARC	SOURCE	#SAT	SATELLITES																		
1	07-04-13 00:00:00	07-04-17 00:00:00	PR2007.106	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	
					20	21	22	23	24	25	26	27	28	29	30	31	32						

OSCULATING ELEMENTS:                   \${P}/OLKI07K\ORB\OLKI07K.STD

REFERENCE SYSTEM: J2000.0  
REFERENCE EPOCH : 54203.3527778 MJD (2007 4 13 8 28 0.00)

SAT	S.MAJ.AXIS	ECCENTRIC.	INCLINAT.	NODE	PERIGEE	M. ANOMALY	PER.PASS.TIME
1	26562216.3	0.00657423	56.751904	12.748871	-100.983643	78.194239	54203.2444684
2	26557814.2	0.00891079	54.212005	-110.319511	-230.459694	144.959573	54203.1520395
3	26562225.4	0.00922094	53.076182	-175.623769	42.377142	109.854374	54203.2006149
4	26561203.1	0.00774206	54.179201	-109.212441	15.534295	-67.969565	54203.4469192
5	26562866.0	0.00772394	53.857667	125.059135	65.692420	-89.193873	54203.4763276
6	26560350.9	0.00572843	53.505915	-172.122251	-99.719574	-6.001248	54203.3610894
7	26559828.7	0.01050640	53.597043	-173.593727	-98.179182	-18.876244	54203.3789203
8	26561715.8	0.00978555	56.038036	72.605700	158.326165	-4.679089	54203.3592588



9	26560396.8	0.01879339	55.337867	67.804415	75.490581	-24.897114	54203.3872600
10	26560563.9	0.00756258	55.514025	-48.584289	27.639429	-179.128789	54203.6008717
11	26560691.7	0.00666182	51.206693	-119.545489	28.321201	20.456219	54203.3244457
12	26561575.1	0.00361025	55.107754	129.860554	-71.644750	54.218526	54203.2776807
13	26558446.3	0.00333972	56.988195	11.995861	-287.640236	172.235596	54203.1142595
14	26562442.1	0.00288348	56.644978	11.140834	-119.206332	136.664193	54203.1634774
16	26560151.9	0.00401218	55.219156	130.755460	-42.208088	-93.088995	54203.4817033
17	26560868.0	0.00261053	55.014170	-169.705489	185.582959	-162.451324	54203.5777772
18	26558087.3	0.00801384	54.602257	-47.608614	211.103110	-100.199062	54203.4915344
19	26560190.7	0.00379606	54.889306	-166.363794	-53.773131	176.808775	54203.1079023
20	26560430.0	0.00327339	54.572117	-50.661051	73.686627	-93.795337	54203.4826836
21	26561722.3	0.01234888	53.810584	-108.168410	195.367365	-21.058046	54203.3819451
22	26558689.6	0.00474560	54.464047	-47.183848	-96.510056	178.420374	54203.1056912
23	26558453.3	0.00485331	55.623200	10.049169	-212.848230	126.092687	54203.1781599
24	26561357.7	0.00882675	54.762271	-107.071773	-46.416523	-107.164774	54203.5012080
25	26576281.4	0.01256326	54.959922	64.576832	-74.003957	-47.543326	54203.4186839
26	26559707.4	0.01816289	56.877620	11.986901	48.373634	81.230377	54203.2402789
27	26562580.6	0.02054517	55.223270	66.473021	255.526120	-76.110840	54203.4582035
28	26558778.5	0.01260901	55.109218	131.279825	235.045771	-142.489842	54203.5501067
29	26560329.7	0.01012300	56.673688	9.949340	319.070847	-177.544004	54203.5986735
30	26559565.3	0.00959474	54.223281	127.851966	75.863070	-120.481928	54203.5196362
31	26559889.3	0.00635629	55.139202	69.737047	-77.495235	21.280615	54203.3233052
32	26559380.5	0.01495822	55.813896	-45.325643	-80.238247	125.883594	54203.1784403

SATELLITE PROBLEMS:

SAT	PROBLEM TYPE	ACTION	FROM	TO
105	BAD PHASE+CODE	OBS. REMOVED	06-07-09 00:00:00	99-12-31 23:59:59
108	BAD PHASE+CODE	OBS. REMOVED	07-04-15 00:00:00	07-04-15 23:59:59
115	BAD PHASE+CODE	OBS. REMOVED	07-03-26 00:00:00	07-05-01 23:59:59
118	BAD PHASE+CODE	OBS. REMOVED	07-03-17 00:00:00	07-04-14 23:59:59
121	BAD PHASE+CODE	OBS. REMOVED	07-03-17 00:00:00	07-04-18 23:59:59
122	BAD PHASE+CODE	OBS. REMOVED	07-03-17 00:00:00	07-04-13 23:59:59
29	BAD PHASE+CODE	OBS. REMOVED	07-04-13 00:00:00	07-04-13 23:59:59

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6. ATMOSPHERE

TROPOSPHERE MODEL

A priori troposphere model: Saastamoinen  
Meteo/Trop.delay values : Extrapolated

Reference height : 0.00 m    Temperature at ref. height: 18.00 C  
 Pressure at ref. height: 1013.25 mbar  
 Humidity at ref. height: 50.00 %

SITE-SPECIFIC TROPOSPHERE PARAMETERS  
 -----

Mapping function used for delay estimation: 1/cos(zenith-distance)  
 Troposphere gradient estimation : No

Par	Station name	Reference epoch	sig_n (m)	sig_e (m)	sig_u (m)	abs/rel
1	GPS2	2007 04 13 08 00 00			0.00000	abs
2	GPS2	2007 04 13 10 00 00			0.00000	rel
3	GPS2	2007 04 13 12 00 00			0.00000	rel
4	GPS2	2007 04 13 14 00 00			0.00000	rel
5	GPS2	2007 04 13 16 00 00			0.00000	rel
6	GPS2	2007 04 13 18 00 00			0.00000	rel
7	GPS2	2007 04 13 20 00 00			0.00000	rel
8	GPS2	2007 04 13 22 00 00			0.00000	rel
9	GPS2	2007 04 14 00 00 00			0.00000	rel
10	GPS2	2007 04 14 02 00 00			0.00000	rel
11	GPS2	2007 04 14 04 00 00			0.00000	rel
12	GPS2	2007 04 14 06 00 00			0.00000	rel
13	GPS2	2007 04 14 08 00 00			0.00000	rel
14	GPS2	2007 04 14 10 00 00			0.00000	rel
15	GPS2	2007 04 14 12 00 00			0.00000	rel
16	GPS2	2007 04 14 14 00 00			0.00000	rel
17	GPS2	2007 04 14 16 00 00			0.00000	rel
18	GPS2	2007 04 14 18 00 00			0.00000	rel
19	GPS2	2007 04 14 20 00 00			0.00000	rel
20	GPS2	2007 04 14 22 00 00			0.00000	rel
21	GPS2	2007 04 15 00 00 00			0.00000	rel
22	GPS2	2007 04 15 02 00 00			0.00000	rel
23	GPS2	2007 04 15 04 00 00			0.00000	rel
24	GPS2	2007 04 15 06 00 00			0.00000	rel
25	GPS2	2007 04 15 08 00 00			0.00000	rel
26	GPS2	2007 04 15 10 00 00			0.00000	rel
27	GPS2	2007 04 15 12 00 00			0.00000	rel
28	GPS2	2007 04 15 14 00 00			0.00000	rel
29	GPS2	2007 04 15 16 00 00			0.00000	rel
30	GPS2	2007 04 15 18 00 00			0.00000	rel
31	GPS2	2007 04 15 20 00 00			0.00000	rel
32	GPS2	2007 04 15 22 00 00			0.00000	rel
33	GPS2	2007 04 16 00 00 00			0.00000	rel
34	GPS2	2007 04 16 02 00 00			0.00000	rel
35	GPS2	2007 04 16 04 00 00			0.00000	rel
36	GPS2	2007 04 16 06 00 00			0.00000	rel
37	GPS2	2007 04 16 08 00 00			0.00000	rel
38	GPS2	2007 04 16 10 00 00			0.00000	rel

39	GPS2	2007 04 16 12 00 00	0.00000	rel
40	GPS2	2007 04 16 14 00 00	0.00000	rel
41	GPS3	2007 04 13 08 00 00	0.00000	abs
42	GPS3	2007 04 13 10 00 00	0.00000	rel
43	GPS3	2007 04 13 12 00 00	0.00000	rel
44	GPS3	2007 04 13 14 00 00	0.00000	rel
45	GPS3	2007 04 13 16 00 00	0.00000	rel
46	GPS3	2007 04 13 18 00 00	0.00000	rel
47	GPS3	2007 04 13 20 00 00	0.00000	rel
48	GPS3	2007 04 13 22 00 00	0.00000	rel
49	GPS3	2007 04 14 00 00 00	0.00000	rel
50	GPS3	2007 04 14 02 00 00	0.00000	rel
51	GPS3	2007 04 14 04 00 00	0.00000	rel
52	GPS3	2007 04 14 06 00 00	0.00000	rel
53	GPS3	2007 04 14 08 00 00	0.00000	rel
54	GPS3	2007 04 14 10 00 00	0.00000	rel
55	GPS3	2007 04 14 12 00 00	0.00000	rel
56	GPS3	2007 04 14 14 00 00	0.00000	rel
57	GPS3	2007 04 14 16 00 00	0.00000	rel
58	GPS3	2007 04 14 18 00 00	0.00000	rel
59	GPS3	2007 04 14 20 00 00	0.00000	rel
60	GPS3	2007 04 14 22 00 00	0.00000	rel
61	GPS3	2007 04 15 00 00 00	0.00000	rel
62	GPS3	2007 04 15 02 00 00	0.00000	rel
63	GPS3	2007 04 15 04 00 00	0.00000	rel
64	GPS3	2007 04 15 06 00 00	0.00000	rel
65	GPS3	2007 04 15 08 00 00	0.00000	rel
66	GPS3	2007 04 15 10 00 00	0.00000	rel
67	GPS3	2007 04 15 12 00 00	0.00000	rel
68	GPS3	2007 04 15 14 00 00	0.00000	rel
69	GPS3	2007 04 15 16 00 00	0.00000	rel
70	GPS3	2007 04 15 18 00 00	0.00000	rel
71	GPS3	2007 04 15 20 00 00	0.00000	rel
72	GPS3	2007 04 15 22 00 00	0.00000	rel
73	GPS3	2007 04 16 00 00 00	0.00000	rel
74	GPS3	2007 04 16 02 00 00	0.00000	rel
75	GPS3	2007 04 16 04 00 00	0.00000	rel
76	GPS3	2007 04 16 06 00 00	0.00000	rel
77	GPS3	2007 04 16 08 00 00	0.00000	rel
78	GPS3	2007 04 16 10 00 00	0.00000	rel
79	GPS3	2007 04 16 12 00 00	0.00000	rel
80	GPS3	2007 04 16 14 00 00	0.00000	rel
81	GPS4	2007 04 13 08 00 00	0.00000	abs
82	GPS4	2007 04 13 10 00 00	0.00000	rel
83	GPS4	2007 04 13 12 00 00	0.00000	rel
84	GPS4	2007 04 13 14 00 00	0.00000	rel
85	GPS4	2007 04 13 16 00 00	0.00000	rel
86	GPS4	2007 04 13 18 00 00	0.00000	rel
87	GPS4	2007 04 13 20 00 00	0.00000	rel
88	GPS4	2007 04 13 22 00 00	0.00000	rel
89	GPS4	2007 04 14 00 00 00	0.00000	rel
90	GPS4	2007 04 14 02 00 00	0.00000	rel
91	GPS4	2007 04 14 04 00 00	0.00000	rel

92	GPS4	2007 04 14 06 00 00	0.00000	rel
93	GPS4	2007 04 14 08 00 00	0.00000	rel
94	GPS4	2007 04 14 10 00 00	0.00000	rel
95	GPS4	2007 04 14 12 00 00	0.00000	rel
96	GPS4	2007 04 14 14 00 00	0.00000	rel
97	GPS4	2007 04 14 16 00 00	0.00000	rel
98	GPS4	2007 04 14 18 00 00	0.00000	rel
99	GPS4	2007 04 14 20 00 00	0.00000	rel
100	GPS4	2007 04 14 22 00 00	0.00000	rel
101	GPS4	2007 04 15 00 00 00	0.00000	rel
102	GPS4	2007 04 15 02 00 00	0.00000	rel
103	GPS4	2007 04 15 04 00 00	0.00000	rel
104	GPS4	2007 04 15 06 00 00	0.00000	rel
105	GPS4	2007 04 15 08 00 00	0.00000	rel
106	GPS4	2007 04 15 10 00 00	0.00000	rel
107	GPS4	2007 04 15 12 00 00	0.00000	rel
108	GPS4	2007 04 15 14 00 00	0.00000	rel
109	GPS4	2007 04 15 16 00 00	0.00000	rel
110	GPS4	2007 04 15 18 00 00	0.00000	rel
111	GPS4	2007 04 15 20 00 00	0.00000	rel
112	GPS4	2007 04 15 22 00 00	0.00000	rel
113	GPS4	2007 04 16 00 00 00	0.00000	rel
114	GPS4	2007 04 16 02 00 00	0.00000	rel
115	GPS4	2007 04 16 04 00 00	0.00000	rel
116	GPS4	2007 04 16 06 00 00	0.00000	rel
117	GPS4	2007 04 16 08 00 00	0.00000	rel
118	GPS4	2007 04 16 10 00 00	0.00000	rel
119	GPS4	2007 04 16 12 00 00	0.00000	rel
120	GPS4	2007 04 16 14 00 00	0.00000	rel
121	GPS5	2007 04 13 08 00 00	0.00000	abs
122	GPS5	2007 04 13 10 00 00	0.00000	rel
123	GPS5	2007 04 13 12 00 00	0.00000	rel
124	GPS5	2007 04 13 14 00 00	0.00000	rel
125	GPS5	2007 04 13 16 00 00	0.00000	rel
126	GPS5	2007 04 13 18 00 00	0.00000	rel
127	GPS5	2007 04 13 20 00 00	0.00000	rel
128	GPS5	2007 04 13 22 00 00	0.00000	rel
129	GPS5	2007 04 14 00 00 00	0.00000	rel
130	GPS5	2007 04 14 02 00 00	0.00000	rel
131	GPS5	2007 04 14 04 00 00	0.00000	rel
132	GPS5	2007 04 14 06 00 00	0.00000	rel
133	GPS5	2007 04 14 08 00 00	0.00000	rel
134	GPS5	2007 04 14 10 00 00	0.00000	rel
135	GPS5	2007 04 14 12 00 00	0.00000	rel
136	GPS5	2007 04 14 14 00 00	0.00000	rel
137	GPS5	2007 04 14 16 00 00	0.00000	rel
138	GPS5	2007 04 14 18 00 00	0.00000	rel
139	GPS5	2007 04 14 20 00 00	0.00000	rel
140	GPS5	2007 04 14 22 00 00	0.00000	rel
141	GPS5	2007 04 15 00 00 00	0.00000	rel
142	GPS5	2007 04 15 02 00 00	0.00000	rel
143	GPS5	2007 04 15 04 00 00	0.00000	rel
144	GPS5	2007 04 15 06 00 00	0.00000	rel

145	GPS5	2007 04 15 08 00 00	0.00000	rel
146	GPS5	2007 04 15 10 00 00	0.00000	rel
147	GPS5	2007 04 15 12 00 00	0.00000	rel
148	GPS5	2007 04 15 14 00 00	0.00000	rel
149	GPS5	2007 04 15 16 00 00	0.00000	rel
150	GPS5	2007 04 15 18 00 00	0.00000	rel
151	GPS5	2007 04 15 20 00 00	0.00000	rel
152	GPS5	2007 04 15 22 00 00	0.00000	rel
153	GPS5	2007 04 16 00 00 00	0.00000	rel
154	GPS5	2007 04 16 02 00 00	0.00000	rel
155	GPS5	2007 04 16 04 00 00	0.00000	rel
156	GPS5	2007 04 16 06 00 00	0.00000	rel
157	GPS5	2007 04 16 08 00 00	0.00000	rel
158	GPS5	2007 04 16 10 00 00	0.00000	rel
159	GPS5	2007 04 16 12 00 00	0.00000	rel
160	GPS5	2007 04 16 14 00 00	0.00000	rel
161	GPS6	2007 04 13 08 00 00	0.00000	abs
162	GPS6	2007 04 13 10 00 00	0.00000	rel
163	GPS6	2007 04 13 12 00 00	0.00000	rel
164	GPS6	2007 04 13 14 00 00	0.00000	rel
165	GPS6	2007 04 13 16 00 00	0.00000	rel
166	GPS6	2007 04 13 18 00 00	0.00000	rel
167	GPS6	2007 04 13 20 00 00	0.00000	rel
168	GPS6	2007 04 13 22 00 00	0.00000	rel
169	GPS6	2007 04 14 00 00 00	0.00000	rel
170	GPS6	2007 04 14 02 00 00	0.00000	rel
171	GPS6	2007 04 14 04 00 00	0.00000	rel
172	GPS6	2007 04 14 06 00 00	0.00000	rel
173	GPS6	2007 04 14 08 00 00	0.00000	rel
174	GPS6	2007 04 14 10 00 00	0.00000	rel
175	GPS6	2007 04 14 12 00 00	0.00000	rel
176	GPS6	2007 04 14 14 00 00	0.00000	rel
177	GPS6	2007 04 14 16 00 00	0.00000	rel
178	GPS6	2007 04 14 18 00 00	0.00000	rel
179	GPS6	2007 04 14 20 00 00	0.00000	rel
180	GPS6	2007 04 14 22 00 00	0.00000	rel
181	GPS6	2007 04 15 00 00 00	0.00000	rel
182	GPS6	2007 04 15 02 00 00	0.00000	rel
183	GPS6	2007 04 15 04 00 00	0.00000	rel
184	GPS6	2007 04 15 06 00 00	0.00000	rel
185	GPS6	2007 04 15 08 00 00	0.00000	rel
186	GPS6	2007 04 15 10 00 00	0.00000	rel
187	GPS6	2007 04 15 12 00 00	0.00000	rel
188	GPS6	2007 04 15 14 00 00	0.00000	rel
189	GPS6	2007 04 15 16 00 00	0.00000	rel
190	GPS6	2007 04 15 18 00 00	0.00000	rel
191	GPS6	2007 04 15 20 00 00	0.00000	rel
192	GPS6	2007 04 15 22 00 00	0.00000	rel
193	GPS6	2007 04 16 00 00 00	0.00000	rel
194	GPS6	2007 04 16 02 00 00	0.00000	rel
195	GPS6	2007 04 16 04 00 00	0.00000	rel
196	GPS6	2007 04 16 06 00 00	0.00000	rel
197	GPS6	2007 04 16 08 00 00	0.00000	rel

198	GPS6	2007 04 16 10 00 00	0.00000	rel
199	GPS6	2007 04 16 12 00 00	0.00000	rel
200	GPS6	2007 04 16 14 00 00	0.00000	rel
201	GPS7	2007 04 13 08 00 00	0.00000	abs
202	GPS7	2007 04 13 10 00 00	0.00000	rel
203	GPS7	2007 04 13 12 00 00	0.00000	rel
204	GPS7	2007 04 13 14 00 00	0.00000	rel
205	GPS7	2007 04 13 16 00 00	0.00000	rel
206	GPS7	2007 04 13 18 00 00	0.00000	rel
207	GPS7	2007 04 13 20 00 00	0.00000	rel
208	GPS7	2007 04 13 22 00 00	0.00000	rel
209	GPS7	2007 04 14 00 00 00	0.00000	rel
210	GPS7	2007 04 14 02 00 00	0.00000	rel
211	GPS7	2007 04 14 04 00 00	0.00000	rel
212	GPS7	2007 04 14 06 00 00	0.00000	rel
213	GPS7	2007 04 14 08 00 00	0.00000	rel
214	GPS7	2007 04 14 10 00 00	0.00000	rel
215	GPS7	2007 04 14 12 00 00	0.00000	rel
216	GPS7	2007 04 14 14 00 00	0.00000	rel
217	GPS7	2007 04 14 16 00 00	0.00000	rel
218	GPS7	2007 04 14 18 00 00	0.00000	rel
219	GPS7	2007 04 14 20 00 00	0.00000	rel
220	GPS7	2007 04 14 22 00 00	0.00000	rel
221	GPS7	2007 04 15 00 00 00	0.00000	rel
222	GPS7	2007 04 15 02 00 00	0.00000	rel
223	GPS7	2007 04 15 04 00 00	0.00000	rel
224	GPS7	2007 04 15 06 00 00	0.00000	rel
225	GPS7	2007 04 15 08 00 00	0.00000	rel
226	GPS7	2007 04 15 10 00 00	0.00000	rel
227	GPS7	2007 04 15 12 00 00	0.00000	rel
228	GPS7	2007 04 15 14 00 00	0.00000	rel
229	GPS7	2007 04 15 16 00 00	0.00000	rel
230	GPS7	2007 04 15 18 00 00	0.00000	rel
231	GPS7	2007 04 15 20 00 00	0.00000	rel
232	GPS7	2007 04 15 22 00 00	0.00000	rel
233	GPS7	2007 04 16 00 00 00	0.00000	rel
234	GPS7	2007 04 16 02 00 00	0.00000	rel
235	GPS7	2007 04 16 04 00 00	0.00000	rel
236	GPS7	2007 04 16 06 00 00	0.00000	rel
237	GPS7	2007 04 16 08 00 00	0.00000	rel
238	GPS7	2007 04 16 10 00 00	0.00000	rel
239	GPS7	2007 04 16 12 00 00	0.00000	rel
240	GPS7	2007 04 16 14 00 00	0.00000	rel
241	GPS8	2007 04 13 08 00 00	0.00000	abs
242	GPS8	2007 04 13 10 00 00	0.00000	rel
243	GPS8	2007 04 13 12 00 00	0.00000	rel
244	GPS8	2007 04 13 14 00 00	0.00000	rel
245	GPS8	2007 04 13 16 00 00	0.00000	rel
246	GPS8	2007 04 13 18 00 00	0.00000	rel
247	GPS8	2007 04 13 20 00 00	0.00000	rel
248	GPS8	2007 04 13 22 00 00	0.00000	rel
249	GPS8	2007 04 14 00 00 00	0.00000	rel
250	GPS8	2007 04 14 02 00 00	0.00000	rel

251	GPS8	2007 04 14 04 00 00	0.00000	rel
252	GPS8	2007 04 14 06 00 00	0.00000	rel
253	GPS8	2007 04 14 08 00 00	0.00000	rel
254	GPS8	2007 04 14 10 00 00	0.00000	rel
255	GPS8	2007 04 14 12 00 00	0.00000	rel
256	GPS8	2007 04 14 14 00 00	0.00000	rel
257	GPS8	2007 04 14 16 00 00	0.00000	rel
258	GPS8	2007 04 14 18 00 00	0.00000	rel
259	GPS8	2007 04 14 20 00 00	0.00000	rel
260	GPS8	2007 04 14 22 00 00	0.00000	rel
261	GPS8	2007 04 15 00 00 00	0.00000	rel
262	GPS8	2007 04 15 02 00 00	0.00000	rel
263	GPS8	2007 04 15 04 00 00	0.00000	rel
264	GPS8	2007 04 15 06 00 00	0.00000	rel
265	GPS8	2007 04 15 08 00 00	0.00000	rel
266	GPS8	2007 04 15 10 00 00	0.00000	rel
267	GPS8	2007 04 15 12 00 00	0.00000	rel
268	GPS8	2007 04 15 14 00 00	0.00000	rel
269	GPS8	2007 04 15 16 00 00	0.00000	rel
270	GPS8	2007 04 15 18 00 00	0.00000	rel
271	GPS8	2007 04 15 20 00 00	0.00000	rel
272	GPS8	2007 04 15 22 00 00	0.00000	rel
273	GPS8	2007 04 16 00 00 00	0.00000	rel
274	GPS8	2007 04 16 02 00 00	0.00000	rel
275	GPS8	2007 04 16 04 00 00	0.00000	rel
276	GPS8	2007 04 16 06 00 00	0.00000	rel
277	GPS8	2007 04 16 08 00 00	0.00000	rel
278	GPS8	2007 04 16 10 00 00	0.00000	rel
279	GPS8	2007 04 16 12 00 00	0.00000	rel
280	GPS8	2007 04 16 14 00 00	0.00000	rel
281	GPS9	2007 04 13 08 00 00	0.00000	abs
282	GPS9	2007 04 13 10 00 00	0.00000	rel
283	GPS9	2007 04 13 12 00 00	0.00000	rel
284	GPS9	2007 04 13 14 00 00	0.00000	rel
285	GPS9	2007 04 13 16 00 00	0.00000	rel
286	GPS9	2007 04 13 18 00 00	0.00000	rel
287	GPS9	2007 04 13 20 00 00	0.00000	rel
288	GPS9	2007 04 13 22 00 00	0.00000	rel
289	GPS9	2007 04 14 00 00 00	0.00000	rel
290	GPS9	2007 04 14 02 00 00	0.00000	rel
291	GPS9	2007 04 14 04 00 00	0.00000	rel
292	GPS9	2007 04 14 06 00 00	0.00000	rel
293	GPS9	2007 04 14 08 00 00	0.00000	rel
294	GPS9	2007 04 14 10 00 00	0.00000	rel
295	GPS9	2007 04 14 12 00 00	0.00000	rel
296	GPS9	2007 04 14 14 00 00	0.00000	rel
297	GPS9	2007 04 14 16 00 00	0.00000	rel
298	GPS9	2007 04 14 18 00 00	0.00000	rel
299	GPS9	2007 04 14 20 00 00	0.00000	rel
300	GPS9	2007 04 14 22 00 00	0.00000	rel
301	GPS9	2007 04 15 00 00 00	0.00000	rel
302	GPS9	2007 04 15 02 00 00	0.00000	rel
303	GPS9	2007 04 15 04 00 00	0.00000	rel

304	GPS9	2007 04 15 06 00 00	0.00000	rel
305	GPS9	2007 04 15 08 00 00	0.00000	rel
306	GPS9	2007 04 15 10 00 00	0.00000	rel
307	GPS9	2007 04 15 12 00 00	0.00000	rel
308	GPS9	2007 04 15 14 00 00	0.00000	rel
309	GPS9	2007 04 15 16 00 00	0.00000	rel
310	GPS9	2007 04 15 18 00 00	0.00000	rel
311	GPS9	2007 04 15 20 00 00	0.00000	rel
312	GPS9	2007 04 15 22 00 00	0.00000	rel
313	GPS9	2007 04 16 00 00 00	0.00000	rel
314	GPS9	2007 04 16 02 00 00	0.00000	rel
315	GPS9	2007 04 16 04 00 00	0.00000	rel
316	GPS9	2007 04 16 06 00 00	0.00000	rel
317	GPS9	2007 04 16 08 00 00	0.00000	rel
318	GPS9	2007 04 16 10 00 00	0.00000	rel
319	GPS9	2007 04 16 12 00 00	0.00000	rel
320	GPS9	2007 04 16 14 00 00	0.00000	rel
321	GP13	2007 04 13 08 00 00	0.00000	abs
322	GP13	2007 04 13 10 00 00	0.00000	rel
323	GP13	2007 04 13 12 00 00	0.00000	rel
324	GP13	2007 04 13 14 00 00	0.00000	rel
325	GP13	2007 04 13 16 00 00	0.00000	rel
326	GP13	2007 04 13 18 00 00	0.00000	rel
327	GP13	2007 04 13 20 00 00	0.00000	rel
328	GP13	2007 04 13 22 00 00	0.00000	rel
329	GP13	2007 04 14 00 00 00	0.00000	rel
330	GP13	2007 04 14 02 00 00	0.00000	rel
331	GP13	2007 04 14 04 00 00	0.00000	rel
332	GP13	2007 04 14 06 00 00	0.00000	rel
333	GP13	2007 04 14 08 00 00	0.00000	rel
334	GP13	2007 04 14 10 00 00	0.00000	rel
335	GP13	2007 04 14 12 00 00	0.00000	rel
336	GP13	2007 04 14 14 00 00	0.00000	rel
337	GP13	2007 04 14 16 00 00	0.00000	rel
338	GP13	2007 04 14 18 00 00	0.00000	rel
339	GP13	2007 04 14 20 00 00	0.00000	rel
340	GP13	2007 04 14 22 00 00	0.00000	rel
341	GP13	2007 04 15 00 00 00	0.00000	rel
342	GP13	2007 04 15 02 00 00	0.00000	rel
343	GP13	2007 04 15 04 00 00	0.00000	rel
344	GP13	2007 04 15 06 00 00	0.00000	rel
345	GP13	2007 04 15 08 00 00	0.00000	rel
346	GP13	2007 04 15 10 00 00	0.00000	rel
347	GP13	2007 04 15 12 00 00	0.00000	rel
348	GP13	2007 04 15 14 00 00	0.00000	rel
349	GP13	2007 04 15 16 00 00	0.00000	rel
350	GP13	2007 04 15 18 00 00	0.00000	rel
351	GP13	2007 04 15 20 00 00	0.00000	rel
352	GP13	2007 04 15 22 00 00	0.00000	rel
353	GP13	2007 04 16 00 00 00	0.00000	rel
354	GP13	2007 04 16 02 00 00	0.00000	rel
355	GP13	2007 04 16 04 00 00	0.00000	rel
356	GP13	2007 04 16 06 00 00	0.00000	rel



```

357 GP13      2007 04 16 08 00 00      0.00000   rel
358 GP13      2007 04 16 10 00 00      0.00000   rel
359 GP13      2007 04 16 12 00 00      0.00000   rel
360 GP13      2007 04 16 14 00 00      0.00000   rel

```

IONOSPHERE MODELS:                    \${P}/OLKI07K\ATM\OLKI07K.ION

-----  
TYPE OF IONOSPHERE MODELS : LOCAL  
RADIUS OF THE EARTH        : 6378.14 KM

MODEL	DEG. OF DEVELOP.			VALIDITY			ORIGIN OF DEVELOPMENT			HEIGHT (KM)	NORMAIZATION FACTORS		
	TIME	LAT.	MIXED	START	END	LOCAL TIME	LAT. (D)	LONG. (D)	TIME (H)		LAT. (D)	ELE. CONT.	
2	2	1	2	2007 4 13 5.0	2007 4 13 13.0	2007 4 13 9.0	61.23	21.47	450	2.00	6.00	0.10D+18	
3	2	1	2	2007 4 13 11.0	2007 4 13 19.0	2007 4 13 15.0	61.23	21.47	450	2.00	6.00	0.10D+18	
4	2	1	2	2007 4 13 17.0	2007 4 14 1.0	2007 4 13 21.0	61.23	21.47	450	2.00	6.00	0.10D+18	
5	2	1	2	2007 4 13 23.0	2007 4 14 7.0	2007 4 14 3.0	61.23	21.47	450	2.00	6.00	0.10D+18	
6	2	1	2	2007 4 14 5.0	2007 4 14 13.0	2007 4 14 9.0	61.23	21.47	450	2.00	6.00	0.10D+18	
7	2	1	2	2007 4 14 11.0	2007 4 14 19.0	2007 4 14 15.0	61.23	21.47	450	2.00	6.00	0.10D+18	
8	2	1	2	2007 4 14 17.0	2007 4 15 1.0	2007 4 14 21.0	61.23	21.47	450	2.00	6.00	0.10D+18	
9	2	1	2	2007 4 14 23.0	2007 4 15 7.0	2007 4 15 3.0	61.23	21.47	450	2.00	6.00	0.10D+18	
10	2	1	2	2007 4 15 5.0	2007 4 15 13.0	2007 4 15 9.0	61.23	21.47	450	2.00	6.00	0.10D+18	
11	2	1	2	2007 4 15 11.0	2007 4 15 19.0	2007 4 15 15.0	61.23	21.47	450	2.00	6.00	0.10D+18	
12	2	1	2	2007 4 15 17.0	2007 4 16 1.0	2007 4 15 21.0	61.23	21.47	450	2.00	6.00	0.10D+18	
13	2	1	2	2007 4 15 23.0	2007 4 16 7.0	2007 4 16 3.0	61.23	21.47	450	2.00	6.00	0.10D+18	
14	2	1	2	2007 4 16 5.0	2007 4 16 13.0	2007 4 16 9.0	61.23	21.47	450	2.00	6.00	0.10D+18	
15	2	1	2	2007 4 16 11.0	2007 4 16 19.0	2007 4 16 15.0	61.23	21.47	450	2.00	6.00	0.10D+18	

MODEL	TERM	POL. DEGREE IN		COEFFICIENT	SIGMA
		TIME	LATIT.		
2	1	0	0	0.954426E+00	0.407388E-02
	2	1	0	0.386157E-01	0.115735E-02
	3	2	0	-0.468942E-01	0.989808E-03
	4	0	1	-0.174385E+00	0.164722E-02
	5	1	1	-0.191625E-01	0.205924E-02
3	1	0	0	0.980776E+00	0.287458E-02
	2	1	0	0.639197E-04	0.727710E-03
	3	2	0	-0.123114E-01	0.656865E-03
	4	0	1	-0.136393E+00	0.108497E-02
	5	1	1	-0.109401E-01	0.111532E-02
4	1	0	0	0.553990E+00	0.576998E-02
	2	1	0	-0.170708E+00	0.180323E-02
	3	2	0	0.376589E-01	0.155057E-02
	4	0	1	-0.181803E+00	0.258740E-02
	5	1	1	-0.692851E-01	0.270507E-02

5	1	0	0	0.466204E+00	0.503640E-02
	2	1	0	0.155599E+00	0.115583E-02
	3	2	0	0.657829E-01	0.918545E-03
	4	0	1	-0.164329E+00	0.179422E-02
	5	1	1	-0.584264E-02	0.141920E-02
6	1	0	0	0.920924E+00	0.368127E-02
	2	1	0	0.606680E-01	0.106491E-02
	3	2	0	-0.152160E-01	0.908989E-03
	4	0	1	-0.182646E+00	0.148963E-02
	5	1	1	-0.101100E-01	0.190251E-02
7	1	0	0	0.100386E+01	0.320670E-02
	2	1	0	-0.226028E-01	0.852598E-03
	3	2	0	-0.128704E-01	0.745664E-03
	4	0	1	-0.131888E+00	0.122324E-02
	5	1	1	-0.166490E-01	0.121852E-02
8	1	0	0	0.505621E+00	0.470558E-02
	2	1	0	-0.119801E+00	0.135065E-02
	3	2	0	0.274275E-01	0.122411E-02
	4	0	1	-0.185687E+00	0.213792E-02
	5	1	1	-0.586422E-01	0.201822E-02
9	1	0	0	0.541182E+00	0.493563E-02
	2	1	0	0.124439E+00	0.113825E-02
	3	2	0	0.574840E-01	0.907099E-03
	4	0	1	-0.110479E+00	0.177505E-02
	5	1	1	-0.584751E-01	0.142828E-02
10	1	0	0	0.888433E+00	0.500800E-02
	2	1	0	0.513252E-01	0.146989E-02
	3	2	0	-0.239376E-01	0.125460E-02
	4	0	1	-0.164210E+00	0.203685E-02
	5	1	1	-0.362609E-01	0.263214E-02
11	1	0	0	0.977354E+00	0.418320E-02
	2	1	0	-0.289492E-02	0.111653E-02
	3	2	0	-0.390980E-02	0.978748E-03
	4	0	1	-0.184715E+00	0.160837E-02
	5	1	1	-0.441256E-01	0.159635E-02
12	1	0	0	0.412463E+00	0.652373E-02
	2	1	0	-0.153431E+00	0.203352E-02
	3	2	0	0.495812E-01	0.176337E-02
	4	0	1	-0.228338E+00	0.286401E-02
	5	1	1	-0.611365E-01	0.298219E-02
13	1	0	0	0.553800E+00	0.495119E-02
	2	1	0	0.172941E+00	0.114442E-02
	3	2	0	0.466108E-01	0.907213E-03
	4	0	1	-0.171117E+00	0.178995E-02
	5	1	1	-0.280119E-01	0.143236E-02

14	1	0	0	0.889582E+00	0.472345E-02
	2	1	0	0.544111E-01	0.140192E-02
	3	2	0	-0.197043E-01	0.119877E-02
	4	0	1	-0.176224E+00	0.193048E-02
	5	1	1	-0.263130E-01	0.251964E-02
15	1	0	0	0.102675E+01	0.332686E-02
	2	1	0	-0.196361E-01	0.887353E-03
	3	2	0	-0.989483E-02	0.775728E-03
	4	0	1	-0.138941E+00	0.129106E-02
	5	1	1	-0.270901E-01	0.126170E-02

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8. POLE COORDINATES AND TIME INFORMATION

A PRIORI POLE AND TIME INFORMATION FROM THE POLE FILE:

DATUM	TIME	X-POLE (") EP-CPO (")	Y-POLE (") PS-CPO (")	UT1-UTC (S)	GPS-UTC (S)	RMS XP (") RMS EP (")	RMS YP (") RMS PS (")	RMS DT (S)
07-04-13	00:00:00	0.04703 0.00000	0.48890 0.00000	-0.081849	14.	0.00001 0.00017	0.00001 0.00017	0.000019
07-04-14	00:00:00	0.04872 0.00000	0.48930 0.00000	-0.083750	14.	0.00001 0.00017	0.00002 0.00017	0.000028
07-04-15	00:00:00	0.05040 0.00000	0.48970 0.00000	-0.085883	14.	0.00001 0.00020	0.00002 0.00019	0.000036
07-04-16	00:00:00	0.05223 0.00000	0.49012 0.00000	-0.088163	14.	0.00002 0.00043	0.00001 0.00078	0.000034
07-04-17	00:00:00	0.05428 0.00000	0.49047 0.00000	-0.090429	14.	0.00002 0.00015	0.00001 0.00028	0.000026

NUTATION MODEL: IAU2000  
SUBDAILY POLE MODEL: IERS2000

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12. TEST OUTPUT

MIN. AND MAX. ELEVATION/NADIR ANGLES AND MAX. SYNCHRONIZATION ERRORS:

SESS	FILE	STATION NAME 1	STATION NAME 2	MIN/MAX ELEV.	MIN/MAX NADIR	SYNCH. ERR. (NS)
1050	1	GPS1	GPS2	20.0 83.7	1.5 13.2	0.0
1060	2	GPS1	GPS2	20.0 81.5	2.0 13.3	0.0
1050	3	GPS1	GPS3	20.0 83.7	1.5 13.2	0.0
1060	4	GPS1	GPS3	20.0 81.5	2.0 13.3	0.0
1030	5	GPS1	GPS4	20.0 83.7	1.5 13.2	0.0
1040	6	GPS1	GPS4	20.0 81.9	1.9 13.3	0.0
1030	7	GPS1	GPS5	20.0 83.7	1.5 13.3	0.0
1040	8	GPS1	GPS5	20.0 81.9	1.9 13.3	0.0
1050	9	GPS1	GPS5	20.0 83.7	1.5 13.2	0.0
1060	10	GPS1	GPS5	20.0 81.5	2.0 13.2	0.0
1030	11	GPS1	GPS6	20.0 83.7	1.5 13.3	0.0
1040	12	GPS1	GPS6	20.0 81.9	1.9 13.3	0.0
1050	13	GPS1	GPS6	20.0 83.7	1.5 13.2	0.0
1060	14	GPS1	GPS6	20.0 81.5	2.0 13.3	0.0
1030	15	GPS1	GPS7	20.0 83.7	1.5 13.3	0.0
1040	16	GPS1	GPS7	20.0 81.9	1.9 13.3	0.0
1050	17	GPS1	GPS8	20.0 83.7	1.5 13.2	0.0
1060	18	GPS1	GPS8	20.0 81.5	2.0 13.3	0.0
1050	19	GPS6	GPS9	20.0 83.7	1.5 13.2	0.0
1060	20	GPS6	GPS9	20.0 81.5	2.0 13.3	0.0
1050	21	GPS6	GP13	20.0 83.7	1.5 13.2	0.0
1060	22	GPS6	GP13	20.0 81.5	2.0 13.3	0.0
1030	23	GPS7	GPS8	20.0 83.7	1.5 13.3	0.0
1040	24	GPS7	GPS8	20.0 81.9	1.9 13.3	0.0
1030	25	GPS7	GPS9	20.0 83.7	1.5 13.3	0.0
1040	26	GPS7	GPS9	20.0 81.9	1.9 13.3	0.0
1030	27	GPS7	GP13	20.0 83.7	1.5 13.3	0.0
1040	28	GPS7	GP13	20.0 81.9	1.9 13.3	0.0

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13. RESULTS (PART 1)

NUMBER OF PARAMETERS (PART 1):

PARAMETER TYPE	#PARAMETERS	#PRE-ELIMINATED	#SET-UP	#NO-OBS	#REF	#SINGULAR
STATION COORDINATES	30	0	30	0	0	0
AMBIGUITIES	29	29 (BEFORE INV)	1027	998	0	0

SITE-SPECIFIC TROPOSPHERE PARAMETERS                    360            0                    360            0            0            141

-----  
TOTAL NUMBER OF PARAMETERS                    419            29                    1417            998            0            141  
-----

NUMBER OF OBSERVATIONS (PART 1):  
-----

TYPE	FREQUENCY	FILE	#OBSERVATIONS
PHASE	L1	ALL	245233
PHASE	L2	ALL	245233

-----  
TOTAL NUMBER OF OBSERVATIONS                    490466  
-----

A POSTERIORI SIGMA OF UNIT WEIGHT (PART 1):  
-----

A POSTERIORI SIGMA OF UNIT WEIGHT :    0.0019 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)  
DEGREE OF FREEDOM (DOF)                    :    490188  
CHI\*\*2/DOF                                    :      3.52

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STATION COORDINATES:                                    \${P}/OLKI07K\STA\TOLKI07K.CRD  
-----

NUM	STATION NAME	PARAMETER	A PRIORI VALUE	NEW VALUE	NEW- A PRIORI	RMS ERROR	3-D ELLIPSOID		2-D ELLIPSE	
1	GPS1	X	2863210.1067	2863210.1067	0.0000	0.0000				
		Y	1126271.4390	1126271.4390	0.0000	0.0000				
		Z	5568267.2990	5568267.2990	0.0000	0.0000				
	HEIGHT		30.5520	30.5520	0.0000	0.0000	0.0000	0.0		
		LATITUDE	61 14 22.754183	61 14 22.754183	0.0000	0.0000	0.0000	90.0	0.0000	90.0
		LONGITUDE	21 28 21.633926	21 28 21.633926	0.0000	0.0000	0.0000	0.0	0.0000	
2	GPS2	X	2863312.4876	2863312.4895	0.0019	0.0002				
		Y	1127586.4513	1127586.4505	-0.0008	0.0001				
		Z	5567953.2561	5567953.2606	0.0045	0.0003				

		HEIGHT	32.8443	32.8489	0.0046	0.0004	0.0004	0.6			
		LATITUDE	61 14 1.535088	61 14 1.535116	0.0009	0.0001	0.0000	88.1	0.0000	87.8	
		LONGITUDE	21 29 41.145601	21 29 41.145503	-0.0015	0.0000	0.0001	-0.3	0.0001		
3	GPS3	X	2862323.4428	2862323.4467	0.0039	0.0002					
		Y	1126533.7706	1126533.7721	0.0015	0.0001					
		Z	5568664.0772	5568664.0834	0.0062	0.0003					
		HEIGHT	27.6613	27.6688	0.0075	0.0004	0.0004	0.6			
		LATITUDE	61 14 49.568852	61 14 49.568828	-0.0007	0.0001	0.0000	88.1	0.0000	87.8	
		LONGITUDE	21 28 59.767954	21 28 59.767954	0.0000	0.0000	0.0001	-0.3	0.0001		
4	GPS4	X	2862758.9415	2862758.9460	0.0045	0.0002					
		Y	1125923.2376	1125923.2378	0.0002	0.0001					
		Z	5568566.0154	5568566.0236	0.0082	0.0003					
		HEIGHT	29.1133	29.1225	0.0092	0.0004	0.0004	0.6			
		LATITUDE	61 14 42.897724	61 14 42.897732	0.0003	0.0001	0.0000	87.5	0.0000	87.2	
		LONGITUDE	21 28 10.980705	21 28 10.980605	-0.0015	0.0000	0.0001	-0.3	0.0001		
5	GPS5	X	2864192.3764	2864192.3723	-0.0041	0.0001					
		Y	1126421.6871	1126421.6865	-0.0006	0.0001					
		Z	5567725.8796	5567725.8700	-0.0096	0.0003					
		HEIGHT	22.2982	22.2879	-0.0103	0.0003	0.0003	0.6			
		LATITUDE	61 13 46.892454	61 13 46.892421	-0.0010	0.0000	0.0000	88.5	0.0000	88.2	
		LONGITUDE	21 28 6.906786	21 28 6.906847	0.0009	0.0000	0.0000	-0.3	0.0000		
6	GPS6	X	2863910.3892	2863910.3945	0.0053	0.0002					
		Y	1125229.5963	1125229.5974	0.0011	0.0001					
		Z	5568112.5408	5568112.5527	0.0119	0.0003					
		HEIGHT	25.0654	25.0784	0.0130	0.0003	0.0003	0.7			
		LATITUDE	61 14 12.686451	61 14 12.686484	0.0010	0.0000	0.0000	88.5	0.0000	88.1	
		LONGITUDE	21 26 59.459035	21 26 59.458973	-0.0009	0.0000	0.0000	-0.3	0.0000		
7	GPS7	X	2863465.8530	2863465.8559	0.0029	0.0002					
		Y	1124819.7828	1124819.7828	0.0000	0.0001					
		Z	5568430.2557	5568430.2643	0.0086	0.0003					
		HEIGHT	32.4126	32.4214	0.0088	0.0004	0.0004	0.7			
		LATITUDE	61 14 33.586772	61 14 33.586829	0.0018	0.0001	0.0000	87.8	0.0000	87.5	
		LONGITUDE	21 26 44.784815	21 26 44.784742	-0.0011	0.0000	0.0001	-0.3	0.0001		
8	GPS8	X	2863019.7046	2863019.7094	0.0048	0.0001					
		Y	1124739.5538	1124739.5543	0.0005	0.0001					
		Z	5568666.6848	5568666.6952	0.0104	0.0003					
		HEIGHT	25.8084	25.8198	0.0114	0.0003	0.0003	0.6			
		LATITUDE	61 14 49.853077	61 14 49.853105	0.0009	0.0000	0.0000	87.8	0.0000	87.5	
		LONGITUDE	21 26 50.715669	21 26 50.715583	-0.0013	0.0000	0.0000	-0.3	0.0000		
9	GPS9	X	2863742.0387	2863742.0404	0.0017	0.0002					

Y	1123996.6145	1123996.6144	-0.0001	0.0001					
Z	5568453.4720	5568453.4806	0.0086	0.0003					
HEIGHT	31.7025	31.7108	0.0083	0.0003	0.0003	0.7			
LATITUDE	61 14 35.187574	61 14 35.187662	0.0027	0.0000	0.0000	88.4	0.0000	88.1	
LONGITUDE	21 25 46.644762	21 25 46.644715	-0.0007	0.0000	0.0000	-0.3	0.0000		
10 GP13	X	2864309.0028	2864309.0098	0.0070	0.0002				
	Y	1124134.0361	1124134.0389	0.0028	0.0001				
	Z	5568134.1930	5568134.2006	0.0076	0.0003				
	HEIGHT	29.8962	29.9065	0.0103	0.0003	0.0003	0.7		
	LATITUDE	61 14 13.855835	61 14 13.855740	-0.0029	0.0000	0.0000	88.3	0.0000	88.0
	LONGITUDE	21 25 41.334054	21 25 41.334060	0.0001	0.0000	0.0000	-0.3	0.0000	

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PROGRAM GPSEST 12-FEB-08 13:53  
BERNESE GPS SOFTWARE VERSION 5.0

SITE-SPECIFIC TROPOSPHERE PARAMETERS: (NOT SAVED)

REQU.	STATION NAME	CORRECTIONS (M)			RMS ERRORS (M)			ZENITH VECTOR (")				ERROR ELLIPSE (M)				
		NORTH	EAST	ZENITH	NORTH	EAST	ZENITH	ANGLE	RMS	RATIO	AZI	MAX	RMS	MIN	RMS	AZI
1	GPS2			0.00000			0.00000									
2	GPS2			0.00000			0.00000									
3	GPS2			0.00000			0.00000									
4	GPS2			0.00000			0.00000									
5	GPS2			0.00000			0.00000									
6	GPS2			0.00000			0.00000									
7	GPS2			0.00000			0.00000									
8	GPS2			0.00000			0.00000									
9	GPS2			0.00000			0.00000									
10	GPS2			0.00000			0.00000									
11	GPS2			0.00000			0.00000									
12	GPS2			0.00000			0.00000									
13	GPS2			0.00000			0.00000									
14	GPS2			0.00000			0.00000									
15	GPS2			0.00000			0.00000									
16	GPS2			0.00000			0.00000									
17	GPS2			0.00000			0.00000									
18	GPS2			0.00000			0.00000									
19	GPS2			0.00000			0.00000									
20	GPS2			0.00000			0.00000									
21	GPS2			0.00000			0.00000									
22	GPS2			0.00000			0.00000									
23	GPS2			0.00000			0.00000									
24	GPS2			0.00000			0.00000									
25	GPS2			-0.00244			0.00047									

26	GPS2	0.00005	0.00031
27	GPS2	-0.00290	0.00028
28	GPS2	-0.00061	0.00028
29	GPS2	-0.00141	0.00026
30	GPS2	-0.00160	0.00028
31	GPS2	-0.00165	0.00027
32	GPS2	0.00041	0.00028
33	GPS2	-0.00240	0.00026
34	GPS2	-0.00061	0.00028
35	GPS2	-0.00133	0.00028
36	GPS2	-0.00191	0.00025
37	GPS2	-0.00028	0.00031
38	GPS2	-0.00014	0.00030
39	GPS2	-0.00275	0.00031
40	GPS2	-0.00246	0.00068
41	GPS3	0.00000	0.00000
42	GPS3	0.00000	0.00000
43	GPS3	0.00000	0.00000
44	GPS3	0.00000	0.00000
45	GPS3	0.00000	0.00000
46	GPS3	0.00000	0.00000
47	GPS3	0.00000	0.00000
48	GPS3	0.00000	0.00000
49	GPS3	0.00000	0.00000
50	GPS3	0.00000	0.00000
51	GPS3	0.00000	0.00000
52	GPS3	0.00000	0.00000
53	GPS3	0.00000	0.00000
54	GPS3	0.00000	0.00000
55	GPS3	0.00000	0.00000
56	GPS3	0.00000	0.00000
57	GPS3	0.00000	0.00000
58	GPS3	0.00000	0.00000
59	GPS3	0.00000	0.00000
60	GPS3	0.00000	0.00000
61	GPS3	0.00000	0.00000
62	GPS3	0.00000	0.00000
63	GPS3	0.00000	0.00000
64	GPS3	0.00000	0.00000
65	GPS3	-0.00964	0.00070
66	GPS3	-0.00315	0.00032
67	GPS3	-0.00466	0.00028
68	GPS3	-0.00339	0.00028
69	GPS3	-0.00367	0.00026
70	GPS3	-0.00436	0.00028
71	GPS3	-0.00285	0.00027
72	GPS3	-0.00378	0.00028
73	GPS3	-0.00380	0.00025
74	GPS3	-0.00444	0.00027
75	GPS3	-0.00388	0.00027
76	GPS3	-0.00208	0.00024
77	GPS3	-0.00387	0.00031
78	GPS3	-0.00385	0.00030



79	GPS3	-0.00447	0.00032
80	GPS3	-0.00160	0.00096
81	GPS4	-0.00438	0.00052
82	GPS4	-0.00293	0.00030
83	GPS4	-0.00451	0.00029
84	GPS4	-0.00313	0.00029
85	GPS4	-0.00321	0.00027
86	GPS4	-0.00418	0.00028
87	GPS4	-0.00239	0.00028
88	GPS4	-0.00331	0.00028
89	GPS4	-0.00342	0.00026
90	GPS4	-0.00392	0.00028
91	GPS4	-0.00247	0.00028
92	GPS4	-0.00279	0.00025
93	GPS4	-0.00275	0.00033
94	GPS4	-0.00274	0.00029
95	GPS4	-0.00455	0.00032
96	GPS4	-0.00233	0.00077
97	GPS4	0.00000	0.00000
98	GPS4	0.00000	0.00000
99	GPS4	0.00000	0.00000
100	GPS4	0.00000	0.00000
101	GPS4	0.00000	0.00000
102	GPS4	0.00000	0.00000
103	GPS4	0.00000	0.00000
104	GPS4	0.00000	0.00000
105	GPS4	0.00000	0.00000
106	GPS4	0.00000	0.00000
107	GPS4	0.00000	0.00000
108	GPS4	0.00000	0.00000
109	GPS4	0.00000	0.00000
110	GPS4	0.00000	0.00000
111	GPS4	0.00000	0.00000
112	GPS4	0.00000	0.00000
113	GPS4	0.00000	0.00000
114	GPS4	0.00000	0.00000
115	GPS4	0.00000	0.00000
116	GPS4	0.00000	0.00000
117	GPS4	0.00000	0.00000
118	GPS4	0.00000	0.00000
119	GPS4	0.00000	0.00000
120	GPS4	0.00000	0.00000
121	GPS5	0.00000	0.00000
122	GPS5	-0.00578	0.00095
123	GPS5	-0.00030	0.00029
124	GPS5	0.00335	0.00027
125	GPS5	0.00248	0.00025
126	GPS5	0.00370	0.00027
127	GPS5	0.00219	0.00026
128	GPS5	0.00007	0.00026
129	GPS5	0.00133	0.00024
130	GPS5	0.00098	0.00026
131	GPS5	0.00058	0.00026

132	GPS5	0.00483	0.00024
133	GPS5	-0.00078	0.00032
134	GPS5	0.00083	0.00029
135	GPS5	-0.00264	0.00052
136	GPS5	0.00000	0.00000
137	GPS5	0.00000	0.00000
138	GPS5	0.00000	0.00000
139	GPS5	0.00000	0.00000
140	GPS5	0.00000	0.00000
141	GPS5	0.00000	0.00000
142	GPS5	0.00000	0.00000
143	GPS5	0.00000	0.00000
144	GPS5	-0.04298	0.14983
145	GPS5	0.00216	0.00034
146	GPS5	0.00030	0.00029
147	GPS5	-0.00119	0.00027
148	GPS5	0.00374	0.00027
149	GPS5	0.00280	0.00025
150	GPS5	0.00415	0.00026
151	GPS5	0.00079	0.00026
152	GPS5	0.00152	0.00027
153	GPS5	0.00033	0.00023
154	GPS5	0.00179	0.00026
155	GPS5	0.00106	0.00026
156	GPS5	0.00380	0.00024
157	GPS5	0.00053	0.00031
158	GPS5	0.00103	0.00028
159	GPS5	-0.00198	0.00028
160	GPS5	0.00873	0.00045
161	GPS6	-0.00907	0.00110
162	GPS6	-0.00282	0.00031
163	GPS6	-0.00508	0.00027
164	GPS6	-0.00408	0.00027
165	GPS6	-0.00445	0.00025
166	GPS6	-0.00385	0.00027
167	GPS6	-0.00264	0.00027
168	GPS6	-0.00435	0.00027
169	GPS6	-0.00310	0.00024
170	GPS6	-0.00407	0.00026
171	GPS6	-0.00330	0.00025
172	GPS6	-0.00344	0.00023
173	GPS6	-0.00399	0.00032
174	GPS6	-0.00303	0.00028
175	GPS6	-0.00499	0.00036
176	GPS6	0.00000	0.00000
177	GPS6	0.00000	0.00000
178	GPS6	0.00000	0.00000
179	GPS6	0.00000	0.00000
180	GPS6	0.00000	0.00000
181	GPS6	0.00000	0.00000
182	GPS6	0.00000	0.00000
183	GPS6	0.00000	0.00000
184	GPS6	0.00000	0.00000

185	GPS6	0.00107	0.00142
186	GPS6	-0.00326	0.00032
187	GPS6	-0.00546	0.00027
188	GPS6	-0.00365	0.00027
189	GPS6	-0.00449	0.00025
190	GPS6	-0.00393	0.00026
191	GPS6	-0.00329	0.00026
192	GPS6	-0.00333	0.00027
193	GPS6	-0.00408	0.00023
194	GPS6	-0.00308	0.00026
195	GPS6	-0.00356	0.00026
196	GPS6	-0.00432	0.00023
197	GPS6	-0.00408	0.00031
198	GPS6	-0.00296	0.00031
199	GPS6	-0.00055	0.00439
200	GPS6	0.00000	0.00000
201	GPS7	0.07214	0.00288
202	GPS7	-0.00475	0.00034
203	GPS7	-0.00430	0.00029
204	GPS7	-0.00354	0.00029
205	GPS7	-0.00365	0.00027
206	GPS7	-0.00419	0.00028
207	GPS7	-0.00259	0.00028
208	GPS7	-0.00422	0.00028
209	GPS7	-0.00309	0.00026
210	GPS7	-0.00406	0.00028
211	GPS7	-0.00332	0.00027
212	GPS7	-0.00291	0.00024
213	GPS7	-0.00254	0.00033
214	GPS7	-0.00296	0.00029
215	GPS7	-0.00451	0.00035
216	GPS7	-0.00482	0.00186
217	GPS7	0.00000	0.00000
218	GPS7	0.00000	0.00000
219	GPS7	0.00000	0.00000
220	GPS7	0.00000	0.00000
221	GPS7	0.00000	0.00000
222	GPS7	0.00000	0.00000
223	GPS7	0.00000	0.00000
224	GPS7	0.00000	0.00000
225	GPS7	0.00000	0.00000
226	GPS7	0.00000	0.00000
227	GPS7	0.00000	0.00000
228	GPS7	0.00000	0.00000
229	GPS7	0.00000	0.00000
230	GPS7	0.00000	0.00000
231	GPS7	0.00000	0.00000
232	GPS7	0.00000	0.00000
233	GPS7	0.00000	0.00000
234	GPS7	0.00000	0.00000
235	GPS7	0.00000	0.00000
236	GPS7	0.00000	0.00000
237	GPS7	0.00000	0.00000

238	GPS7	0.00000	0.00000
239	GPS7	0.00000	0.00000
240	GPS7	0.00000	0.00000
241	GPS8	-0.08406	0.00359
242	GPS8	-0.00250	0.00033
243	GPS8	-0.00573	0.00027
244	GPS8	-0.00434	0.00027
245	GPS8	-0.00408	0.00025
246	GPS8	-0.00638	0.00027
247	GPS8	-0.00577	0.00027
248	GPS8	-0.00459	0.00027
249	GPS8	-0.00428	0.00024
250	GPS8	-0.00431	0.00026
251	GPS8	-0.00433	0.00025
252	GPS8	-0.00273	0.00023
253	GPS8	-0.00270	0.00032
254	GPS8	-0.00330	0.00028
255	GPS8	-0.00525	0.00033
256	GPS8	-0.00595	0.00185
257	GPS8	0.00000	0.00000
258	GPS8	0.00000	0.00000
259	GPS8	0.00000	0.00000
260	GPS8	0.00000	0.00000
261	GPS8	0.00000	0.00000
262	GPS8	0.00000	0.00000
263	GPS8	0.00000	0.00000
264	GPS8	0.00000	0.00000
265	GPS8	0.00157	0.00112
266	GPS8	-0.00452	0.00032
267	GPS8	-0.00583	0.00027
268	GPS8	-0.00342	0.00027
269	GPS8	-0.00456	0.00025
270	GPS8	-0.00486	0.00026
271	GPS8	-0.00140	0.00026
272	GPS8	-0.00561	0.00027
273	GPS8	-0.00483	0.00024
274	GPS8	-0.00361	0.00026
275	GPS8	-0.00427	0.00026
276	GPS8	-0.00337	0.00023
277	GPS8	-0.00331	0.00030
278	GPS8	-0.00357	0.00029
279	GPS8	-0.00594	0.00032
280	GPS8	-0.00102	0.00208
281	GPS9	-0.10673	0.00360
282	GPS9	-0.00029	0.00033
283	GPS9	-0.00412	0.00027
284	GPS9	-0.00153	0.00027
285	GPS9	-0.00273	0.00025
286	GPS9	-0.00348	0.00027
287	GPS9	-0.00056	0.00026
288	GPS9	-0.00403	0.00027
289	GPS9	-0.00173	0.00024
290	GPS9	-0.00226	0.00026

291	GPS9	-0.00229	0.00026
292	GPS9	-0.00247	0.00023
293	GPS9	-0.00011	0.00032
294	GPS9	-0.00234	0.00028
295	GPS9	-0.00331	0.00034
296	GPS9	-0.03735	0.02649
297	GPS9	0.00000	0.00000
298	GPS9	0.00000	0.00000
299	GPS9	0.00000	0.00000
300	GPS9	0.00000	0.00000
301	GPS9	0.00000	0.00000
302	GPS9	0.00000	0.00000
303	GPS9	0.00000	0.00000
304	GPS9	0.00000	0.00000
305	GPS9	-0.00562	0.00183
306	GPS9	-0.00169	0.00033
307	GPS9	-0.00453	0.00027
308	GPS9	-0.00029	0.00027
309	GPS9	-0.00302	0.00025
310	GPS9	-0.00327	0.00026
311	GPS9	-0.00071	0.00026
312	GPS9	-0.00268	0.00027
313	GPS9	-0.00285	0.00023
314	GPS9	-0.00115	0.00026
315	GPS9	-0.00240	0.00026
316	GPS9	-0.00354	0.00024
317	GPS9	-0.00192	0.00031
318	GPS9	-0.00266	0.00031
319	GPS9	-0.00195	0.00440
320	GPS9	0.00000	0.00000
321	GP13	-0.02616	0.00785
322	GP13	-0.00200	0.00034
323	GP13	-0.00439	0.00027
324	GP13	-0.00345	0.00027
325	GP13	-0.00378	0.00025
326	GP13	-0.00368	0.00027
327	GP13	-0.00197	0.00026
328	GP13	-0.00465	0.00027
329	GP13	-0.00213	0.00024
330	GP13	-0.00357	0.00026
331	GP13	-0.00281	0.00025
332	GP13	-0.00278	0.00023
333	GP13	-0.00260	0.00032
334	GP13	-0.00217	0.00028
335	GP13	-0.00433	0.00033
336	GP13	-0.00597	0.00185
337	GP13	0.00000	0.00000
338	GP13	0.00000	0.00000
339	GP13	0.00000	0.00000
340	GP13	0.00000	0.00000
341	GP13	0.00000	0.00000
342	GP13	0.00000	0.00000
343	GP13	0.00000	0.00000

344	GP13	0.00000	0.00000
345	GP13	-0.00561	0.00367
346	GP13	-0.00228	0.00034
347	GP13	-0.00514	0.00027
348	GP13	-0.00224	0.00027
349	GP13	-0.00413	0.00025
350	GP13	-0.00361	0.00026
351	GP13	-0.00261	0.00026
352	GP13	-0.00300	0.00027
353	GP13	-0.00347	0.00023
354	GP13	-0.00260	0.00026
355	GP13	-0.00315	0.00026
356	GP13	-0.00433	0.00023
357	GP13	-0.00411	0.00031
358	GP13	-0.00226	0.00032
359	GP13	-0.00771	0.01250
360	GP13	0.00000	0.00000

1\${P}/OLKI07K  
OLKI07K

PROGRAM GPSEST 12-FEB-08 13:53  
BERNESE GPS SOFTWARE VERSION 5.0

-----  
RMS ERRORS OF ELLIP. COORDINATES AND COORDINATE DIFFER. IN MM (PART 1):  
-----

NUM		1	2	3	4	5	6	7	8	9	10
1	B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
1	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	H	0.0	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3
2	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	H	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.4
3	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	H	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.4
4	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	H	0.4	0.5	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.4
5	B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
5	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	H	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3
6	B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
6	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	H	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3

7	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4
8	B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3
9	B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3
10	B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3

1\${P}/OLKI07K  
OLKI07K

PROGRAM GPSEST 12-FEB-08 13:53  
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SLOPE DISTANCES AND RMS ERRORS IN M (PART 1):

NUM		2 N	3 N	4 N	5 N	6 N	7 N	8 N	9 N
1	O	1355.8621	1006.1927	643.4483	1131.6197	1264.8248	1482.9925	1594.5013	2343.5952
	N	1355.8604	1006.1920	643.4489	1131.6206	1264.8254	1482.9940	1594.5028	2343.5964
	RMS	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
2	O		1609.8487	1856.9241	1477.3558	2436.7239	2811.6728	2949.4962	3649.8847
	N		1609.8467	1856.9237	1477.3542	2436.7234	2811.6728	2949.4960	3649.8845
	RMS		0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
3	O			756.3239	2094.2040	2126.8432	2073.0479	1924.5782	2914.4348
	N			756.3250	2094.2039	2126.8430	2073.0484	1924.5795	2914.4349
	RMS			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	O				1734.6515	1418.6646	1317.4851	1216.2397	2165.8769
	N				1734.6527	1418.6637	1317.4844	1216.2396	2165.8758
	RMS				0.0001	0.0000	0.0000	0.0000	0.0000
5	O					1284.5638	1894.7505	2256.0687	2571.6088
	N					1284.5666	1894.7540	2256.0715	2571.6124
	RMS					0.0000	0.0000	0.0000	0.0000
6	O						683.0097	1157.8153	1290.2791
	N						683.0104	1157.8152	1290.2798
	RMS						0.0001	0.0000	0.0000

7	O
N	N
	RMS
8	O
N	N
	RMS
9	O
N	N
	RMS

511.2571	868.5756
511.2562	868.5753
0.0001	0.0000
	1057.9154
	1057.9141
	0.0000

1\$(P)/OLKI07K  
OLKI07K

PROGRAM GPSEST 12-FEB-08 13:53  
BERNESE GPS SOFTWARE VERSION 5.0

SLOPE DISTANCES AND RMS ERRORS IN M (PART 1): CONTINUATION

NUM		10 N
1	O	2407.0274
N	N	2407.0277
	RMS	0.0000
2	O	3597.9093
N	N	3597.9074
	RMS	0.0000
3	O	3159.4226
N	N	3159.4233
	RMS	0.0000
4	O	2406.3255
N	N	2406.3253
	RMS	0.0000
5	O	2326.7292
N	N	2326.7293
	RMS	0.0000
6	O	1166.0248
N	N	1166.0236
	RMS	0.0000
7	O	1126.4117
N	N	1126.4132
	RMS	0.0000



	8		O		1520.6870	
	N		N		1520.6889	
			RMS		0.0000	
	9		O		665.0354	
	N		N		665.0409	
			RMS		0.0000	

-----

### Appendix III. Results of the second measurements at Olkiluoto in 2007.

```
=====
Program : GPSEST                               Bernese GPS Software Version 5.0
Purpose : Parameter estimation
Campaign: ${P}/OLKI07S                          Default session: 2750 year 2007
Date    : 13-Feb-2008 09:07                    User name      : ja
=====
```

OLKI07S

-----

```
1${P}/OLKI07S                                PROGRAM GPSEST 13-FEB-08 09:07
OLKI07S                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

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-----

1. CAMPAIGNS
2. OBSERVATION FILES
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8. POLE COORDINATES AND TIME INFORMATION
9. ANTENNA PHASE CENTERS
10. CONSTANTS
11. PARAMETER CHARACTERIZATION LIST
12. TEST OUTPUT
13. RESULTS (PART 1)
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```
1${P}/OLKI07S                                PROGRAM GPSEST 13-FEB-08 09:07
OLKI07S                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

#### INPUT AND OUTPUT FILENAMES

-----

-----

```

Session table           : ${P}/OLKI07S\STA\SESSIONS.SES
General constants      : ${X}/GEN\CONST.
Geodetic datum         : ${X}/GEN\DATUM.
Station information    : ${P}/OLKI07S\STA\OLKI07S.STA
Earth rotation parameters : ${P}/OLKI07S\ORB\C04_2007.ERP
Subdaily pole model   : ${X}/GEN\IERS2000.SUB
Nutation model        : ${X}/GEN\IAU2000.NUT
Satellite information  : ${X}/GEN\SATELLIT.
Receiver information   : ${X}/GEN\RECEIVER.
Satellite problems    : ${X}/GEN\SAT_2007.CRX
Phase center eccentricities : ${X}/GEN\PHAS_IGS.REL
SINEX general input file : ${X}/GEN\SINEX.
IONEX control file    : ${X}/GEN\IONEX.
Difference GPS-UTC    : ---
A priori station coordinates: ${P}/OLKI07S\STA\OLKI.CRD
GNSS standard orbits  : ${P}/OLKI07S\ORB\OLKI07S.STD
GNSS orbit partials  : ---
Ionosphere models     : ${P}/OLKI07S\ATM\OLKI07S.ION
Troposphere estimates : ---
Station sigma factors : ---
Station eccentricities : ---
Ocean loading tables  : ---
GNSS clock corrections : ---
Differential code biases : ---
Receiver antenna orientation: ---
Kinematic coordinates : ---
Kinematic velocities  : ---
Standard orbit(s)    : ---
Orbit partials       : ---
Attitude data        : ---
Precise orbit(s)     : ---
LEO orbital elements : ---
Station coordinates   : ${P}/OLKI07S\STA\TOLKI07S.CRD
GNSS orbital elements : ---
Troposphere estimates : ---
Troposphere SINEX    : ---
Ionosphere models     : ---
IONEX                 : ---
Residuals             : ---
Coordinate covariance matrix: ---
Full covariance matrix : ---
Normal equations      : ---
Bernese ERP file      : ---
IERS ERP file         : ---
GNSS clock corrections : ---
Clock RINEX           : ---
Kinematic coordinates : ---
Differential code biases : ---
Phase center variations (gri: ---
Phase center variations (har: ---
Scratch file          : ${U}/WORK\GPSEST.SCR
Scratch files         : ${U}/WORK\GPSEST.SC1
Program output        : ${P}/OLKI07S\OUT\GPSEST.L24

```

Error message : \${U}/WORK/ERROR.MSG

1\${P}/OLKI07S  
OLKI07S

PROGRAM GPSEST 13-FEB-08 09:07  
BERNESE GPS SOFTWARE VERSION 5.0

1. CAMPAIGNS

CAMPAIGN NAME	NUM STATION NAME	NUM STATION NAME	NUM STATION NAME	NUM STATION NAME	NUM STATION NAME
\${P}/OLKI07S :	1 GPS1	2 GPS2	3 GPS3	4 GPS4	5 GPS5
	6 GPS6	7 GPS7	8 GPS8	9 GPS9	10 GP13

2. OBSERVATION FILES

\${P}/OLKI07S

MAIN CHARACTERISTICS:

FILE	OBSERVATION FILE HEADER	OBSERVATION FILE	SESS	RECEIVER 1	RECEIVER 2
1	\${P}/OLKI07S/OBS/01022740.PSH	\${P}/OLKI07S/OBS/01022740.PSO	2740	ASHTECH Z-XII3	ASHTECH Z-XII3
2	\${P}/OLKI07S/OBS/01022750.PSH	\${P}/OLKI07S/OBS/01022750.PSO	2750	ASHTECH Z-XII3	ASHTECH Z-XII3
3	\${P}/OLKI07S/OBS/01032740.PSH	\${P}/OLKI07S/OBS/01032740.PSO	2740	ASHTECH Z-XII3	ASHTECH Z-XII3
4	\${P}/OLKI07S/OBS/01032750.PSH	\${P}/OLKI07S/OBS/01032750.PSO	2750	ASHTECH Z-XII3	ASHTECH Z-XII3
5	\${P}/OLKI07S/OBS/01042730.PSH	\${P}/OLKI07S/OBS/01042730.PSO	2730	ASHTECH Z-XII3	ASHTECH Z-XII3
6	\${P}/OLKI07S/OBS/01042740.PSH	\${P}/OLKI07S/OBS/01042740.PSO	2740	ASHTECH Z-XII3	ASHTECH Z-XII3
7	\${P}/OLKI07S/OBS/01052730.PSH	\${P}/OLKI07S/OBS/01052730.PSO	2730	ASHTECH Z-XII3	ASHTECH Z-XII3
8	\${P}/OLKI07S/OBS/01052740.PSH	\${P}/OLKI07S/OBS/01052740.PSO	2740	ASHTECH Z-XII3	ASHTECH Z-XII3
9	\${P}/OLKI07S/OBS/01052750.PSH	\${P}/OLKI07S/OBS/01052750.PSO	2750	ASHTECH Z-XII3	ASHTECH Z-XII3
10	\${P}/OLKI07S/OBS/01062730.PSH	\${P}/OLKI07S/OBS/01062730.PSO	2730	ASHTECH Z-XII3	ASHTECH Z-XII3
11	\${P}/OLKI07S/OBS/01062740.PSH	\${P}/OLKI07S/OBS/01062740.PSO	2740	ASHTECH Z-XII3	ASHTECH Z-XII3
12	\${P}/OLKI07S/OBS/01062750.PSH	\${P}/OLKI07S/OBS/01062750.PSO	2750	ASHTECH Z-XII3	ASHTECH Z-XII3
13	\${P}/OLKI07S/OBS/01072730.PSH	\${P}/OLKI07S/OBS/01072730.PSO	2730	ASHTECH Z-XII3	ASHTECH Z-XII3
14	\${P}/OLKI07S/OBS/01072740.PSH	\${P}/OLKI07S/OBS/01072740.PSO	2740	ASHTECH Z-XII3	ASHTECH Z-XII3
15	\${P}/OLKI07S/OBS/01082740.PSH	\${P}/OLKI07S/OBS/01082740.PSO	2740	ASHTECH Z-XII3	ASHTECH Z-XII3
16	\${P}/OLKI07S/OBS/01082750.PSH	\${P}/OLKI07S/OBS/01082750.PSO	2750	ASHTECH Z-XII3	ASHTECH Z-XII3
17	\${P}/OLKI07S/OBS/06092740.PSH	\${P}/OLKI07S/OBS/06092740.PSO	2740	ASHTECH Z-XII3	ASHTECH Z-XII3
18	\${P}/OLKI07S/OBS/06092750.PSH	\${P}/OLKI07S/OBS/06092750.PSO	2750	ASHTECH Z-XII3	ASHTECH Z-XII3
19	\${P}/OLKI07S/OBS/06132740.PSH	\${P}/OLKI07S/OBS/06132740.PSO	2740	ASHTECH Z-XII3	ASHTECH Z-XII3

20	#{P}/OLKI07S\OBS\06132750.PSH	#{P}/OLKI07S\OBS\06132750.PSO	2750	ASHTECH Z-XII3	ASHTECH Z-XII3
21	#{P}/OLKI07S\OBS\07082730.PSH	#{P}/OLKI07S\OBS\07082730.PSO	2730	ASHTECH Z-XII3	ASHTECH Z-XII3
22	#{P}/OLKI07S\OBS\07092730.PSH	#{P}/OLKI07S\OBS\07092730.PSO	2730	ASHTECH Z-XII3	ASHTECH Z-XII3
23	#{P}/OLKI07S\OBS\07132730.PSH	#{P}/OLKI07S\OBS\07132730.PSO	2730	ASHTECH Z-XII3	ASHTECH Z-XII3

FILE	TYP	FREQ.	STATION 1	STATION 2	SESS	FIRST	OBSERV.TIME	#EPO	DT	#EF	#CLK	ARC	#SAT	AMB.I.+S.			#CLUSTERS				RM	
														W	12	#AMB	L1	L2	L5			
1	P	L1,L2	GPS1	GPS2	2740	7-10-01	9:17:30	1765	30	0	E	E	1	30	N	Y	Y	50	16	16	50	0
2	P	L1,L2	GPS1	GPS2	2750	7-10-02	0:00:30	1300	30	0	E	E	1	29	N	Y	Y	35	10	10	35	0
3	P	L1,L2	GPS1	GPS3	2740	7-10-01	8:58:30	1803	30	0	E	E	1	30	N	Y	Y	53	18	18	53	0
4	P	L1,L2	GPS1	GPS3	2750	7-10-02	0:00:30	1270	30	0	E	E	1	30	N	Y	Y	36	11	11	36	0
5	P	L1,L2	GPS1	GPS4	2730	7-09-30	8:19:30	1881	30	0	E	E	1	30	N	Y	Y	60	25	25	60	0
6	P	L1,L2	GPS1	GPS4	2740	7-10-01	0:00:30	1034	30	0	E	E	1	29	N	Y	Y	42	19	19	42	0
7	P	L1,L2	GPS1	GPS5	2730	7-09-30	6:24:00	2112	30	0	E	E	1	30	N	Y	Y	58	17	17	58	0
8	P	L1,L2	GPS1	GPS5	2740	7-10-01	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	79	24	24	79	0
9	P	L1,L2	GPS1	GPS5	2750	7-10-02	0:00:30	1119	30	0	E	E	1	27	N	Y	Y	31	9	9	31	0
10	P	L1,L2	GPS1	GPS6	2730	7-09-30	6:49:00	2062	30	0	E	E	1	30	N	Y	Y	62	23	23	62	0
11	P	L1,L2	GPS1	GPS6	2740	7-10-01	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	78	27	27	78	0
12	P	L1,L2	GPS1	GPS6	2750	7-10-02	0:00:30	1164	30	0	E	E	1	30	N	Y	Y	35	13	13	35	0
13	P	L1,L2	GPS1	GPS7	2730	7-09-30	7:47:30	1945	30	0	E	E	1	30	N	Y	Y	57	21	21	57	0
14	P	L1,L2	GPS1	GPS7	2740	7-10-01	0:00:30	1013	30	0	E	E	1	29	N	Y	Y	34	12	12	34	0
15	P	L1,L2	GPS1	GPS8	2740	7-10-01	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	93	38	38	93	0
16	P	L1,L2	GPS1	GPS8	2750	7-10-02	0:00:30	1245	30	0	E	E	1	30	N	Y	Y	46	22	22	46	0
17	P	L1,L2	GPS6	GPS9	2740	7-10-01	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	80	29	29	80	0
18	P	L1,L2	GPS6	GPS9	2750	7-10-02	0:00:30	1164	30	0	E	E	1	30	N	Y	Y	39	17	17	39	0
19	P	L1,L2	GPS6	GP13	2740	7-10-01	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	78	27	27	78	0
20	P	L1,L2	GPS6	GP13	2750	7-10-02	0:00:30	1164	30	0	E	E	1	30	N	Y	Y	40	18	18	40	0
21	P	L1,L2	GPS7	GPS8	2730	7-09-30	8:05:00	1910	30	0	E	E	1	30	N	Y	Y	66	28	28	66	0
22	P	L1,L2	GPS7	GPS9	2730	7-09-30	7:47:30	1945	30	0	E	E	1	30	N	Y	Y	51	15	15	51	0
23	P	L1,L2	GPS7	GP13	2730	7-09-30	7:47:30	1945	30	0	E	E	1	30	N	Y	Y	51	15	15	51	0

SATELLITES:

-----

FILE #SAT SATELLITES

FILE	#SAT	SATELLITES																														
1	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
2	29	1	2	3	4	5	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
3	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
4	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
5	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
6	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	23	24	25	26	27	28	29	30	31		
7	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
8	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
9	27	1	2	3	4	6	7	8	9	10	11	12	13	16	17	18	19	20	21	22	23	24	25	26	27	28	29	31				
10	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
11	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
12	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
13	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

14	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	23	24	25	26	27	28	29	30	31	
15	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
16	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
17	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
18	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
19	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
20	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
21	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
22	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
23	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

OBSERVATION SELECTION:

-----  
SAMPLING RATE : 30 SEC  
ELEVATION CUT-OFF ANGLE : 20 DEGREES  
SATELLITE SYSTEM : GPS  
SPECIAL DATA SELECTION : NO

1\$(P)/OLKI07S  
OLKI07S

PROGRAM GPSEST 13-FEB-08 09:07  
BERNESE GPS SOFTWARE VERSION 5.0

3. GENERAL OPTIONS

-----  
TIDAL CORRECTION OF STATION COORDINATES : IERS CONVENTIONS 2000

A PRIORI SIGMA OF UNIT WEIGHT:

-----  
A PRIORI SIGMA OF UNIT WEIGHT : 0.001 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)

MODEL FOR ELEVATION-DEPENDENT WEIGHTING : 1/COS(Z)

CORRELATIONS AND SESSIONS:

-----  
STRATEGY : CORRELATIONS CORRECTLY MODELLED  
TIME INTERVAL : 0.10000 SEC (TO IDENTIFY EPOCH)

SESS #FILE FILE NUMBERS

-----  
2740 9 1 3 6 8 11 14 15 17 19  
2750 7 2 4 9 12 16 18 20  
2730 7 5 7 10 13 21 22 23

AMBIGUITY RESOLUTION STRATEGY:

-----  
 AMBIGUITIES PRE-ELIMINATED EVERY 30 SECONDS

SYNCHRONIZATION ERRORS:

-----  
 STRATEGY : SYNCHRONIZATION ERRORS NOT APPLIED

4. STATIONS

-----  
 Local geodetic datum:                    \${X}/GEN\DATUM.

Datum name	Ell. param./ Scale	Shifts to WGS-84	Rotations to WGS-84
WGS - 84	A = 6378137.000 m 1/F= 298.2572236 SC = 0.00000D+00	DX = 0.0000 m DY = 0.0000 m DZ = 0.0000 m	RX = 0.00000 arcsec RY = 0.00000 arcsec RZ = 0.00000 arcsec

A priori station coordinates:            \${P}/OLKI07S\STA\OLKI.CRD

num	Station name	obs e/f/h	A priori station coordinates WGS-84			A priori station coordinates Ellipsoidal in local geodetic datum		
			X (m)	Y (m)	Z (m)	Latitude	Longitude	Height (m)
1	GPS1	Y ESTIM	2863210.1067	1126271.4390	5568267.2990	61 14 22.754183	21 28 21.633926	30.5520
2	GPS2	Y ESTIM	2863312.4876	1127586.4513	5567953.2561	61 14 1.535088	21 29 41.145601	32.8443
3	GPS3	Y ESTIM	2862323.4428	1126533.7706	5568664.0772	61 14 49.568852	21 28 59.767954	27.6613
4	GPS4	Y ESTIM	2862758.9415	1125923.2376	5568566.0154	61 14 42.897724	21 28 10.980705	29.1133
5	GPS5	Y ESTIM	2864192.3764	1126421.6871	5567725.8796	61 13 46.892454	21 28 6.906786	22.2982
6	GPS6	Y ESTIM	2863910.3892	1125229.5963	5568112.5408	61 14 12.686451	21 26 59.459035	25.0654
7	GPS7	Y ESTIM	2863465.8530	1124819.7828	5568430.2557	61 14 33.586772	21 26 44.784815	32.4126
8	GPS8	Y ESTIM	2863019.7046	1124739.5538	5568666.6848	61 14 49.853077	21 26 50.715669	25.8084
9	GPS9	Y ESTIM	2863742.0387	1123996.6145	5568453.4720	61 14 35.187574	21 25 46.644762	31.7025
10	GP13	Y ESTIM	2864309.0028	1124134.0361	5568134.1930	61 14 13.855835	21 25 41.334054	29.8962

A priori sigma:

Station coordinates a priori sigma in local geodetic datum				
num	Station name	N (m)	E (m)	U (m)
1	GPS1	0.00001	0.00001	0.00001

1\${P}/OLKI07S  
OLKI07S

PROGRAM GPSEST 13-FEB-08 09:07  
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5. SATELLITE ORBITS

ARC CHARACTERISTICS:

ARC	START OF ARC	END OF ARC	SOURCE	#SAT	SATELLITES																		
1	07-09-30 00:00:00	07-10-03 00:00:00	PR2007.275	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	
					20	21	22	23	24	25	26	27	28	29	30	31	32						

OSCULATING ELEMENTS:                    \${P}/OLKI07S\ORB\OLKI07S.STD

REFERENCE SYSTEM: J2000.0  
REFERENCE EPOCH : 54373.2666667 MJD (2007 9 30 6 24 0.00)

SAT	S.MAJ.AXIS	ECCENTRIC.	INCLINAT.	NODE	PERIGEE	M. ANOMALY	PER.PASS.TIME
1	26555666.1	0.00688294	56.790193	6.172316	-104.068833	22.112815	54373.2360488
2	26560887.4	0.00866756	54.126825	-117.254571	-222.325039	68.755498	54373.1714384
3	26558498.2	0.00986638	53.077066	177.350417	43.901848	35.414533	54373.2176232
4	26559090.4	0.00783872	54.088843	-116.156628	16.471536	-139.816762	54373.4602972
5	26559379.5	0.00844427	53.922423	118.100868	68.878397	-171.391192	54373.5040281
6	26562235.5	0.00562274	53.512072	-179.072013	263.087838	-86.938020	54373.3870874
7	26563641.0	0.01025912	53.604247	179.469350	265.123098	-92.940817	54373.3954123
8	26558617.0	0.01019217	56.177516	65.934257	160.728167	-82.432384	54373.3808232
9	26561533.8	0.01938687	55.483380	60.994834	78.293295	-102.855977	54373.4091303
10	26560764.9	0.00756845	55.368277	-55.381649	28.506635	107.672143	54373.1175387
11	26562200.2	0.00722111	51.132036	-126.979070	28.978394	-55.228843	54373.3431658
12	26559692.1	0.00310131	55.160953	123.129044	-63.835135	-25.109992	54373.3014424
13	26562590.4	0.00335862	57.029937	5.454656	82.134491	90.819516	54373.1408670
14	26558995.7	0.00354974	56.677686	4.543476	-125.848034	73.722087	54373.1645704
16	26561863.1	0.00403032	55.269254	124.039490	326.750010	-176.244824	54373.5107842
17	26560196.5	0.00294898	55.012360	-176.393383	-168.920786	121.238652	54373.0987543
18	26559973.2	0.00887707	54.458319	-54.545060	213.986072	-171.778492	54373.5045724
19	26559483.7	0.00413774	54.886583	-173.076701	-43.527074	90.768858	54373.1409592
20	26559372.6	0.00322639	54.424452	-57.607182	77.066433	-174.518274	54373.5083587
21	26558269.2	0.01302968	53.716716	-115.179313	200.206896	-95.280247	54373.3986130
22	26561807.4	0.00503226	54.322871	-54.143875	-100.251365	108.649480	54373.1161763
23	26560947.1	0.00531950	55.657599	3.287695	-204.854226	46.826872	54373.2018099
24	26560352.9	0.00850850	54.670516	-113.921421	-45.087681	178.684294	54373.0191914





6	GPS2	2007 09 30 16 00 00	0.00000	rel
7	GPS2	2007 09 30 18 00 00	0.00000	rel
8	GPS2	2007 09 30 20 00 00	0.00000	rel
9	GPS2	2007 09 30 22 00 00	0.00000	rel
10	GPS2	2007 10 01 00 00 00	0.00000	rel
11	GPS2	2007 10 01 02 00 00	0.00000	rel
12	GPS2	2007 10 01 04 00 00	0.00000	rel
13	GPS2	2007 10 01 06 00 00	0.00000	rel
14	GPS2	2007 10 01 08 00 00	0.00000	rel
15	GPS2	2007 10 01 10 00 00	0.00000	rel
16	GPS2	2007 10 01 12 00 00	0.00000	rel
17	GPS2	2007 10 01 14 00 00	0.00000	rel
18	GPS2	2007 10 01 16 00 00	0.00000	rel
19	GPS2	2007 10 01 18 00 00	0.00000	rel
20	GPS2	2007 10 01 20 00 00	0.00000	rel
21	GPS2	2007 10 01 22 00 00	0.00000	rel
22	GPS2	2007 10 02 00 00 00	0.00000	rel
23	GPS2	2007 10 02 02 00 00	0.00000	rel
24	GPS2	2007 10 02 04 00 00	0.00000	rel
25	GPS2	2007 10 02 06 00 00	0.00000	rel
26	GPS2	2007 10 02 08 00 00	0.00000	rel
27	GPS2	2007 10 02 10 00 00	0.00000	rel
28	GPS2	2007 10 02 12 00 00	0.00000	rel
29	GPS3	2007 09 30 06 00 00	0.00000	abs
30	GPS3	2007 09 30 08 00 00	0.00000	rel
31	GPS3	2007 09 30 10 00 00	0.00000	rel
32	GPS3	2007 09 30 12 00 00	0.00000	rel
33	GPS3	2007 09 30 14 00 00	0.00000	rel
34	GPS3	2007 09 30 16 00 00	0.00000	rel
35	GPS3	2007 09 30 18 00 00	0.00000	rel
36	GPS3	2007 09 30 20 00 00	0.00000	rel
37	GPS3	2007 09 30 22 00 00	0.00000	rel
38	GPS3	2007 10 01 00 00 00	0.00000	rel
39	GPS3	2007 10 01 02 00 00	0.00000	rel
40	GPS3	2007 10 01 04 00 00	0.00000	rel
41	GPS3	2007 10 01 06 00 00	0.00000	rel
42	GPS3	2007 10 01 08 00 00	0.00000	rel
43	GPS3	2007 10 01 10 00 00	0.00000	rel
44	GPS3	2007 10 01 12 00 00	0.00000	rel
45	GPS3	2007 10 01 14 00 00	0.00000	rel
46	GPS3	2007 10 01 16 00 00	0.00000	rel
47	GPS3	2007 10 01 18 00 00	0.00000	rel
48	GPS3	2007 10 01 20 00 00	0.00000	rel
49	GPS3	2007 10 01 22 00 00	0.00000	rel
50	GPS3	2007 10 02 00 00 00	0.00000	rel
51	GPS3	2007 10 02 02 00 00	0.00000	rel
52	GPS3	2007 10 02 04 00 00	0.00000	rel
53	GPS3	2007 10 02 06 00 00	0.00000	rel
54	GPS3	2007 10 02 08 00 00	0.00000	rel
55	GPS3	2007 10 02 10 00 00	0.00000	rel
56	GPS3	2007 10 02 12 00 00	0.00000	rel
57	GPS4	2007 09 30 06 00 00	0.00000	abs
58	GPS4	2007 09 30 08 00 00	0.00000	rel

59	GPS4	2007 09 30 10 00 00	0.00000	rel
60	GPS4	2007 09 30 12 00 00	0.00000	rel
61	GPS4	2007 09 30 14 00 00	0.00000	rel
62	GPS4	2007 09 30 16 00 00	0.00000	rel
63	GPS4	2007 09 30 18 00 00	0.00000	rel
64	GPS4	2007 09 30 20 00 00	0.00000	rel
65	GPS4	2007 09 30 22 00 00	0.00000	rel
66	GPS4	2007 10 01 00 00 00	0.00000	rel
67	GPS4	2007 10 01 02 00 00	0.00000	rel
68	GPS4	2007 10 01 04 00 00	0.00000	rel
69	GPS4	2007 10 01 06 00 00	0.00000	rel
70	GPS4	2007 10 01 08 00 00	0.00000	rel
71	GPS4	2007 10 01 10 00 00	0.00000	rel
72	GPS4	2007 10 01 12 00 00	0.00000	rel
73	GPS4	2007 10 01 14 00 00	0.00000	rel
74	GPS4	2007 10 01 16 00 00	0.00000	rel
75	GPS4	2007 10 01 18 00 00	0.00000	rel
76	GPS4	2007 10 01 20 00 00	0.00000	rel
77	GPS4	2007 10 01 22 00 00	0.00000	rel
78	GPS4	2007 10 02 00 00 00	0.00000	rel
79	GPS4	2007 10 02 02 00 00	0.00000	rel
80	GPS4	2007 10 02 04 00 00	0.00000	rel
81	GPS4	2007 10 02 06 00 00	0.00000	rel
82	GPS4	2007 10 02 08 00 00	0.00000	rel
83	GPS4	2007 10 02 10 00 00	0.00000	rel
84	GPS4	2007 10 02 12 00 00	0.00000	rel
85	GPS5	2007 09 30 06 00 00	0.00000	abs
86	GPS5	2007 09 30 08 00 00	0.00000	rel
87	GPS5	2007 09 30 10 00 00	0.00000	rel
88	GPS5	2007 09 30 12 00 00	0.00000	rel
89	GPS5	2007 09 30 14 00 00	0.00000	rel
90	GPS5	2007 09 30 16 00 00	0.00000	rel
91	GPS5	2007 09 30 18 00 00	0.00000	rel
92	GPS5	2007 09 30 20 00 00	0.00000	rel
93	GPS5	2007 09 30 22 00 00	0.00000	rel
94	GPS5	2007 10 01 00 00 00	0.00000	rel
95	GPS5	2007 10 01 02 00 00	0.00000	rel
96	GPS5	2007 10 01 04 00 00	0.00000	rel
97	GPS5	2007 10 01 06 00 00	0.00000	rel
98	GPS5	2007 10 01 08 00 00	0.00000	rel
99	GPS5	2007 10 01 10 00 00	0.00000	rel
100	GPS5	2007 10 01 12 00 00	0.00000	rel
101	GPS5	2007 10 01 14 00 00	0.00000	rel
102	GPS5	2007 10 01 16 00 00	0.00000	rel
103	GPS5	2007 10 01 18 00 00	0.00000	rel
104	GPS5	2007 10 01 20 00 00	0.00000	rel
105	GPS5	2007 10 01 22 00 00	0.00000	rel
106	GPS5	2007 10 02 00 00 00	0.00000	rel
107	GPS5	2007 10 02 02 00 00	0.00000	rel
108	GPS5	2007 10 02 04 00 00	0.00000	rel
109	GPS5	2007 10 02 06 00 00	0.00000	rel
110	GPS5	2007 10 02 08 00 00	0.00000	rel
111	GPS5	2007 10 02 10 00 00	0.00000	rel

112	GPS5	2007 10 02 12 00 00	0.00000	rel
113	GPS6	2007 09 30 06 00 00	0.00000	abs
114	GPS6	2007 09 30 08 00 00	0.00000	rel
115	GPS6	2007 09 30 10 00 00	0.00000	rel
116	GPS6	2007 09 30 12 00 00	0.00000	rel
117	GPS6	2007 09 30 14 00 00	0.00000	rel
118	GPS6	2007 09 30 16 00 00	0.00000	rel
119	GPS6	2007 09 30 18 00 00	0.00000	rel
120	GPS6	2007 09 30 20 00 00	0.00000	rel
121	GPS6	2007 09 30 22 00 00	0.00000	rel
122	GPS6	2007 10 01 00 00 00	0.00000	rel
123	GPS6	2007 10 01 02 00 00	0.00000	rel
124	GPS6	2007 10 01 04 00 00	0.00000	rel
125	GPS6	2007 10 01 06 00 00	0.00000	rel
126	GPS6	2007 10 01 08 00 00	0.00000	rel
127	GPS6	2007 10 01 10 00 00	0.00000	rel
128	GPS6	2007 10 01 12 00 00	0.00000	rel
129	GPS6	2007 10 01 14 00 00	0.00000	rel
130	GPS6	2007 10 01 16 00 00	0.00000	rel
131	GPS6	2007 10 01 18 00 00	0.00000	rel
132	GPS6	2007 10 01 20 00 00	0.00000	rel
133	GPS6	2007 10 01 22 00 00	0.00000	rel
134	GPS6	2007 10 02 00 00 00	0.00000	rel
135	GPS6	2007 10 02 02 00 00	0.00000	rel
136	GPS6	2007 10 02 04 00 00	0.00000	rel
137	GPS6	2007 10 02 06 00 00	0.00000	rel
138	GPS6	2007 10 02 08 00 00	0.00000	rel
139	GPS6	2007 10 02 10 00 00	0.00000	rel
140	GPS6	2007 10 02 12 00 00	0.00000	rel
141	GPS7	2007 09 30 06 00 00	0.00000	abs
142	GPS7	2007 09 30 08 00 00	0.00000	rel
143	GPS7	2007 09 30 10 00 00	0.00000	rel
144	GPS7	2007 09 30 12 00 00	0.00000	rel
145	GPS7	2007 09 30 14 00 00	0.00000	rel
146	GPS7	2007 09 30 16 00 00	0.00000	rel
147	GPS7	2007 09 30 18 00 00	0.00000	rel
148	GPS7	2007 09 30 20 00 00	0.00000	rel
149	GPS7	2007 09 30 22 00 00	0.00000	rel
150	GPS7	2007 10 01 00 00 00	0.00000	rel
151	GPS7	2007 10 01 02 00 00	0.00000	rel
152	GPS7	2007 10 01 04 00 00	0.00000	rel
153	GPS7	2007 10 01 06 00 00	0.00000	rel
154	GPS7	2007 10 01 08 00 00	0.00000	rel
155	GPS7	2007 10 01 10 00 00	0.00000	rel
156	GPS7	2007 10 01 12 00 00	0.00000	rel
157	GPS7	2007 10 01 14 00 00	0.00000	rel
158	GPS7	2007 10 01 16 00 00	0.00000	rel
159	GPS7	2007 10 01 18 00 00	0.00000	rel
160	GPS7	2007 10 01 20 00 00	0.00000	rel
161	GPS7	2007 10 01 22 00 00	0.00000	rel
162	GPS7	2007 10 02 00 00 00	0.00000	rel
163	GPS7	2007 10 02 02 00 00	0.00000	rel
164	GPS7	2007 10 02 04 00 00	0.00000	rel

165	GPS7	2007 10 02 06 00 00	0.00000	rel
166	GPS7	2007 10 02 08 00 00	0.00000	rel
167	GPS7	2007 10 02 10 00 00	0.00000	rel
168	GPS7	2007 10 02 12 00 00	0.00000	rel
169	GPS8	2007 09 30 06 00 00	0.00000	abs
170	GPS8	2007 09 30 08 00 00	0.00000	rel
171	GPS8	2007 09 30 10 00 00	0.00000	rel
172	GPS8	2007 09 30 12 00 00	0.00000	rel
173	GPS8	2007 09 30 14 00 00	0.00000	rel
174	GPS8	2007 09 30 16 00 00	0.00000	rel
175	GPS8	2007 09 30 18 00 00	0.00000	rel
176	GPS8	2007 09 30 20 00 00	0.00000	rel
177	GPS8	2007 09 30 22 00 00	0.00000	rel
178	GPS8	2007 10 01 00 00 00	0.00000	rel
179	GPS8	2007 10 01 02 00 00	0.00000	rel
180	GPS8	2007 10 01 04 00 00	0.00000	rel
181	GPS8	2007 10 01 06 00 00	0.00000	rel
182	GPS8	2007 10 01 08 00 00	0.00000	rel
183	GPS8	2007 10 01 10 00 00	0.00000	rel
184	GPS8	2007 10 01 12 00 00	0.00000	rel
185	GPS8	2007 10 01 14 00 00	0.00000	rel
186	GPS8	2007 10 01 16 00 00	0.00000	rel
187	GPS8	2007 10 01 18 00 00	0.00000	rel
188	GPS8	2007 10 01 20 00 00	0.00000	rel
189	GPS8	2007 10 01 22 00 00	0.00000	rel
190	GPS8	2007 10 02 00 00 00	0.00000	rel
191	GPS8	2007 10 02 02 00 00	0.00000	rel
192	GPS8	2007 10 02 04 00 00	0.00000	rel
193	GPS8	2007 10 02 06 00 00	0.00000	rel
194	GPS8	2007 10 02 08 00 00	0.00000	rel
195	GPS8	2007 10 02 10 00 00	0.00000	rel
196	GPS8	2007 10 02 12 00 00	0.00000	rel
197	GPS9	2007 09 30 06 00 00	0.00000	abs
198	GPS9	2007 09 30 08 00 00	0.00000	rel
199	GPS9	2007 09 30 10 00 00	0.00000	rel
200	GPS9	2007 09 30 12 00 00	0.00000	rel
201	GPS9	2007 09 30 14 00 00	0.00000	rel
202	GPS9	2007 09 30 16 00 00	0.00000	rel
203	GPS9	2007 09 30 18 00 00	0.00000	rel
204	GPS9	2007 09 30 20 00 00	0.00000	rel
205	GPS9	2007 09 30 22 00 00	0.00000	rel
206	GPS9	2007 10 01 00 00 00	0.00000	rel
207	GPS9	2007 10 01 02 00 00	0.00000	rel
208	GPS9	2007 10 01 04 00 00	0.00000	rel
209	GPS9	2007 10 01 06 00 00	0.00000	rel
210	GPS9	2007 10 01 08 00 00	0.00000	rel
211	GPS9	2007 10 01 10 00 00	0.00000	rel
212	GPS9	2007 10 01 12 00 00	0.00000	rel
213	GPS9	2007 10 01 14 00 00	0.00000	rel
214	GPS9	2007 10 01 16 00 00	0.00000	rel
215	GPS9	2007 10 01 18 00 00	0.00000	rel
216	GPS9	2007 10 01 20 00 00	0.00000	rel
217	GPS9	2007 10 01 22 00 00	0.00000	rel

218	GPS9	2007 10 02 00 00 00	0.00000	rel
219	GPS9	2007 10 02 02 00 00	0.00000	rel
220	GPS9	2007 10 02 04 00 00	0.00000	rel
221	GPS9	2007 10 02 06 00 00	0.00000	rel
222	GPS9	2007 10 02 08 00 00	0.00000	rel
223	GPS9	2007 10 02 10 00 00	0.00000	rel
224	GPS9	2007 10 02 12 00 00	0.00000	rel
225	GP13	2007 09 30 06 00 00	0.00000	abs
226	GP13	2007 09 30 08 00 00	0.00000	rel
227	GP13	2007 09 30 10 00 00	0.00000	rel
228	GP13	2007 09 30 12 00 00	0.00000	rel
229	GP13	2007 09 30 14 00 00	0.00000	rel
230	GP13	2007 09 30 16 00 00	0.00000	rel
231	GP13	2007 09 30 18 00 00	0.00000	rel
232	GP13	2007 09 30 20 00 00	0.00000	rel
233	GP13	2007 09 30 22 00 00	0.00000	rel
234	GP13	2007 10 01 00 00 00	0.00000	rel
235	GP13	2007 10 01 02 00 00	0.00000	rel
236	GP13	2007 10 01 04 00 00	0.00000	rel
237	GP13	2007 10 01 06 00 00	0.00000	rel
238	GP13	2007 10 01 08 00 00	0.00000	rel
239	GP13	2007 10 01 10 00 00	0.00000	rel
240	GP13	2007 10 01 12 00 00	0.00000	rel
241	GP13	2007 10 01 14 00 00	0.00000	rel
242	GP13	2007 10 01 16 00 00	0.00000	rel
243	GP13	2007 10 01 18 00 00	0.00000	rel
244	GP13	2007 10 01 20 00 00	0.00000	rel
245	GP13	2007 10 01 22 00 00	0.00000	rel
246	GP13	2007 10 02 00 00 00	0.00000	rel
247	GP13	2007 10 02 02 00 00	0.00000	rel
248	GP13	2007 10 02 04 00 00	0.00000	rel
249	GP13	2007 10 02 06 00 00	0.00000	rel
250	GP13	2007 10 02 08 00 00	0.00000	rel
251	GP13	2007 10 02 10 00 00	0.00000	rel
252	GP13	2007 10 02 12 00 00	0.00000	rel

IONOSPHERE MODELS:    \${P}/OLKI07S\ATM\OLKI07S.ION

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TYPE OF IONOSPHERE MODELS : LOCAL  
RADIUS OF THE EARTH : 6378.14 KM

DEG. OF DEVELOP.				ORIGIN OF DEVELOPMENT					HEIGHT	NORMAIZATION FACTORS		
MODEL	TIME	LAT.	MIXED	VALIDITY START	VALIDITY END	LOCAL TIME	LAT. (D)	LONG. (D)	(KM)	TIME (H)	LAT. (D)	ELE. CONT.
1	2	1	2	2007 9 29 23.0	2007 9 30 7.0	2007 9 30 3.0	61.23	21.47	450	2.00	6.00	0.10D+18
2	2	1	2	2007 9 30 5.0	2007 9 30 13.0	2007 9 30 9.0	61.23	21.47	450	2.00	6.00	0.10D+18
3	2	1	2	2007 9 30 11.0	2007 9 30 19.0	2007 9 30 15.0	61.23	21.47	450	2.00	6.00	0.10D+18
4	2	1	2	2007 9 30 17.0	2007 10 1 1.0	2007 9 30 21.0	61.23	21.47	450	2.00	6.00	0.10D+18
5	2	1	2	2007 9 30 23.0	2007 10 1 7.0	2007 10 1 3.0	61.23	21.47	450	2.00	6.00	0.10D+18
6	2	1	2	2007 10 1 5.0	2007 10 1 13.0	2007 10 1 9.0	61.23	21.47	450	2.00	6.00	0.10D+18

7	2	1	2	2007 10	1 11.0	2007 10	1 19.0	2007 10	1 15.0	61.23	21.47	450	2.00	6.00	0.10D+18
8	2	1	2	2007 10	1 17.0	2007 10	2 1.0	2007 10	1 21.0	61.23	21.47	450	2.00	6.00	0.10D+18
9	2	1	2	2007 10	1 23.0	2007 10	2 7.0	2007 10	2 3.0	61.23	21.47	450	2.00	6.00	0.10D+18
10	2	1	2	2007 10	2 5.0	2007 10	2 13.0	2007 10	2 9.0	61.23	21.47	450	2.00	6.00	0.10D+18

MODEL	TERM	POL. TIME	DEGREE IN LATIT.	COEFFICIENT	SIGMA
1	1	0	0	0.243015E+00	0.254072E-02
	2	1	0	0.730178E-01	0.695809E-03
	3	2	0	0.736438E-01	0.553125E-03
	4	0	1	-0.384474E-01	0.956964E-03
	5	1	1	-0.217778E-02	0.964260E-03
2	1	0	0	0.747295E+00	0.288805E-02
	2	1	0	0.633502E-01	0.805758E-03
	3	2	0	-0.359931E-01	0.690167E-03
	4	0	1	-0.874805E-01	0.121995E-02
	5	1	1	-0.218692E-01	0.128329E-02
3	1	0	0	0.696795E+00	0.318596E-02
	2	1	0	-0.858398E-01	0.760415E-03
	3	2	0	-0.354491E-01	0.611467E-03
	4	0	1	-0.146332E+00	0.114227E-02
	5	1	1	-0.526456E-01	0.954661E-03
4	1	0	0	0.296587E+00	0.478745E-02
	2	1	0	-0.444251E-01	0.139593E-02
	3	2	0	0.156805E-01	0.125016E-02
	4	0	1	-0.150348E+00	0.181132E-02
	5	1	1	-0.809772E-02	0.225676E-02
5	1	0	0	0.297671E+00	0.277500E-02
	2	1	0	0.844568E-01	0.755766E-03
	3	2	0	0.685953E-01	0.602457E-03
	4	0	1	-0.897432E-01	0.104799E-02
	5	1	1	0.193919E-01	0.105572E-02
6	1	0	0	0.757876E+00	0.275056E-02
	2	1	0	0.907847E-01	0.775611E-03
	3	2	0	-0.296691E-01	0.663393E-03
	4	0	1	-0.120130E+00	0.117429E-02
	5	1	1	-0.109980E-01	0.125256E-02
7	1	0	0	0.751667E+00	0.263226E-02
	2	1	0	-0.125782E+00	0.626510E-03
	3	2	0	-0.296382E-01	0.501647E-03
	4	0	1	-0.168096E+00	0.949722E-03
	5	1	1	-0.345007E-01	0.786332E-03
8	1	0	0	0.290677E+00	0.350270E-02
	2	1	0	-0.608662E-01	0.101594E-02

	3	2	0	0.257106E-01	0.908553E-03
	4	0	1	-0.166794E+00	0.132576E-02
	5	1	1	-0.197229E-02	0.163806E-02
9	1	0	0	0.319894E+00	0.284492E-02
	2	1	0	0.768564E-01	0.775445E-03
	3	2	0	0.596580E-01	0.623975E-03
	4	0	1	-0.116632E+00	0.108087E-02
	5	1	1	0.274814E-01	0.109682E-02
10	1	0	0	0.813442E+00	0.255125E-02
	2	1	0	0.985951E-01	0.734637E-03
	3	2	0	-0.396731E-01	0.631609E-03
	4	0	1	-0.127460E+00	0.110129E-02
	5	1	1	-0.277049E-01	0.118537E-02

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8. POLE COORDINATES AND TIME INFORMATION

A PRIORI POLE AND TIME INFORMATION FROM THE POLE FILE:

DATUM	TIME	X-POLE (") EP-CPO (")	Y-POLE (") PS-CPO (")	UT1-UTC (S)	GPS-UTC (S)	RMS XP (") RMS EP (")	RMS YP (") RMS PS (")	RMS DT (S)
07-09-30	00:00:00	0.13612 0.00000	0.20782 0.00000	-0.186285	14.	0.00001 0.00015	0.00002 0.00021	0.000049
07-10-01	00:00:00	0.13362 0.00000	0.20648 0.00000	-0.187140	14.	0.00001 0.00010	0.00001 0.00014	0.000025
07-10-02	00:00:00	0.13060 0.00000	0.20526 0.00000	-0.187705	14.	0.00001 0.00010	0.00001 0.00014	0.000025
07-10-03	00:00:00	0.12755 0.00000	0.20403 0.00000	-0.188280	14.	0.00001 0.00010	0.00001 0.00015	0.000036

NUTATION MODEL: IAU2000  
SUBDAILY POLE MODEL: IERS2000

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12. TEST OUTPUT



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MIN. AND MAX. ELEVATION/NADIR ANGLES AND MAX. SYNCHRONIZATION ERRORS:

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SESS	FILE	STATION NAME 1	STATION NAME 2	MIN/MAX ELEV.	MIN/MAX NADIR	SYNCH. ERR. (NS)
2740	1	GPS1	GPS2	20.0 82.0	1.9 13.3	0.0
2750	2	GPS1	GPS2	20.0 83.6	1.5 13.2	0.0
2740	3	GPS1	GPS3	20.0 82.0	1.9 13.3	0.0
2750	4	GPS1	GPS3	20.0 83.6	1.5 13.2	0.0
2730	5	GPS1	GPS4	20.0 82.0	1.9 13.3	0.0
2740	6	GPS1	GPS4	20.0 83.6	1.5 13.2	0.0
2730	7	GPS1	GPS5	20.0 82.0	1.9 13.2	0.0
2740	8	GPS1	GPS5	20.0 83.6	1.5 13.3	0.0
2750	9	GPS1	GPS5	20.0 83.6	1.5 13.2	0.0
2730	10	GPS1	GPS6	20.0 82.0	1.9 13.3	0.0
2740	11	GPS1	GPS6	20.0 83.6	1.5 13.3	0.0
2750	12	GPS1	GPS6	20.0 83.6	1.5 13.2	0.0
2730	13	GPS1	GPS7	20.0 82.0	1.9 13.3	0.0
2740	14	GPS1	GPS7	20.0 83.6	1.5 13.2	0.0
2740	15	GPS1	GPS8	20.0 83.6	1.5 13.3	0.0
2750	16	GPS1	GPS8	20.0 83.6	1.5 13.2	0.0
2740	17	GPS6	GPS9	20.0 83.6	1.5 13.3	0.0
2750	18	GPS6	GPS9	20.0 83.6	1.5 13.2	0.0
2740	19	GPS6	GP13	20.0 83.6	1.5 13.3	0.0
2750	20	GPS6	GP13	20.0 83.6	1.5 13.2	0.0
2730	21	GPS7	GPS8	20.0 82.0	1.9 13.3	0.0
2730	22	GPS7	GPS9	20.0 82.0	1.9 13.3	0.0
2730	23	GPS7	GP13	20.0 82.0	1.9 13.3	0.0

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13. RESULTS (PART 1)

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NUMBER OF PARAMETERS (PART 1):

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PARAMETER TYPE	#PARAMETERS	#PRE-ELIMINATED	#SET-UP	#NO-OBS	#REF	#SINGULAR
STATION COORDINATES	30	0	30	0	0	0
AMBIGUITIES	21	21 (BEFORE INV)	908	887	0	0
SITE-SPECIFIC TROPOSPHERE PARAMETERS	252	0	252	0	0	58
TOTAL NUMBER OF PARAMETERS	303	21	1190	887	0	58

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NUMBER OF OBSERVATIONS (PART 1):  
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TYPE	FREQUENCY	FILE	#OBSERVATIONS
PHASE	L1	ALL	232355
PHASE	L2	ALL	232355
TOTAL NUMBER OF OBSERVATIONS			464710

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A POSTERIORI SIGMA OF UNIT WEIGHT (PART 1):  
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A POSTERIORI SIGMA OF UNIT WEIGHT : 0.0018 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)  
DEGREE OF FREEDOM (DOF) : 464465  
CHI\*\*2/DOF : 3.19

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STATION COORDINATES:  
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NUM	STATION NAME	PARAMETER	A PRIORI VALUE	NEW VALUE	NEW- A PRIORI	RMS ERROR	3-D ELLIPSOID		2-D ELLIPSE	
1	GPS1	X	2863210.1067	2863210.1067	0.0000	0.0000				
		Y	1126271.4390	1126271.4390	0.0000	0.0000				
		Z	5568267.2990	5568267.2990	0.0000	0.0000				
		HEIGHT	30.5520	30.5520	0.0000	0.0000	0.0000	0.0		
		LATITUDE	61 14 22.754183	61 14 22.754183	0.0000	0.0000	0.0000	90.0	0.0000	90.0
		LONGITUDE	21 28 21.633926	21 28 21.633926	0.0000	0.0000	0.0000	0.0	0.0000	
2	GPS2	X	2863312.4876	2863312.4866	-0.0010	0.0002				
		Y	1127586.4513	1127586.4501	-0.0012	0.0001				
		Z	5567953.2561	5567953.2554	-0.0007	0.0003				
		HEIGHT	32.8443	32.8429	-0.0013	0.0004	0.0004	0.7		
		LATITUDE	61 14 1.535088	61 14 1.535116	0.0009	0.0001	0.0000	88.7	0.0000	88.6
		LONGITUDE	21 29 41.145601	21 29 41.145550	-0.0007	0.0000	0.0001	-0.1	0.0001	

3	GPS3	X	2862323.4428	2862323.4463	0.0035	0.0002					
		Y	1126533.7706	1126533.7726	0.0020	0.0001					
		Z	5568664.0772	5568664.0810	0.0038	0.0003					
		HEIGHT	27.6613	27.6665	0.0052	0.0004	0.0004	0.6			
		LATITUDE	61 14 49.568852	61 14 49.568799	-0.0016	0.0001	0.0000	88.8	0.0000	88.7	
		LONGITUDE	21 28 59.767954	21 28 59.767993	0.0006	0.0000	0.0001	-0.1	0.0001		
4	GPS4	X	2862758.9415	2862758.9474	0.0059	0.0002					
		Y	1125923.2376	1125923.2383	0.0007	0.0001					
		Z	5568566.0154	5568566.0253	0.0099	0.0003					
		HEIGHT	29.1133	29.1247	0.0115	0.0004	0.0004	0.6			
		LATITUDE	61 14 42.897724	61 14 42.897715	-0.0003	0.0001	0.0000	89.1	0.0000	89.1	
		LONGITUDE	21 28 10.980705	21 28 10.980603	-0.0015	0.0000	0.0001	0.0	0.0001		
5	GPS5	X	2864192.3764	2864192.3705	-0.0059	0.0001					
		Y	1126421.6871	1126421.6855	-0.0016	0.0001					
		Z	5567725.8796	5567725.8639	-0.0157	0.0003					
		HEIGHT	22.2982	22.2815	-0.0167	0.0003	0.0003	0.6			
		LATITUDE	61 13 46.892454	61 13 46.892382	-0.0022	0.0000	0.0000	89.3	0.0000	89.2	
		LONGITUDE	21 28 6.906786	21 28 6.906831	0.0007	0.0000	0.0000	-0.1	0.0000		
6	GPS6	X	2863910.3892	2863910.3952	0.0060	0.0001					
		Y	1125229.5963	1125229.5981	0.0018	0.0001					
		Z	5568112.5408	5568112.5526	0.0118	0.0003					
		HEIGHT	25.0654	25.0788	0.0133	0.0003	0.0003	0.6			
		LATITUDE	61 14 12.686451	61 14 12.686457	0.0002	0.0000	0.0000	89.2	0.0000	89.1	
		LONGITUDE	21 26 59.459035	21 26 59.459001	-0.0005	0.0000	0.0000	-0.1	0.0000		
7	GPS7	X	2863465.8530	2863465.8563	0.0033	0.0002					
		Y	1124819.7828	1124819.7834	0.0006	0.0001					
		Z	5568430.2557	5568430.2638	0.0081	0.0003					
		HEIGHT	32.4126	32.4213	0.0087	0.0004	0.0004	0.6			
		LATITUDE	61 14 33.586772	61 14 33.586804	0.0010	0.0001	0.0000	89.1	0.0000	89.0	
		LONGITUDE	21 26 44.784815	21 26 44.784773	-0.0006	0.0000	0.0001	-0.1	0.0001		
8	GPS8	X	2863019.7046	2863019.7088	0.0042	0.0001					
		Y	1124739.5538	1124739.5541	0.0003	0.0001					
		Z	5568666.6848	5568666.6930	0.0082	0.0003					
		HEIGHT	25.8084	25.8176	0.0091	0.0003	0.0003	0.6			
		LATITUDE	61 14 49.853077	61 14 49.853090	0.0004	0.0000	0.0000	88.9	0.0000	88.8	
		LONGITUDE	21 26 50.715669	21 26 50.715583	-0.0013	0.0000	0.0000	-0.1	0.0000		
9	GPS9	X	2863742.0387	2863742.0407	0.0020	0.0001					
		Y	1123996.6145	1123996.6141	-0.0004	0.0001					
		Z	5568453.4720	5568453.4797	0.0077	0.0003					
		HEIGHT	31.7025	31.7101	0.0076	0.0003	0.0003	0.6			

	LATITUDE	61 14 35.187574	61 14 35.187643	0.0021	0.0000	0.0000	89.3	0.0000	89.2
	LONGITUDE	21 25 46.644762	21 25 46.644688	-0.0011	0.0000	0.0000	-0.1	0.0000	
10	GP13	X	2864309.0028	2864309.0097	0.0069	0.0001			
		Y	1124134.0361	1124134.0386	0.0025	0.0001			
		Z	5568134.1930	5568134.1997	0.0067	0.0003			
	HEIGHT		29.8962	29.9056	0.0094	0.0003	0.6		
	LATITUDE	61 14 13.855835	61 14 13.855731	-0.0032	0.0000	0.0000	89.3	0.0000	89.2
	LONGITUDE	21 25 41.334054	21 25 41.334044	-0.0002	0.0000	0.0000	-0.1	0.0000	

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SITE-SPECIFIC TROPOSPHERE PARAMETERS: (NOT SAVED)  
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REQU.	STATION NAME	CORRECTIONS (M)			RMS ERRORS (M)			ZENITH VECTOR (")				ERROR ELLIPSE (M)				
		NORTH	EAST	ZENITH	NORTH	EAST	ZENITH	ANGLE	RMS	RATIO	AZI	MAX	RMS	MIN	RMS	AZI
1	GPS2			0.00000			0.00000									
2	GPS2			0.00000			0.00000									
3	GPS2			0.00000			0.00000									
4	GPS2			0.00000			0.00000									
5	GPS2			0.00000			0.00000									
6	GPS2			0.00000			0.00000									
7	GPS2			0.00000			0.00000									
8	GPS2			0.00000			0.00000									
9	GPS2			0.00000			0.00000									
10	GPS2			0.00000			0.00000									
11	GPS2			0.00000			0.00000									
12	GPS2			0.00000			0.00000									
13	GPS2			0.00000			0.00000									
14	GPS2			0.00000			0.00146									
15	GPS2			0.00489			0.00029									
16	GPS2			0.00016			0.00027									
17	GPS2			0.00143			0.00028									
18	GPS2			0.00076			0.00028									
19	GPS2			0.00025			0.00025									
20	GPS2			0.00081			0.00035									
21	GPS2			0.00333			0.00028									
22	GPS2			-0.00135			0.00029									
23	GPS2			0.00478			0.00029									
24	GPS2			0.00178			0.00026									
25	GPS2			0.00092			0.00025									
26	GPS2			0.00042			0.00026									
27	GPS2			0.00276			0.00029									
28	GPS2			0.00765			0.00133									
29	GPS3			0.00000			0.00000									

30	GPS3	0.00000	0.00000
31	GPS3	0.00000	0.00000
32	GPS3	0.00000	0.00000
33	GPS3	0.00000	0.00000
34	GPS3	0.00000	0.00000
35	GPS3	0.00000	0.00000
36	GPS3	0.00000	0.00000
37	GPS3	0.00000	0.00000
38	GPS3	0.00000	0.00000
39	GPS3	0.00000	0.00000
40	GPS3	0.00000	0.00000
41	GPS3	0.00000	0.00000
42	GPS3	-0.00207	0.00121
43	GPS3	-0.00357	0.00044
44	GPS3	-0.00341	0.00027
45	GPS3	-0.00359	0.00027
46	GPS3	-0.00382	0.00028
47	GPS3	-0.00243	0.00025
48	GPS3	-0.00285	0.00035
49	GPS3	-0.00310	0.00028
50	GPS3	-0.00525	0.00029
51	GPS3	-0.00236	0.00029
52	GPS3	-0.00296	0.00025
53	GPS3	-0.00452	0.00025
54	GPS3	-0.00192	0.00026
55	GPS3	-0.00489	0.00029
56	GPS3	0.00763	0.00212
57	GPS4	0.00000	0.00000
58	GPS4	-0.00257	0.00039
59	GPS4	-0.00508	0.00026
60	GPS4	-0.00410	0.00027
61	GPS4	-0.00400	0.00027
62	GPS4	-0.00468	0.00028
63	GPS4	-0.00429	0.00026
64	GPS4	-0.00396	0.00035
65	GPS4	-0.00420	0.00028
66	GPS4	-0.00584	0.00029
67	GPS4	-0.00390	0.00029
68	GPS4	-0.00383	0.00025
69	GPS4	-0.00503	0.00026
70	GPS4	-0.00290	0.00029
71	GPS4	-0.00654	0.00127
72	GPS4	0.00000	0.00000
73	GPS4	0.00000	0.00000
74	GPS4	0.00000	0.00000
75	GPS4	0.00000	0.00000
76	GPS4	0.00000	0.00000
77	GPS4	0.00000	0.00000
78	GPS4	0.00000	0.00000
79	GPS4	0.00000	0.00000
80	GPS4	0.00000	0.00000
81	GPS4	0.00000	0.00000
82	GPS4	0.00000	0.00000

83	GPS4	0.00000	0.00000
84	GPS4	0.00000	0.00000
85	GPS5	0.01922	0.00051
86	GPS5	0.00324	0.00026
87	GPS5	0.00318	0.00025
88	GPS5	0.00342	0.00024
89	GPS5	0.00375	0.00025
90	GPS5	0.00359	0.00025
91	GPS5	0.00789	0.00025
92	GPS5	0.00512	0.00034
93	GPS5	0.00486	0.00027
94	GPS5	0.00200	0.00028
95	GPS5	0.00721	0.00027
96	GPS5	0.00593	0.00023
97	GPS5	0.00763	0.00024
98	GPS5	0.00537	0.00025
99	GPS5	0.00294	0.00024
100	GPS5	0.00396	0.00024
101	GPS5	0.00362	0.00025
102	GPS5	0.00314	0.00026
103	GPS5	0.00778	0.00024
104	GPS5	0.00037	0.00034
105	GPS5	0.00526	0.00027
106	GPS5	0.00082	0.00027
107	GPS5	0.00598	0.00027
108	GPS5	0.00521	0.00023
109	GPS5	0.00802	0.00024
110	GPS5	0.00470	0.00026
111	GPS5	0.00570	0.00061
112	GPS5	0.00000	0.00000
113	GPS6	-0.00934	0.00067
114	GPS6	-0.00286	0.00027
115	GPS6	-0.00477	0.00025
116	GPS6	-0.00341	0.00024
117	GPS6	-0.00388	0.00025
118	GPS6	-0.00501	0.00025
119	GPS6	-0.00416	0.00024
120	GPS6	-0.00216	0.00033
121	GPS6	-0.00309	0.00027
122	GPS6	-0.00525	0.00027
123	GPS6	-0.00201	0.00027
124	GPS6	-0.00362	0.00023
125	GPS6	-0.00508	0.00023
126	GPS6	-0.00374	0.00024
127	GPS6	-0.00525	0.00024
128	GPS6	-0.00336	0.00024
129	GPS6	-0.00383	0.00025
130	GPS6	-0.00446	0.00026
131	GPS6	-0.00359	0.00024
132	GPS6	-0.00347	0.00033
133	GPS6	-0.00323	0.00027
134	GPS6	-0.00594	0.00027
135	GPS6	-0.00307	0.00026

136	GPS6	-0.00459	0.00023
137	GPS6	-0.00392	0.00023
138	GPS6	-0.00295	0.00025
139	GPS6	-0.00485	0.00040
140	GPS6	0.00000	0.00000
141	GPS7	-0.00576	0.00856
142	GPS7	-0.00280	0.00033
143	GPS7	-0.00456	0.00026
144	GPS7	-0.00308	0.00027
145	GPS7	-0.00380	0.00027
146	GPS7	-0.00467	0.00027
147	GPS7	-0.00340	0.00025
148	GPS7	-0.00308	0.00035
149	GPS7	-0.00284	0.00028
150	GPS7	-0.00532	0.00029
151	GPS7	-0.00218	0.00029
152	GPS7	-0.00267	0.00025
153	GPS7	-0.00508	0.00025
154	GPS7	-0.00279	0.00029
155	GPS7	-0.00962	0.00215
156	GPS7	0.00000	0.00000
157	GPS7	0.00000	0.00000
158	GPS7	0.00000	0.00000
159	GPS7	0.00000	0.00000
160	GPS7	0.00000	0.00000
161	GPS7	0.00000	0.00000
162	GPS7	0.00000	0.00000
163	GPS7	0.00000	0.00000
164	GPS7	0.00000	0.00000
165	GPS7	0.00000	0.00000
166	GPS7	0.00000	0.00000
167	GPS7	0.00000	0.00000
168	GPS7	0.00000	0.00000
169	GPS8	0.00000	0.00000
170	GPS8	-0.00116	0.00033
171	GPS8	-0.00473	0.00025
172	GPS8	-0.00322	0.00025
173	GPS8	-0.00334	0.00025
174	GPS8	-0.00432	0.00025
175	GPS8	-0.00235	0.00024
176	GPS8	-0.00249	0.00034
177	GPS8	-0.00338	0.00028
178	GPS8	-0.00535	0.00028
179	GPS8	-0.00303	0.00027
180	GPS8	-0.00213	0.00023
181	GPS8	-0.00478	0.00024
182	GPS8	-0.00141	0.00025
183	GPS8	-0.00568	0.00025
184	GPS8	-0.00365	0.00024
185	GPS8	-0.00344	0.00025
186	GPS8	-0.00332	0.00026
187	GPS8	-0.00226	0.00024
188	GPS8	-0.00243	0.00034

189	GPS8	-0.00262	0.00028
190	GPS8	-0.00518	0.00027
191	GPS8	-0.00303	0.00027
192	GPS8	-0.00417	0.00023
193	GPS8	-0.00304	0.00024
194	GPS8	-0.00148	0.00025
195	GPS8	-0.00417	0.00028
196	GPS8	-0.01087	0.00531
197	GPS9	0.00430	0.00857
198	GPS9	0.00034	0.00031
199	GPS9	-0.00372	0.00025
200	GPS9	-0.00204	0.00024
201	GPS9	-0.00219	0.00025
202	GPS9	-0.00310	0.00025
203	GPS9	-0.00389	0.00024
204	GPS9	0.00009	0.00033
205	GPS9	-0.00117	0.00027
206	GPS9	-0.00431	0.00027
207	GPS9	0.00040	0.00027
208	GPS9	-0.00069	0.00023
209	GPS9	-0.00424	0.00023
210	GPS9	-0.00052	0.00024
211	GPS9	-0.00434	0.00024
212	GPS9	-0.00111	0.00024
213	GPS9	-0.00277	0.00025
214	GPS9	-0.00217	0.00026
215	GPS9	-0.00322	0.00024
216	GPS9	-0.00017	0.00033
217	GPS9	-0.00169	0.00027
218	GPS9	-0.00449	0.00027
219	GPS9	0.00025	0.00027
220	GPS9	-0.00262	0.00023
221	GPS9	-0.00230	0.00023
222	GPS9	0.00019	0.00025
223	GPS9	-0.00229	0.00040
224	GPS9	0.00000	0.00000
225	GP13	0.00239	0.00857
226	GP13	-0.00362	0.00031
227	GP13	-0.00386	0.00025
228	GP13	-0.00263	0.00024
229	GP13	-0.00292	0.00025
230	GP13	-0.00485	0.00025
231	GP13	-0.00376	0.00024
232	GP13	-0.00218	0.00033
233	GP13	-0.00132	0.00027
234	GP13	-0.00419	0.00028
235	GP13	-0.00098	0.00027
236	GP13	-0.00309	0.00023
237	GP13	-0.00392	0.00023
238	GP13	-0.00314	0.00024
239	GP13	-0.00467	0.00024
240	GP13	-0.00153	0.00024
241	GP13	-0.00351	0.00025



242	GP13	-0.00361	0.00026
243	GP13	-0.00273	0.00024
244	GP13	-0.00396	0.00033
245	GP13	-0.00206	0.00027
246	GP13	-0.00496	0.00027
247	GP13	-0.00180	0.00027
248	GP13	-0.00502	0.00023
249	GP13	-0.00211	0.00023
250	GP13	-0.00261	0.00025
251	GP13	-0.00316	0.00040
252	GP13	0.00000	0.00000

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OLKI07S

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-----  
RMS ERRORS OF ELLIP. COORDINATES AND COORDINATE DIFFER. IN MM (PART 1):  
-----

NUM		1	2	3	4	5	6	7	8	9	10
1	B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.0	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3
2	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.4
3	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.4
4	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4
5	B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3
6	B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3
7	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4
B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	

8	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3
9	B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3
10	B	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3

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SLOPE DISTANCES AND RMS ERRORS IN M (PART 1):

NUM		2 N	3 N	4 N	5 N	6 N	7 N	8 N	9 N
1	O	1355.8621	1006.1927	643.4483	1131.6197	1264.8248	1482.9925	1594.5013	2343.5952
	N	1355.8611	1006.1916	643.4484	1131.6219	1264.8252	1482.9934	1594.5025	2343.5967
	RMS	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
2	O		1609.8487	1856.9241	1477.3558	2436.7239	2811.6728	2949.4962	3649.8847
	N		1609.8459	1856.9238	1477.3555	2436.7235	2811.6728	2949.4964	3649.8854
	RMS		0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
3	O			756.3239	2094.2040	2126.8432	2073.0479	1924.5782	2914.4348
	N			756.3255	2094.2045	2126.8431	2073.0485	1924.5801	2914.4358
	RMS			0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
4	O				1734.6515	1418.6646	1317.4851	1216.2397	2165.8769
	N				1734.6534	1418.6635	1317.4840	1216.2396	2165.8762
	RMS				0.0001	0.0000	0.0000	0.0000	0.0000
5	O					1284.5638	1894.7505	2256.0687	2571.6088
	N					1284.5663	1894.7539	2256.0720	2571.6129
	RMS					0.0000	0.0000	0.0000	0.0000
6	O						683.0097	1157.8153	1290.2791
	N						683.0105	1157.8156	1290.2806
	RMS						0.0001	0.0000	0.0000
7	O							511.2571	868.5756
	N							511.2564	868.5762
	RMS							0.0001	0.0000
8	O								1057.9154

```

| N | N |
|   | RMS |
|   |   |
| 9 | O |
| N | N |
|   | RMS |

```

```

1057.9145
0.0000

```

```

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OLKI07S

```

```

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```

SLOPE DISTANCES AND RMS ERRORS IN M (PART 1): CONTINUATION

NUM		10 N
1	O	2407.0274
	N	2407.0279
	RMS	0.0000
2	O	3597.9093
	N	3597.9083
	RMS	0.0000
3	O	3159.4226
	N	3159.4239
	RMS	0.0000
4	O	2406.3255
	N	2406.3254
	RMS	0.0000
5	O	2326.7292
	N	2326.7297
	RMS	0.0000
6	O	1166.0248
	N	1166.0243
	RMS	0.0000
7	O	1126.4117
	N	1126.4135
	RMS	0.0000
8	O	1520.6870
	N	1520.6889
	RMS	0.0000
9	O	665.0354

	N		N		665.0406	
			RMS		0.0000	

---

## Appendix IV. Results of the first measurements at the pillars located outside Olkiluoto in 2007.

```
=====
Program : GPSEST                               Bernese GPS Software Version 5.0
Purpose : Parameter estimation
Campaign: ${P}/OL07KU                          Default session: 1060 year 2007
Date    : 24-Jan-2008 12:40                    User name      : ja
=====
```

OL07KU

```
1${P}/OL07KU                                PROGRAM GPSEST   24-JAN-08 12:40
OL07KU                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

### TABLE OF CONTENTS

- 1. CAMPAIGNS
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- 3. GENERAL OPTIONS
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- 5. SATELLITE ORBITS
- 6. ATMOSPHERE
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- 8. POLE COORDINATES AND TIME INFORMATION
- 9. ANTENNA PHASE CENTERS
- 10. CONSTANTS
- 11. PARAMETER CHARACTERIZATION LIST
- 12. TEST OUTPUT
- 13. RESULTS (PART 1)
- 14. RESULTS (PART 2)

```
1${P}/OL07KU                                PROGRAM GPSEST   24-JAN-08 12:40
OL07KU                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

### INPUT AND OUTPUT FILENAMES

```
-----
Session table          : ${P}/OL07KU\STA\SESSIONS.SES
```

```

General constants      : ${X}/GEN\CONST.
Geodetic datum        : ${X}/GEN\DATUM.
Station information    : ${P}/OLO7KU\STA\OLO7KU.STA
Earth rotation parameters : ${P}/OLO7KU\ORB\C04_2007.ERP
Subdaily pole model   : ${X}/GEN\IERS2000.SUB
Nutation model        : ${X}/GEN\IAU2000.NUT
Satellite information  : ${X}/GEN\SATELLIT.
Receiver information   : ${X}/GEN\RECEIVER.
Satellite problems    : ${X}/GEN\SAT_2007.CRX
Phase center eccentricities : ${X}/GEN\PHAS_IGS.REL
SINEX general input file : ${X}/GEN\SINEX.
IONEX control file    : ${X}/GEN\IONEX.
Difference GPS-UTC    : ---
A priori station coordinates: ${P}/OLO7KU\STA\OLKIU.CRD
GNSS standard orbits  : ${P}/OLO7KU\ORB\OLO7KU.STD
GNSS orbit partials  : ---
Ionosphere models     : ---
Troposphere estimates : ---
Station sigma factors : ---
Station eccentricities : ---
Ocean loading tables  : ---
GNSS clock corrections : ---
Differential code biases : ---
Receiver antenna orientation: ---
Kinematic coordinates : ---
Kinematic velocities  : ---
Standard orbit(s)     : ---
Orbit partials        : ---
Attitude data         : ---
Precise orbit(s)      : ---
LEO orbital elements  : ---
Station coordinates   : ${P}/OLO7KU\STA\TOL07KU.CRD
GNSS orbital elements : ---
Troposphere estimates : ---
Troposphere SINEX     : ---
Ionosphere models     : ---
IONEX                 : ---
Residuals             : ---
Coordinate covariance matrix: ---
Full covariance matrix : ---
Normal equations      : ---
Bernese ERP file      : ---
IERS ERP file         : ---
GNSS clock corrections : ---
Clock RINEX           : ---
Kinematic coordinates : ---
Differential code biases : ---
Phase center variations (gri: ---
Phase center variations (har: ---
Scratch file          : ${U}/WORK\GPSEST.SCR
Scratch files         : ${U}/WORK\GPSEST.SC1
Program output        : ${P}/OLO7KU\OUT\GPSEST.L19
Error message         : ${U}/WORK\ERROR.MSG

```

1\${P}/OL07KU  
OL07KU

PROGRAM GPSEST 24-JAN-08 12:40  
BERNESE GPS SOFTWARE VERSION 5.0

1. CAMPAIGNS

CAMPAIGN NAME	NUM	STATION NAME	NUM	STATION NAME	NUM	STATION NAME	NUM	STATION NAME	NUM	STATION NAME
\${P}/OL07KU	:	1 GPS1	2	GP11	3	GP12	4	GP14	5	GP15

2. OBSERVATION FILES

\${P}/OL07KU

MAIN CHARACTERISTICS:

FILE	OBSERVATION FILE HEADER	OBSERVATION FILE	SESS	RECEIVER 1	RECEIVER 2
1	\${P}/OL07KU\OBS\01111000.PSH	\${P}/OL07KU\OBS\01111000.PSO	1000	ASHTECH Z-XII3	ASHTECH Z-XII3
2	\${P}/OL07KU\OBS\01111010.PSH	\${P}/OL07KU\OBS\01111010.PSO	1010	ASHTECH Z-XII3	ASHTECH Z-XII3
3	\${P}/OL07KU\OBS\01111020.PSH	\${P}/OL07KU\OBS\01111020.PSO	1020	ASHTECH Z-XII3	ASHTECH Z-XII3
4	\${P}/OL07KU\OBS\01121030.PSH	\${P}/OL07KU\OBS\01121030.PSO	1030	ASHTECH Z-XII3	ASHTECH UZ-12
5	\${P}/OL07KU\OBS\01121040.PSH	\${P}/OL07KU\OBS\01121040.PSO	1040	ASHTECH Z-XII3	ASHTECH UZ-12
6	\${P}/OL07KU\OBS\01121050.PSH	\${P}/OL07KU\OBS\01121050.PSO	1050	ASHTECH Z-XII3	ASHTECH UZ-12
7	\${P}/OL07KU\OBS\01121060.PSH	\${P}/OL07KU\OBS\01121060.PSO	1060	ASHTECH Z-XII3	ASHTECH UZ-12
8	\${P}/OL07KU\OBS\01141000.PSH	\${P}/OL07KU\OBS\01141000.PSO	1000	ASHTECH Z-XII3	ASHTECH Z-XII3
9	\${P}/OL07KU\OBS\01141010.PSH	\${P}/OL07KU\OBS\01141010.PSO	1010	ASHTECH Z-XII3	ASHTECH Z-XII3
10	\${P}/OL07KU\OBS\01141020.PSH	\${P}/OL07KU\OBS\01141020.PSO	1020	ASHTECH Z-XII3	ASHTECH Z-XII3
11	\${P}/OL07KU\OBS\01151000.PSH	\${P}/OL07KU\OBS\01151000.PSO	1000	ASHTECH Z-XII3	ASHTECH Z-XII3
12	\${P}/OL07KU\OBS\01151010.PSH	\${P}/OL07KU\OBS\01151010.PSO	1010	ASHTECH Z-XII3	ASHTECH Z-XII3
13	\${P}/OL07KU\OBS\01151020.PSH	\${P}/OL07KU\OBS\01151020.PSO	1020	ASHTECH Z-XII3	ASHTECH Z-XII3
14	\${P}/OL07KU\OBS\14111000.PSH	\${P}/OL07KU\OBS\14111000.PSO	1000	ASHTECH Z-XII3	ASHTECH Z-XII3
15	\${P}/OL07KU\OBS\14111010.PSH	\${P}/OL07KU\OBS\14111010.PSO	1010	ASHTECH Z-XII3	ASHTECH Z-XII3
16	\${P}/OL07KU\OBS\14111020.PSH	\${P}/OL07KU\OBS\14111020.PSO	1020	ASHTECH Z-XII3	ASHTECH Z-XII3
17	\${P}/OL07KU\OBS\14151000.PSH	\${P}/OL07KU\OBS\14151000.PSO	1000	ASHTECH Z-XII3	ASHTECH Z-XII3
18	\${P}/OL07KU\OBS\14151010.PSH	\${P}/OL07KU\OBS\14151010.PSO	1010	ASHTECH Z-XII3	ASHTECH Z-XII3
19	\${P}/OL07KU\OBS\14151020.PSH	\${P}/OL07KU\OBS\14151020.PSO	1020	ASHTECH Z-XII3	ASHTECH Z-XII3

AMB.I.+S. #CLUSTERS

FILE	TYP	FREQ.	STATION 1	STATION 2	SESS	FIRST	OBSERV.TIME	#EPO	DT	#EF	#CLK	ARC	#SAT	W	L2	#AMB	L1	L2	L5	RM	
1	P	L3	GPS1	GP11	1000	7-04-10	12:58:00	1324	30	0	E E	1	30	N	Y	Y	45	16	16	45	0
2	P	L3	GPS1	GP11	1010	7-04-11	0:00:30	2879	30	0	E E	1	30	N	Y	Y	76	25	25	76	0
3	P	L3	GPS1	GP11	1020	7-04-12	0:00:30	1515	30	0	E E	1	30	N	Y	Y	50	16	16	50	0
4	P	L3	GPS1	GP12	1030	7-04-13	6:24:30	2111	30	0	E E	1	29	N	Y	Y	57	20	20	57	0
5	P	L3	GPS1	GP12	1040	7-04-14	0:00:30	2879	30	0	E E	1	30	N	Y	Y	76	25	25	76	0
6	P	L3	GPS1	GP12	1050	7-04-15	0:00:30	2879	30	0	E E	1	30	N	Y	Y	78	24	24	78	0
7	P	L3	GPS1	GP12	1060	7-04-16	0:00:30	1390	30	0	E E	1	30	N	Y	Y	40	11	11	40	0
8	P	L3	GPS1	GP14	1000	7-04-10	12:29:30	1381	30	0	E E	1	30	N	Y	Y	40	13	13	40	0
9	P	L3	GPS1	GP14	1010	7-04-11	0:00:30	2879	30	0	E E	1	30	N	Y	Y	77	26	26	77	0
10	P	L3	GPS1	GP14	1020	7-04-12	0:00:30	1468	30	0	E E	1	30	N	Y	Y	41	12	12	41	0
11	P	L3	GPS1	GP15	1000	7-04-10	9:06:00	1788	30	0	E E	1	30	N	Y	Y	46	14	14	46	0
12	P	L3	GPS1	GP15	1010	7-04-11	0:00:30	2879	30	0	E E	1	30	N	Y	Y	76	25	25	76	0
13	P	L3	GPS1	GP15	1020	7-04-12	0:00:30	1412	30	0	E E	1	30	N	Y	Y	40	12	12	40	0
14	P	L3	GP14	GP11	1000	7-04-10	12:58:00	1324	30	0	E E	1	30	N	Y	Y	53	24	24	53	0
15	P	L3	GP14	GP11	1010	7-04-11	0:00:30	2879	30	0	E E	1	30	N	Y	Y	77	26	26	77	0
16	P	L3	GP14	GP11	1020	7-04-12	0:00:30	1468	30	0	E E	1	30	N	Y	Y	45	15	15	45	0
17	P	L3	GP14	GP15	1000	7-04-10	12:29:30	1381	30	0	E E	1	30	N	Y	Y	44	17	17	44	0
18	P	L3	GP14	GP15	1010	7-04-11	0:00:30	2879	30	0	E E	1	30	N	Y	Y	76	25	25	76	0
19	P	L3	GP14	GP15	1020	7-04-12	0:00:30	1412	30	0	E E	1	30	N	Y	Y	45	17	17	45	0

SATELLITES:

FILE #SAT SATELLITES

1	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
3	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
4	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	30	31	
5	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
6	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
7	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
8	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
9	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
10	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
11	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
12	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
13	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
14	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
15	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
16	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
17	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
18	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
19	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

OBSERVATION SELECTION:



SAMPLING RATE : 30 SEC  
ELEVATION CUT-OFF ANGLE : 20 DEGREES  
SATELLITE SYSTEM : GPS  
SPECIAL DATA SELECTION : NO

1\${P}/OL07KU  
OL07KU

PROGRAM GPSEST 24-JAN-08 12:40  
BERNESE GPS SOFTWARE VERSION 5.0

-----  
3. GENERAL OPTIONS  
-----

TIDAL CORRECTION OF STATION COORDINATES : IERS CONVENTIONS 2000

A PRIORI SIGMA OF UNIT WEIGHT:  
-----

A PRIORI SIGMA OF UNIT WEIGHT : 0.001 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)

MODEL FOR ELEVATION-DEPENDENT WEIGHTING : 1/COS(Z)

CORRELATIONS AND SESSIONS:  
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STRATEGY : CORRELATIONS WITHIN BASELINE

AMBIGUITY RESOLUTION STRATEGY:  
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AMBIGUITIES PRE-ELIMINATED EVERY 30 SECONDS

SYNCHRONIZATION ERRORS:  
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STRATEGY : SYNCHRONIZATION ERRORS NOT APPLIED

4. STATIONS  
-----

Local geodetic datum: \${X}/GEN\DATUM.

Datum name	Ell. param./ Scale	Shifts to WGS-84	Rotations to WGS-84
WGS - 84	A = 6378137.000 m 1/F= 298.2572236	DX = 0.0000 m DY = 0.0000 m	RX = 0.00000 arcsec RY = 0.00000 arcsec

SC = 0.00000D+00      DZ =      0.0000 m      RZ =      0.00000 arcsec

A priori station coordinates:      \${P}/OL07KU\STA\OLKIU.CRD

A priori station coordinates      A priori station coordinates  
WGS-84      Ellipsoidal in local geodetic datum

num	Station name	obs	e/f/h	X (m)	Y (m)	Z (m)	Latitude	Longitude	Height (m)
1	GPS1	Y	ESTIM	2863210.2855	1126271.3627	5568267.2028	61 14 22.748766	21 28 21.624778	30.5343
2	GP11	Y	ESTIM	2859164.4451	1133699.2391	5568849.3287	61 15 1.096558	21 37 44.500394	43.1905
3	GP12	Y	ESTIM	2861097.0631	1122358.5353	5570120.7180	61 16 27.780953	21 25 9.163734	21.8609
4	GP14	Y	ESTIM	2864514.8990	1133711.1997	5566120.9120	61 11 57.682867	21 35 33.201720	48.3365
5	GP15	Y	ESTIM	2866984.1300	1129664.4472	5565663.1052	61 11 27.618629	21 30 20.512380	37.5870

A priori sigma:

Station coordinates a priori sigma  
in local geodetic datum

num	Station name	N (m)	E (m)	U (m)
1	GPS1	0.00001	0.00001	0.00001

1\${P}/OL07KU  
OL07KU

PROGRAM GPSEST 24-JAN-08 12:40  
BERNESE GPS SOFTWARE VERSION 5.0

5. SATELLITE ORBITS

ARC CHARACTERISTICS:

ARC	START OF ARC	END OF ARC	SOURCE	#SAT	SATELLITES
1	07-04-10 00:00:00	07-04-17 00:00:00	PR2007.106	31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 16 17 19 20 21 22 23 24 25 26 27 28 29 30 31 32 68

OSCULATING ELEMENTS:      \${P}/OL07KU\ORB\OL07KU.STD

REFERENCE SYSTEM: J2000.0  
REFERENCE EPOCH : 54200.3791667 MJD (2007 4 10 9 6 0.00)

SAT	S.MAJ.AXIS	ECCENTRIC.	INCLINAT.	NODE	PERIGEE	M. ANOMALY	PER.PASS.TIME
1	26562395.8	0.00656363	56.749885	12.865651	-100.903146	91.099391	54200.2529807
2	26558016.0	0.00890291	54.215552	-110.198116	-230.501486	157.761764	54200.1606976
3	26562592.2	0.00920839	53.072766	-175.500009	42.466987	122.731545	54200.2091637
4	26561969.5	0.00776507	54.183237	-109.090244	15.248161	-54.646504	54200.4548582
5	26563438.5	0.00772726	53.857147	125.180402	65.488008	-75.918528	54200.4843311
6	26560240.1	0.00571024	53.501809	-172.001103	-99.933897	7.277732	54200.3690872
7	26559426.6	0.01047501	53.592647	-173.472730	-98.283291	-5.824531	54200.3872331
8	26562271.7	0.00979984	56.038413	72.725439	158.465600	8.144093	54200.3678860
9	26559688.1	0.01874949	55.337059	67.925763	75.421755	-11.888831	54200.3956319
10	26559667.2	0.00760465	55.517355	-48.467738	27.569878	-166.240191	54200.6093981
11	26560014.6	0.00664221	51.208112	-119.414459	28.030886	33.657156	54200.3325529
12	26561941.0	0.00360660	55.106834	129.977842	-71.471317	66.928065	54200.2864639
13	26558200.5	0.00333322	56.985389	12.110811	72.538486	-175.088458	54200.6216323
14	26561830.2	0.00289078	56.642207	11.257732	-119.669491	150.143070	54200.1712032
16	26559250.4	0.00400338	55.217641	130.871705	-41.874665	-80.565462	54200.4907418
17	26560159.4	0.00262478	55.009971	-169.587653	184.941653	-149.001259	54200.5855291
19	26560920.6	0.00374849	54.886454	-166.245840	306.409513	-170.421673	54200.6152059
20	26560786.1	0.00328441	54.576318	-50.541433	73.378729	-80.737210	54200.4909893
21	26561796.2	0.01233891	53.813941	-108.044380	-164.568557	-8.275556	54200.3906291
22	26558770.9	0.00473453	54.467733	-47.065216	263.811503	-168.991664	54200.6131969
23	26558870.8	0.00485006	55.621130	10.167676	-212.462061	138.603468	54200.1872188
24	26560680.8	0.00885604	54.765249	-106.951309	-46.255475	-94.440298	54200.5099676
25	26575620.7	0.01253163	54.958901	64.698679	-74.066083	-32.570631	54200.4243154
26	26560360.1	0.01815807	56.875881	12.102958	48.403103	94.063120	54200.2488905
27	26562653.1	0.02057435	55.222741	66.595707	-104.524504	-63.078862	54200.4665414
28	26558973.4	0.01258129	55.108210	131.395867	235.014710	-129.529968	54200.5585499
29	26560829.9	0.01010683	56.671979	10.065981	318.901639	-164.513921	54200.6070223
30	26560419.0	0.00957089	54.222785	127.971646	75.649529	-107.445345	54200.5279776
31	26560503.6	0.00637349	55.139667	69.859027	-77.512037	34.220991	54200.3317707
32	26558594.5	0.01498478	55.816843	-45.210368	-80.321482	138.786072	54200.1869689
68	26558855.8	0.00797675	54.606428	-47.490106	210.843099	-87.141097	54200.4998457

SATELLITE PROBLEMS:

SAT	PROBLEM TYPE	ACTION	FROM	TO
18	MANOEUVRE	NEW SAT.	68 07-04-10 15:51:50	
105	BAD PHASE+CODE	OBS. REMOVED	06-07-09 00:00:00	99-12-31 23:59:59
108	BAD PHASE+CODE	OBS. REMOVED	07-04-15 00:00:00	07-04-15 23:59:59
115	BAD PHASE+CODE	OBS. REMOVED	07-03-26 00:00:00	07-05-01 23:59:59
118	BAD PHASE+CODE	OBS. REMOVED	07-03-17 00:00:00	07-04-14 23:59:59
121	BAD PHASE+CODE	OBS. REMOVED	07-03-17 00:00:00	07-04-18 23:59:59
122	BAD PHASE+CODE	OBS. REMOVED	07-03-17 00:00:00	07-04-13 23:59:59
29	BAD PHASE+CODE	OBS. REMOVED	07-04-13 00:00:00	07-04-13 23:59:59



27	GP11	2007 04 12 12 00 00	0.00000	rel
28	GP11	2007 04 12 14 00 00	0.00000	rel
29	GP11	2007 04 12 16 00 00	0.00000	rel
30	GP11	2007 04 12 18 00 00	0.00000	rel
31	GP11	2007 04 12 20 00 00	0.00000	rel
32	GP11	2007 04 12 22 00 00	0.00000	rel
33	GP11	2007 04 13 00 00 00	0.00000	rel
34	GP11	2007 04 13 02 00 00	0.00000	rel
35	GP11	2007 04 13 04 00 00	0.00000	rel
36	GP11	2007 04 13 06 00 00	0.00000	rel
37	GP11	2007 04 13 08 00 00	0.00000	rel
38	GP11	2007 04 13 10 00 00	0.00000	rel
39	GP11	2007 04 13 12 00 00	0.00000	rel
40	GP11	2007 04 13 14 00 00	0.00000	rel
41	GP11	2007 04 13 16 00 00	0.00000	rel
42	GP11	2007 04 13 18 00 00	0.00000	rel
43	GP11	2007 04 13 20 00 00	0.00000	rel
44	GP11	2007 04 13 22 00 00	0.00000	rel
45	GP11	2007 04 14 00 00 00	0.00000	rel
46	GP11	2007 04 14 02 00 00	0.00000	rel
47	GP11	2007 04 14 04 00 00	0.00000	rel
48	GP11	2007 04 14 06 00 00	0.00000	rel
49	GP11	2007 04 14 08 00 00	0.00000	rel
50	GP11	2007 04 14 10 00 00	0.00000	rel
51	GP11	2007 04 14 12 00 00	0.00000	rel
52	GP11	2007 04 14 14 00 00	0.00000	rel
53	GP11	2007 04 14 16 00 00	0.00000	rel
54	GP11	2007 04 14 18 00 00	0.00000	rel
55	GP11	2007 04 14 20 00 00	0.00000	rel
56	GP11	2007 04 14 22 00 00	0.00000	rel
57	GP11	2007 04 15 00 00 00	0.00000	rel
58	GP11	2007 04 15 02 00 00	0.00000	rel
59	GP11	2007 04 15 04 00 00	0.00000	rel
60	GP11	2007 04 15 06 00 00	0.00000	rel
61	GP11	2007 04 15 08 00 00	0.00000	rel
62	GP11	2007 04 15 10 00 00	0.00000	rel
63	GP11	2007 04 15 12 00 00	0.00000	rel
64	GP11	2007 04 15 14 00 00	0.00000	rel
65	GP11	2007 04 15 16 00 00	0.00000	rel
66	GP11	2007 04 15 18 00 00	0.00000	rel
67	GP11	2007 04 15 20 00 00	0.00000	rel
68	GP11	2007 04 15 22 00 00	0.00000	rel
69	GP11	2007 04 16 00 00 00	0.00000	rel
70	GP11	2007 04 16 02 00 00	0.00000	rel
71	GP11	2007 04 16 04 00 00	0.00000	rel
72	GP11	2007 04 16 06 00 00	0.00000	rel
73	GP11	2007 04 16 08 00 00	0.00000	rel
74	GP11	2007 04 16 10 00 00	0.00000	rel
75	GP11	2007 04 16 12 00 00	0.00000	rel
76	GP12	2007 04 10 08 00 00	0.00000	abs
77	GP12	2007 04 10 10 00 00	0.00000	rel
78	GP12	2007 04 10 12 00 00	0.00000	rel
79	GP12	2007 04 10 14 00 00	0.00000	rel

80	GP12	2007 04 10 16 00 00	0.00000	rel
81	GP12	2007 04 10 18 00 00	0.00000	rel
82	GP12	2007 04 10 20 00 00	0.00000	rel
83	GP12	2007 04 10 22 00 00	0.00000	rel
84	GP12	2007 04 11 00 00 00	0.00000	rel
85	GP12	2007 04 11 02 00 00	0.00000	rel
86	GP12	2007 04 11 04 00 00	0.00000	rel
87	GP12	2007 04 11 06 00 00	0.00000	rel
88	GP12	2007 04 11 08 00 00	0.00000	rel
89	GP12	2007 04 11 10 00 00	0.00000	rel
90	GP12	2007 04 11 12 00 00	0.00000	rel
91	GP12	2007 04 11 14 00 00	0.00000	rel
92	GP12	2007 04 11 16 00 00	0.00000	rel
93	GP12	2007 04 11 18 00 00	0.00000	rel
94	GP12	2007 04 11 20 00 00	0.00000	rel
95	GP12	2007 04 11 22 00 00	0.00000	rel
96	GP12	2007 04 12 00 00 00	0.00000	rel
97	GP12	2007 04 12 02 00 00	0.00000	rel
98	GP12	2007 04 12 04 00 00	0.00000	rel
99	GP12	2007 04 12 06 00 00	0.00000	rel
100	GP12	2007 04 12 08 00 00	0.00000	rel
101	GP12	2007 04 12 10 00 00	0.00000	rel
102	GP12	2007 04 12 12 00 00	0.00000	rel
103	GP12	2007 04 12 14 00 00	0.00000	rel
104	GP12	2007 04 12 16 00 00	0.00000	rel
105	GP12	2007 04 12 18 00 00	0.00000	rel
106	GP12	2007 04 12 20 00 00	0.00000	rel
107	GP12	2007 04 12 22 00 00	0.00000	rel
108	GP12	2007 04 13 00 00 00	0.00000	rel
109	GP12	2007 04 13 02 00 00	0.00000	rel
110	GP12	2007 04 13 04 00 00	0.00000	rel
111	GP12	2007 04 13 06 00 00	0.00000	rel
112	GP12	2007 04 13 08 00 00	0.00000	rel
113	GP12	2007 04 13 10 00 00	0.00000	rel
114	GP12	2007 04 13 12 00 00	0.00000	rel
115	GP12	2007 04 13 14 00 00	0.00000	rel
116	GP12	2007 04 13 16 00 00	0.00000	rel
117	GP12	2007 04 13 18 00 00	0.00000	rel
118	GP12	2007 04 13 20 00 00	0.00000	rel
119	GP12	2007 04 13 22 00 00	0.00000	rel
120	GP12	2007 04 14 00 00 00	0.00000	rel
121	GP12	2007 04 14 02 00 00	0.00000	rel
122	GP12	2007 04 14 04 00 00	0.00000	rel
123	GP12	2007 04 14 06 00 00	0.00000	rel
124	GP12	2007 04 14 08 00 00	0.00000	rel
125	GP12	2007 04 14 10 00 00	0.00000	rel
126	GP12	2007 04 14 12 00 00	0.00000	rel
127	GP12	2007 04 14 14 00 00	0.00000	rel
128	GP12	2007 04 14 16 00 00	0.00000	rel
129	GP12	2007 04 14 18 00 00	0.00000	rel
130	GP12	2007 04 14 20 00 00	0.00000	rel
131	GP12	2007 04 14 22 00 00	0.00000	rel
132	GP12	2007 04 15 00 00 00	0.00000	rel

133	GP12	2007 04 15 02 00 00	0.00000	rel
134	GP12	2007 04 15 04 00 00	0.00000	rel
135	GP12	2007 04 15 06 00 00	0.00000	rel
136	GP12	2007 04 15 08 00 00	0.00000	rel
137	GP12	2007 04 15 10 00 00	0.00000	rel
138	GP12	2007 04 15 12 00 00	0.00000	rel
139	GP12	2007 04 15 14 00 00	0.00000	rel
140	GP12	2007 04 15 16 00 00	0.00000	rel
141	GP12	2007 04 15 18 00 00	0.00000	rel
142	GP12	2007 04 15 20 00 00	0.00000	rel
143	GP12	2007 04 15 22 00 00	0.00000	rel
144	GP12	2007 04 16 00 00 00	0.00000	rel
145	GP12	2007 04 16 02 00 00	0.00000	rel
146	GP12	2007 04 16 04 00 00	0.00000	rel
147	GP12	2007 04 16 06 00 00	0.00000	rel
148	GP12	2007 04 16 08 00 00	0.00000	rel
149	GP12	2007 04 16 10 00 00	0.00000	rel
150	GP12	2007 04 16 12 00 00	0.00000	rel
151	GP14	2007 04 10 08 00 00	0.00000	abs
152	GP14	2007 04 10 10 00 00	0.00000	rel
153	GP14	2007 04 10 12 00 00	0.00000	rel
154	GP14	2007 04 10 14 00 00	0.00000	rel
155	GP14	2007 04 10 16 00 00	0.00000	rel
156	GP14	2007 04 10 18 00 00	0.00000	rel
157	GP14	2007 04 10 20 00 00	0.00000	rel
158	GP14	2007 04 10 22 00 00	0.00000	rel
159	GP14	2007 04 11 00 00 00	0.00000	rel
160	GP14	2007 04 11 02 00 00	0.00000	rel
161	GP14	2007 04 11 04 00 00	0.00000	rel
162	GP14	2007 04 11 06 00 00	0.00000	rel
163	GP14	2007 04 11 08 00 00	0.00000	rel
164	GP14	2007 04 11 10 00 00	0.00000	rel
165	GP14	2007 04 11 12 00 00	0.00000	rel
166	GP14	2007 04 11 14 00 00	0.00000	rel
167	GP14	2007 04 11 16 00 00	0.00000	rel
168	GP14	2007 04 11 18 00 00	0.00000	rel
169	GP14	2007 04 11 20 00 00	0.00000	rel
170	GP14	2007 04 11 22 00 00	0.00000	rel
171	GP14	2007 04 12 00 00 00	0.00000	rel
172	GP14	2007 04 12 02 00 00	0.00000	rel
173	GP14	2007 04 12 04 00 00	0.00000	rel
174	GP14	2007 04 12 06 00 00	0.00000	rel
175	GP14	2007 04 12 08 00 00	0.00000	rel
176	GP14	2007 04 12 10 00 00	0.00000	rel
177	GP14	2007 04 12 12 00 00	0.00000	rel
178	GP14	2007 04 12 14 00 00	0.00000	rel
179	GP14	2007 04 12 16 00 00	0.00000	rel
180	GP14	2007 04 12 18 00 00	0.00000	rel
181	GP14	2007 04 12 20 00 00	0.00000	rel
182	GP14	2007 04 12 22 00 00	0.00000	rel
183	GP14	2007 04 13 00 00 00	0.00000	rel
184	GP14	2007 04 13 02 00 00	0.00000	rel
185	GP14	2007 04 13 04 00 00	0.00000	rel

186	GP14	2007 04 13 06 00 00	0.00000	rel
187	GP14	2007 04 13 08 00 00	0.00000	rel
188	GP14	2007 04 13 10 00 00	0.00000	rel
189	GP14	2007 04 13 12 00 00	0.00000	rel
190	GP14	2007 04 13 14 00 00	0.00000	rel
191	GP14	2007 04 13 16 00 00	0.00000	rel
192	GP14	2007 04 13 18 00 00	0.00000	rel
193	GP14	2007 04 13 20 00 00	0.00000	rel
194	GP14	2007 04 13 22 00 00	0.00000	rel
195	GP14	2007 04 14 00 00 00	0.00000	rel
196	GP14	2007 04 14 02 00 00	0.00000	rel
197	GP14	2007 04 14 04 00 00	0.00000	rel
198	GP14	2007 04 14 06 00 00	0.00000	rel
199	GP14	2007 04 14 08 00 00	0.00000	rel
200	GP14	2007 04 14 10 00 00	0.00000	rel
201	GP14	2007 04 14 12 00 00	0.00000	rel
202	GP14	2007 04 14 14 00 00	0.00000	rel
203	GP14	2007 04 14 16 00 00	0.00000	rel
204	GP14	2007 04 14 18 00 00	0.00000	rel
205	GP14	2007 04 14 20 00 00	0.00000	rel
206	GP14	2007 04 14 22 00 00	0.00000	rel
207	GP14	2007 04 15 00 00 00	0.00000	rel
208	GP14	2007 04 15 02 00 00	0.00000	rel
209	GP14	2007 04 15 04 00 00	0.00000	rel
210	GP14	2007 04 15 06 00 00	0.00000	rel
211	GP14	2007 04 15 08 00 00	0.00000	rel
212	GP14	2007 04 15 10 00 00	0.00000	rel
213	GP14	2007 04 15 12 00 00	0.00000	rel
214	GP14	2007 04 15 14 00 00	0.00000	rel
215	GP14	2007 04 15 16 00 00	0.00000	rel
216	GP14	2007 04 15 18 00 00	0.00000	rel
217	GP14	2007 04 15 20 00 00	0.00000	rel
218	GP14	2007 04 15 22 00 00	0.00000	rel
219	GP14	2007 04 16 00 00 00	0.00000	rel
220	GP14	2007 04 16 02 00 00	0.00000	rel
221	GP14	2007 04 16 04 00 00	0.00000	rel
222	GP14	2007 04 16 06 00 00	0.00000	rel
223	GP14	2007 04 16 08 00 00	0.00000	rel
224	GP14	2007 04 16 10 00 00	0.00000	rel
225	GP14	2007 04 16 12 00 00	0.00000	rel
226	GP15	2007 04 10 08 00 00	0.00000	abs
227	GP15	2007 04 10 10 00 00	0.00000	rel
228	GP15	2007 04 10 12 00 00	0.00000	rel
229	GP15	2007 04 10 14 00 00	0.00000	rel
230	GP15	2007 04 10 16 00 00	0.00000	rel
231	GP15	2007 04 10 18 00 00	0.00000	rel
232	GP15	2007 04 10 20 00 00	0.00000	rel
233	GP15	2007 04 10 22 00 00	0.00000	rel
234	GP15	2007 04 11 00 00 00	0.00000	rel
235	GP15	2007 04 11 02 00 00	0.00000	rel
236	GP15	2007 04 11 04 00 00	0.00000	rel
237	GP15	2007 04 11 06 00 00	0.00000	rel
238	GP15	2007 04 11 08 00 00	0.00000	rel



239	GP15	2007 04 11 10 00 00	0.00000	rel
240	GP15	2007 04 11 12 00 00	0.00000	rel
241	GP15	2007 04 11 14 00 00	0.00000	rel
242	GP15	2007 04 11 16 00 00	0.00000	rel
243	GP15	2007 04 11 18 00 00	0.00000	rel
244	GP15	2007 04 11 20 00 00	0.00000	rel
245	GP15	2007 04 11 22 00 00	0.00000	rel
246	GP15	2007 04 12 00 00 00	0.00000	rel
247	GP15	2007 04 12 02 00 00	0.00000	rel
248	GP15	2007 04 12 04 00 00	0.00000	rel
249	GP15	2007 04 12 06 00 00	0.00000	rel
250	GP15	2007 04 12 08 00 00	0.00000	rel
251	GP15	2007 04 12 10 00 00	0.00000	rel
252	GP15	2007 04 12 12 00 00	0.00000	rel
253	GP15	2007 04 12 14 00 00	0.00000	rel
254	GP15	2007 04 12 16 00 00	0.00000	rel
255	GP15	2007 04 12 18 00 00	0.00000	rel
256	GP15	2007 04 12 20 00 00	0.00000	rel
257	GP15	2007 04 12 22 00 00	0.00000	rel
258	GP15	2007 04 13 00 00 00	0.00000	rel
259	GP15	2007 04 13 02 00 00	0.00000	rel
260	GP15	2007 04 13 04 00 00	0.00000	rel
261	GP15	2007 04 13 06 00 00	0.00000	rel
262	GP15	2007 04 13 08 00 00	0.00000	rel
263	GP15	2007 04 13 10 00 00	0.00000	rel
264	GP15	2007 04 13 12 00 00	0.00000	rel
265	GP15	2007 04 13 14 00 00	0.00000	rel
266	GP15	2007 04 13 16 00 00	0.00000	rel
267	GP15	2007 04 13 18 00 00	0.00000	rel
268	GP15	2007 04 13 20 00 00	0.00000	rel
269	GP15	2007 04 13 22 00 00	0.00000	rel
270	GP15	2007 04 14 00 00 00	0.00000	rel
271	GP15	2007 04 14 02 00 00	0.00000	rel
272	GP15	2007 04 14 04 00 00	0.00000	rel
273	GP15	2007 04 14 06 00 00	0.00000	rel
274	GP15	2007 04 14 08 00 00	0.00000	rel
275	GP15	2007 04 14 10 00 00	0.00000	rel
276	GP15	2007 04 14 12 00 00	0.00000	rel
277	GP15	2007 04 14 14 00 00	0.00000	rel
278	GP15	2007 04 14 16 00 00	0.00000	rel
279	GP15	2007 04 14 18 00 00	0.00000	rel
280	GP15	2007 04 14 20 00 00	0.00000	rel
281	GP15	2007 04 14 22 00 00	0.00000	rel
282	GP15	2007 04 15 00 00 00	0.00000	rel
283	GP15	2007 04 15 02 00 00	0.00000	rel
284	GP15	2007 04 15 04 00 00	0.00000	rel
285	GP15	2007 04 15 06 00 00	0.00000	rel
286	GP15	2007 04 15 08 00 00	0.00000	rel
287	GP15	2007 04 15 10 00 00	0.00000	rel
288	GP15	2007 04 15 12 00 00	0.00000	rel
289	GP15	2007 04 15 14 00 00	0.00000	rel
290	GP15	2007 04 15 16 00 00	0.00000	rel
291	GP15	2007 04 15 18 00 00	0.00000	rel

292	GP15	2007 04 15 20 00 00	0.00000	rel
293	GP15	2007 04 15 22 00 00	0.00000	rel
294	GP15	2007 04 16 00 00 00	0.00000	rel
295	GP15	2007 04 16 02 00 00	0.00000	rel
296	GP15	2007 04 16 04 00 00	0.00000	rel
297	GP15	2007 04 16 06 00 00	0.00000	rel
298	GP15	2007 04 16 08 00 00	0.00000	rel
299	GP15	2007 04 16 10 00 00	0.00000	rel
300	GP15	2007 04 16 12 00 00	0.00000	rel

IONOSPHERE MODELS:

-----

NO IONOSPHERE MODELS APPLIED

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8. POLE COORDINATES AND TIME INFORMATION

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A PRIORI POLE AND TIME INFORMATION FROM THE POLE FILE:

-----

DATUM	TIME	X-POLE (") EP-CPO (")	Y-POLE (") PS-CPO (")	UT1-UTC (S)	GPS-UTC (S)	RMS XP (") RMS EP (")	RMS YP (") RMS PS (")	RMS DT (S)
07-04-10	00:00:00	0.04259 0.00000	0.48740 0.00000	-0.077656	14.	0.00002 0.00009	0.00001 0.00013	0.000014
07-04-11	00:00:00	0.04402 0.00000	0.48787 0.00000	-0.078898	14.	0.00001 0.00009	0.00001 0.00013	0.000014
07-04-12	00:00:00	0.04553 0.00000	0.48844 0.00000	-0.080278	14.	0.00001 0.00010	0.00001 0.00014	0.000017
07-04-13	00:00:00	0.04703 0.00000	0.48890 0.00000	-0.081849	14.	0.00001 0.00017	0.00001 0.00017	0.000019
07-04-14	00:00:00	0.04872 0.00000	0.48930 0.00000	-0.083750	14.	0.00001 0.00017	0.00002 0.00017	0.000028
07-04-15	00:00:00	0.05040 0.00000	0.48970 0.00000	-0.085883	14.	0.00001 0.00020	0.00002 0.00019	0.000036
07-04-16	00:00:00	0.05223 0.00000	0.49012 0.00000	-0.088163	14.	0.00002 0.00043	0.00001 0.00078	0.000034
07-04-17	00:00:00	0.05428 0.00000	0.49047 0.00000	-0.090429	14.	0.00002 0.00015	0.00001 0.00028	0.000026

NUTATION MODEL: IAU2000  
SUBDAILY POLE MODEL: IERS2000

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12. TEST OUTPUT

MIN. AND MAX. ELEVATION/NADIR ANGLES AND MAX. SYNCHRONIZATION ERRORS:

SESS	FILE	STATION NAME 1	STATION NAME 2	MIN/MAX ELEV.	MIN/MAX NADIR	SYNCH. ERR. (NS)
0001	1	GPS1	GP11	20.0 83.7	1.5 13.3	0.0
0002	2	GPS1	GP11	20.0 83.7	1.5 13.3	0.0
0003	3	GPS1	GP11	20.0 81.9	1.9 13.3	0.0
0004	4	GPS1	GP12	20.0 83.7	1.5 13.3	0.0
0005	5	GPS1	GP12	20.0 83.7	1.5 13.3	0.0
0006	6	GPS1	GP12	20.0 83.7	1.5 13.3	0.0
0007	7	GPS1	GP12	20.0 81.5	2.0 13.3	0.0
0008	8	GPS1	GP14	20.0 83.8	1.5 13.3	0.0
0009	9	GPS1	GP14	20.0 83.8	1.5 13.3	0.0
0010	10	GPS1	GP14	20.0 81.9	1.9 13.3	0.0
0011	11	GPS1	GP15	20.0 83.7	1.5 13.3	0.0
0012	12	GPS1	GP15	20.0 83.7	1.5 13.3	0.0
0013	13	GPS1	GP15	20.0 81.9	1.9 13.3	0.0
0014	14	GP14	GP11	20.0 83.8	1.5 13.3	0.0
0015	15	GP14	GP11	20.0 83.8	1.5 13.3	0.0
0016	16	GP14	GP11	20.0 81.9	1.9 13.3	0.0
0017	17	GP14	GP15	20.0 83.8	1.5 13.3	0.0
0018	18	GP14	GP15	20.0 83.8	1.5 13.3	0.0
0019	19	GP14	GP15	20.0 81.9	1.9 13.3	0.0

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13. RESULTS (PART 1)

NUMBER OF PARAMETERS (PART 1):

PARAMETER TYPE	#PARAMETERS	#PRE-ELIMINATED	#SET-UP	#NO-OBS	#REF	#SINGULAR
STATION COORDINATES	15	0	15	0	0	0
AMBIGUITIES	29	29 (BEFORE INV)	363	334	0	13
SITE-SPECIFIC TROPOSPHERE PARAMETERS	300	0	300	0	0	181

```
-----
TOTAL NUMBER OF PARAMETERS          344      29          678      334      0      194
-----
```

NUMBER OF OBSERVATIONS (PART 1):

```
-----
TYPE          FREQUENCY      FILE          #OBSERVATIONS
-----
PHASE         L3             ALL           210589
-----
TOTAL NUMBER OF OBSERVATIONS          210589
-----
```

A POSTERIORI SIGMA OF UNIT WEIGHT (PART 1):

```
-----
A POSTERIORI SIGMA OF UNIT WEIGHT :    0.0009 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)
DEGREE OF FREEDOM (DOF)           :    210439
CHI**2/DOF                         :         0.86
```

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STATION COORDINATES:                   \${P}/OL07KU\STA\TOL07KU.CRD

```
-----
NUM  STATION NAME  PARAMETER  A PRIORI VALUE  NEW VALUE  NEW- A PRIORI  RMS ERROR  3-D ELLIPSOID  2-D ELLIPSE
-----
1   GPS1          X          2863210.2855   2863210.2855  0.0000         0.0000
   Y          1126271.3627   1126271.3627  0.0000         0.0000
   Z          5568267.2028   5568267.2028  0.0000         0.0000
   HEIGHT     30.5343        30.5343        0.0000         0.0000   0.0000  0.0
   LATITUDE   61 14 22.748766 61 14 22.748766 0.0000         0.0000   0.0000  90.0
   LONGITUDE  21 28 21.624778 21 28 21.624778 0.0000         0.0000   0.0000  0.0   0.0000
2   GP11          X          2859164.4451   2859164.4568  0.0117         0.0003
   Y          1133699.2391   1133699.2411  0.0020         0.0001
   Z          5568849.3287   5568849.3515  0.0228         0.0005
   HEIGHT     43.1905        43.2161        0.0256         0.0006   0.0006  0.7
   LATITUDE   61 15 1.096558 61 15 1.096583 0.0008         0.0001   0.0000  89.9   0.0000  89.7
-----
```

		LONGITUDE	21 37 44.500394	21 37 44.500228	-0.0025	0.0000	0.0001	-0.2	0.0001	
3	GP12	X	2861097.0631	2861097.0781	0.0150	0.0003				
		Y	1122358.5353	1122358.5395	0.0042	0.0001				
		Z	5570120.7180	5570120.7445	0.0265	0.0005				
		HEIGHT	21.8609	21.8915	0.0307	0.0006	0.0006	0.7		
		LATITUDE	61 16 27.780953	61 16 27.780925	-0.0009	0.0001	0.0000	88.7	0.0000	88.4
		LONGITUDE	21 25 9.163734	21 25 9.163626	-0.0016	0.0000	0.0001	-0.2	0.0001	
4	GP14	X	2864514.8990	2864514.9054	0.0064	0.0002				
		Y	1133711.1997	1133711.2074	0.0077	0.0001				
		Z	5566120.9120	5566120.9328	0.0208	0.0004				
		HEIGHT	48.3365	48.3590	0.0225	0.0005	0.0005	0.7		
		LATITUDE	61 11 57.682867	61 11 57.682941	0.0023	0.0001	0.0000	89.7	0.0000	89.5
		LONGITUDE	21 35 33.201720	21 35 33.202042	0.0048	0.0000	0.0001	-0.2	0.0001	
5	GP15	X	2866984.1300	2866984.1384	0.0084	0.0003				
		Y	1129664.4472	1129664.4530	0.0058	0.0001				
		Z	5565663.1052	5565663.1269	0.0217	0.0005				
		HEIGHT	37.5870	37.6108	0.0238	0.0005	0.0005	0.7		
		LATITUDE	61 11 27.618629	61 11 27.618686	0.0018	0.0001	0.0000	89.6	0.0000	89.3
		LONGITUDE	21 30 20.512380	21 30 20.512535	0.0023	0.0000	0.0001	-0.2	0.0001	

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OL07KU

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BERNESE GPS SOFTWARE VERSION 5.0

-----  
SITE-SPECIFIC TROPOSPHERE PARAMETERS: (NOT SAVED)  
-----

REQU.	STATION NAME	CORRECTIONS (M)			RMS ERRORS (M)			ZENITH VECTOR (")				ERROR ELLIPSE (M)				
		NORTH	EAST	ZENITH	NORTH	EAST	ZENITH	ANGLE	RMS	RATIO	AZI	MAX	RMS	MIN	RMS	AZI
1	GP11			0.00000			0.00000									
2	GP11			0.00000			0.00000									
3	GP11			-0.01101			0.00148									
4	GP11			-0.00845			0.00051									
5	GP11			-0.01284			0.00042									
6	GP11			-0.00878			0.00042									
7	GP11			-0.01113			0.00050									
8	GP11			-0.00903			0.00043									
9	GP11			-0.00922			0.00042									
10	GP11			-0.00693			0.00044									
11	GP11			-0.00576			0.00043									
12	GP11			-0.00997			0.00040									
13	GP11			-0.00825			0.00057									
14	GP11			-0.00862			0.00046									

15	GP11	-0.00701	0.00046
16	GP11	-0.00928	0.00045
17	GP11	-0.00955	0.00042
18	GP11	-0.00637	0.00042
19	GP11	-0.00505	0.00043
20	GP11	-0.00805	0.00043
21	GP11	-0.01037	0.00042
22	GP11	-0.00924	0.00044
23	GP11	-0.00902	0.00044
24	GP11	-0.01127	0.00040
25	GP11	-0.01003	0.00056
26	GP11	-0.00992	0.00047
27	GP11	-0.00741	0.00058
28	GP11	-0.04656	0.00366
29	GP11	0.00000	0.00000
30	GP11	0.00000	0.00000
31	GP11	0.00000	0.00000
32	GP11	0.00000	0.00000
33	GP11	0.00000	0.00000
34	GP11	0.00000	0.00000
35	GP11	0.00000	0.00000
36	GP11	0.00000	0.00000
37	GP11	0.00000	0.00000
38	GP11	0.00000	0.00000
39	GP11	0.00000	0.00000
40	GP11	0.00000	0.00000
41	GP11	0.00000	0.00000
42	GP11	0.00000	0.00000
43	GP11	0.00000	0.00000
44	GP11	0.00000	0.00000
45	GP11	0.00000	0.00000
46	GP11	0.00000	0.00000
47	GP11	0.00000	0.00000
48	GP11	0.00000	0.00000
49	GP11	0.00000	0.00000
50	GP11	0.00000	0.00000
51	GP11	0.00000	0.00000
52	GP11	0.00000	0.00000
53	GP11	0.00000	0.00000
54	GP11	0.00000	0.00000
55	GP11	0.00000	0.00000
56	GP11	0.00000	0.00000
57	GP11	0.00000	0.00000
58	GP11	0.00000	0.00000
59	GP11	0.00000	0.00000
60	GP11	0.00000	0.00000
61	GP11	0.00000	0.00000
62	GP11	0.00000	0.00000
63	GP11	0.00000	0.00000
64	GP11	0.00000	0.00000
65	GP11	0.00000	0.00000
66	GP11	0.00000	0.00000
67	GP11	0.00000	0.00000

68	GP11	0.00000	0.00000
69	GP11	0.00000	0.00000
70	GP11	0.00000	0.00000
71	GP11	0.00000	0.00000
72	GP11	0.00000	0.00000
73	GP11	0.00000	0.00000
74	GP11	0.00000	0.00000
75	GP11	0.00000	0.00000
76	GP12	0.00000	0.00000
77	GP12	0.00000	0.00000
78	GP12	0.00000	0.00000
79	GP12	0.00000	0.00000
80	GP12	0.00000	0.00000
81	GP12	0.00000	0.00000
82	GP12	0.00000	0.00000
83	GP12	0.00000	0.00000
84	GP12	0.00000	0.00000
85	GP12	0.00000	0.00000
86	GP12	0.00000	0.00000
87	GP12	0.00000	0.00000
88	GP12	0.00000	0.00000
89	GP12	0.00000	0.00000
90	GP12	0.00000	0.00000
91	GP12	0.00000	0.00000
92	GP12	0.00000	0.00000
93	GP12	0.00000	0.00000
94	GP12	0.00000	0.00000
95	GP12	0.00000	0.00000
96	GP12	0.00000	0.00000
97	GP12	0.00000	0.00000
98	GP12	0.00000	0.00000
99	GP12	0.00000	0.00000
100	GP12	0.00000	0.00000
101	GP12	0.00000	0.00000
102	GP12	0.00000	0.00000
103	GP12	0.00000	0.00000
104	GP12	0.00000	0.00000
105	GP12	0.00000	0.00000
106	GP12	0.00000	0.00000
107	GP12	0.00000	0.00000
108	GP12	0.00000	0.00000
109	GP12	0.00000	0.00000
110	GP12	0.00000	0.00000
111	GP12	-0.01391	0.00108
112	GP12	-0.01505	0.00072
113	GP12	-0.01061	0.00057
114	GP12	-0.01427	0.00054
115	GP12	-0.01149	0.00054
116	GP12	-0.01332	0.00050
117	GP12	-0.01243	0.00054
118	GP12	-0.01244	0.00054
119	GP12	-0.01388	0.00054
120	GP12	-0.01168	0.00048

121	GP12	-0.01446	0.00053
122	GP12	-0.01382	0.00052
123	GP12	-0.01074	0.00048
124	GP12	-0.01877	0.00069
125	GP12	-0.00569	0.00059
126	GP12	-0.01420	0.00054
127	GP12	-0.01245	0.00054
128	GP12	-0.01307	0.00050
129	GP12	-0.01575	0.00053
130	GP12	-0.01181	0.00052
131	GP12	-0.01161	0.00056
132	GP12	-0.01399	0.00048
133	GP12	-0.01265	0.00053
134	GP12	-0.01477	0.00052
135	GP12	-0.01043	0.00048
136	GP12	-0.01632	0.00064
137	GP12	-0.01090	0.00058
138	GP12	-0.01340	0.00053
139	GP12	-0.01071	0.00054
140	GP12	-0.01254	0.00050
141	GP12	-0.01284	0.00053
142	GP12	-0.01025	0.00052
143	GP12	-0.01145	0.00054
144	GP12	-0.01258	0.00046
145	GP12	-0.01365	0.00052
146	GP12	-0.01308	0.00052
147	GP12	-0.01263	0.00048
148	GP12	-0.01499	0.00062
149	GP12	-0.01247	0.00061
150	GP12	-0.01393	0.00105
151	GP14	0.00000	0.00000
152	GP14	0.00000	0.00000
153	GP14	-0.01272	0.00073
154	GP14	-0.00910	0.00043
155	GP14	-0.01246	0.00037
156	GP14	-0.01004	0.00037
157	GP14	-0.01232	0.00044
158	GP14	-0.00992	0.00038
159	GP14	-0.01043	0.00038
160	GP14	-0.00939	0.00039
161	GP14	-0.00952	0.00037
162	GP14	-0.00888	0.00035
163	GP14	-0.01068	0.00051
164	GP14	-0.00841	0.00041
165	GP14	-0.00857	0.00041
166	GP14	-0.01278	0.00040
167	GP14	-0.00831	0.00037
168	GP14	-0.00814	0.00038
169	GP14	-0.00951	0.00039
170	GP14	-0.00913	0.00038
171	GP14	-0.01239	0.00037
172	GP14	-0.01108	0.00039
173	GP14	-0.01018	0.00038



174	GP14	-0.01065	0.00035
175	GP14	-0.00943	0.00050
176	GP14	-0.01079	0.00042
177	GP14	-0.00949	0.00055
178	GP14	0.00591	0.01787
179	GP14	0.00000	0.00000
180	GP14	0.00000	0.00000
181	GP14	0.00000	0.00000
182	GP14	0.00000	0.00000
183	GP14	0.00000	0.00000
184	GP14	0.00000	0.00000
185	GP14	0.00000	0.00000
186	GP14	0.00000	0.00000
187	GP14	0.00000	0.00000
188	GP14	0.00000	0.00000
189	GP14	0.00000	0.00000
190	GP14	0.00000	0.00000
191	GP14	0.00000	0.00000
192	GP14	0.00000	0.00000
193	GP14	0.00000	0.00000
194	GP14	0.00000	0.00000
195	GP14	0.00000	0.00000
196	GP14	0.00000	0.00000
197	GP14	0.00000	0.00000
198	GP14	0.00000	0.00000
199	GP14	0.00000	0.00000
200	GP14	0.00000	0.00000
201	GP14	0.00000	0.00000
202	GP14	0.00000	0.00000
203	GP14	0.00000	0.00000
204	GP14	0.00000	0.00000
205	GP14	0.00000	0.00000
206	GP14	0.00000	0.00000
207	GP14	0.00000	0.00000
208	GP14	0.00000	0.00000
209	GP14	0.00000	0.00000
210	GP14	0.00000	0.00000
211	GP14	0.00000	0.00000
212	GP14	0.00000	0.00000
213	GP14	0.00000	0.00000
214	GP14	0.00000	0.00000
215	GP14	0.00000	0.00000
216	GP14	0.00000	0.00000
217	GP14	0.00000	0.00000
218	GP14	0.00000	0.00000
219	GP14	0.00000	0.00000
220	GP14	0.00000	0.00000
221	GP14	0.00000	0.00000
222	GP14	0.00000	0.00000
223	GP14	0.00000	0.00000
224	GP14	0.00000	0.00000
225	GP14	0.00000	0.00000
226	GP15	-0.02152	0.00291

227	GP15	-0.00955	0.00064
228	GP15	-0.01346	0.00052
229	GP15	-0.00936	0.00046
230	GP15	-0.01178	0.00041
231	GP15	-0.00994	0.00042
232	GP15	-0.01035	0.00049
233	GP15	-0.01020	0.00043
234	GP15	-0.01032	0.00042
235	GP15	-0.00980	0.00043
236	GP15	-0.01042	0.00041
237	GP15	-0.00935	0.00039
238	GP15	-0.01289	0.00056
239	GP15	-0.00945	0.00046
240	GP15	-0.01132	0.00045
241	GP15	-0.01263	0.00045
242	GP15	-0.01030	0.00041
243	GP15	-0.00772	0.00042
244	GP15	-0.01058	0.00043
245	GP15	-0.01161	0.00043
246	GP15	-0.01175	0.00042
247	GP15	-0.01035	0.00043
248	GP15	-0.01031	0.00042
249	GP15	-0.01047	0.00039
250	GP15	-0.01300	0.00056
251	GP15	-0.00820	0.00048
252	GP15	-0.01207	0.00077
253	GP15	0.00000	0.00000
254	GP15	0.00000	0.00000
255	GP15	0.00000	0.00000
256	GP15	0.00000	0.00000
257	GP15	0.00000	0.00000
258	GP15	0.00000	0.00000
259	GP15	0.00000	0.00000
260	GP15	0.00000	0.00000
261	GP15	0.00000	0.00000
262	GP15	0.00000	0.00000
263	GP15	0.00000	0.00000
264	GP15	0.00000	0.00000
265	GP15	0.00000	0.00000
266	GP15	0.00000	0.00000
267	GP15	0.00000	0.00000
268	GP15	0.00000	0.00000
269	GP15	0.00000	0.00000
270	GP15	0.00000	0.00000
271	GP15	0.00000	0.00000
272	GP15	0.00000	0.00000
273	GP15	0.00000	0.00000
274	GP15	0.00000	0.00000
275	GP15	0.00000	0.00000
276	GP15	0.00000	0.00000
277	GP15	0.00000	0.00000
278	GP15	0.00000	0.00000
279	GP15	0.00000	0.00000

```

280 GP15          0.00000          0.00000
281 GP15          0.00000          0.00000
282 GP15          0.00000          0.00000
283 GP15          0.00000          0.00000
284 GP15          0.00000          0.00000
285 GP15          0.00000          0.00000
286 GP15          0.00000          0.00000
287 GP15          0.00000          0.00000
288 GP15          0.00000          0.00000
289 GP15          0.00000          0.00000
290 GP15          0.00000          0.00000
291 GP15          0.00000          0.00000
292 GP15          0.00000          0.00000
293 GP15          0.00000          0.00000
294 GP15          0.00000          0.00000
295 GP15          0.00000          0.00000
296 GP15          0.00000          0.00000
297 GP15          0.00000          0.00000
298 GP15          0.00000          0.00000
299 GP15          0.00000          0.00000
300 GP15          0.00000          0.00000

```

```

1${P}/OL07KU
OL07KU

```

```

PROGRAM GPSEST 24-JAN-08 12:40
BERNESE GPS SOFTWARE VERSION 5.0

```

-----

RMS ERRORS OF ELLIPSS. COORDINATES AND COORDINATE DIFFER. IN MM (PART 1):

-----

NUM		1	2	3	4	5
1	B	0.0	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0
	H	0.0	0.6	0.6	0.5	0.5
2	B	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.1	0.0	0.1
	H	0.6	0.6	0.8	0.6	0.7
3	B	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.1	0.0	0.1	0.1
	H	0.6	0.8	0.6	0.7	0.8
4	B	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.1	0.0	0.0
	H	0.5	0.6	0.7	0.5	0.6
5	B	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.1	0.1	0.0	0.0
	H	0.5	0.7	0.8	0.6	0.5

1\$ {P}/OL07KU  
OL07KU

PROGRAM GPSEST 24-JAN-08 12:40  
BERNESE GPS SOFTWARE VERSION 5.0

SLOPE DISTANCES AND RMS ERRORS IN M (PART 1):

NUM		2 N	3 N	4 N	5 N
1	O	8478.2689	4817.8258	7852.3726	5704.0555
	N	8478.2666	4817.8261	7852.3753	5704.0546
	RMS	0.0000	0.0001	0.0001	0.0001
2	O		11574.2389	6005.9768	9358.3673
	N		11574.2377	6005.9730	9358.3632
	RMS		0.0001	0.0001	0.0001
3	O			12512.5153	10387.6955
	N			12512.5180	10387.6949
	RMS			0.0001	0.0001
4	O				4762.6563
	N				4762.6588
	RMS				0.0000

## Appendix V. Results of the second measurements at the pillars located outside Olkiluoto in 2007.

```
=====
Program : GPSEST                               Bernese GPS Software Version 5.0
Purpose : Parameter estimation
Campaign: ${P}/OL07SU                          Default session: 2740 year 2007
Date    : 25-Jan-2008 14:57                    User name      : ja
=====
```

OL07SU

-----

```
1${P}/OL07SU                                PROGRAM GPSEST  25-JAN-08 14:57
OL07SU                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

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-----

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8. POLE COORDINATES AND TIME INFORMATION
9. ANTENNA PHASE CENTERS
10. CONSTANTS
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12. TEST OUTPUT
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14. RESULTS (PART 2)

```
1${P}/OL07SU                                PROGRAM GPSEST  25-JAN-08 14:57
OL07SU                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

### INPUT AND OUTPUT FILENAMES

-----

-----

```
Session table          : ${P}/OL07SU\STA\SESSIONS.SES
```

```

General constants      : ${X}/GEN\CONST.
Geodetic datum        : ${X}/GEN\DATUM.
Station information    : ${P}/OLO7SU\STA\OLO7SU.STA
Earth rotation parameters : ${P}/OLO7SU\ORB\C04_2007.ERP
Subdaily pole model   : ${X}/GEN\IERS2000.SUB
Nutation model        : ${X}/GEN\IAU2000.NUT
Satellite information  : ${X}/GEN\SATELLIT.
Receiver information   : ${X}/GEN\RECEIVER.
Satellite problems    : ${X}/GEN\SAT_2007.CRX
Phase center eccentricities : ${X}/GEN\PHAS_IGS.REL
SINEX general input file : ${X}/GEN\SINEX.
IONEX control file    : ${X}/GEN\IONEX.
Difference GPS-UTC    : ---
A priori station coordinates: ${P}/OLO7SU\STA\OLKIU.CRD
GNSS standard orbits  : ${P}/OLO7SU\ORB\OLO7SU.STD
GNSS orbit partials  : ---
Ionosphere models     : ---
Troposphere estimates : ---
Station sigma factors : ---
Station eccentricities : ---
Ocean loading tables  : ---
GNSS clock corrections : ---
Differential code biases : ---
Receiver antenna orientation: ---
Kinematic coordinates : ---
Kinematic velocities  : ---
Standard orbit(s)     : ---
Orbit partials        : ---
Attitude data         : ---
Precise orbit(s)      : ---
LEO orbital elements  : ---
Station coordinates   : ${P}/OLO7SU\STA\TOL07SU.CRD
GNSS orbital elements : ---
Troposphere estimates : ---
Troposphere SINEX     : ---
Ionosphere models     : ---
IONEX                 : ---
Residuals            : ---
Coordinate covariance matrix: ---
Full covariance matrix : ---
Normal equations      : ---
Bernese ERP file      : ---
IERS ERP file         : ---
GNSS clock corrections : ---
Clock RINEX           : ---
Kinematic coordinates : ---
Differential code biases : ---
Phase center variations (gri: ---
Phase center variations (har: ---
Scratch file          : ${U}/WORK\GPSEST.SCR
Scratch files         : ${U}/WORK\GPSEST.SC1
Program output        : ${P}/OLO7SU\OUT\GPSEST.L26
Error message         : ${U}/WORK\ERROR.MSG

```

1\${P}/OL07SU  
OL07SU

PROGRAM GPSEST 25-JAN-08 14:57  
BERNESE GPS SOFTWARE VERSION 5.0

1. CAMPAIGNS

-----  
CAMPAIGN NAME      NUM STATION NAME      NUM STATION NAME      NUM STATION NAME      NUM STATION NAME      NUM STATION NAME  
-----  
\${P}/OL07SU      :      1 GPS1                      2 GP11                      3 GP12                      4 GP14                      5 GP15

2. OBSERVATION FILES

-----  
\${P}/OL07SU  
-----

MAIN CHARACTERISTICS:

-----  
FILE    OBSERVATION FILE HEADER      OBSERVATION FILE      SESS    RECEIVER 1      RECEIVER 2  
-----  
1    \${P}/OL07SU\OBS\01112700.PSH    \${P}/OL07SU\OBS\01112700.PSO    2700    ASHTECH Z-XII3      ASHTECH Z-XII3  
2    \${P}/OL07SU\OBS\01112710.PSH    \${P}/OL07SU\OBS\01112710.PSO    2710    ASHTECH Z-XII3      ASHTECH Z-XII3  
3    \${P}/OL07SU\OBS\01112720.PSH    \${P}/OL07SU\OBS\01112720.PSO    2720    ASHTECH Z-XII3      ASHTECH Z-XII3  
4    \${P}/OL07SU\OBS\01122700.PSH    \${P}/OL07SU\OBS\01122700.PSO    2700    ASHTECH Z-XII3      ASHTECH UZ-12  
5    \${P}/OL07SU\OBS\01122710.PSH    \${P}/OL07SU\OBS\01122710.PSO    2710    ASHTECH Z-XII3      ASHTECH UZ-12  
6    \${P}/OL07SU\OBS\01122720.PSH    \${P}/OL07SU\OBS\01122720.PSO    2720    ASHTECH Z-XII3      ASHTECH UZ-12  
7    \${P}/OL07SU\OBS\01122730.PSH    \${P}/OL07SU\OBS\01122730.PSO    2730    ASHTECH Z-XII3      ASHTECH UZ-12  
8    \${P}/OL07SU\OBS\01122740.PSH    \${P}/OL07SU\OBS\01122740.PSO    2740    ASHTECH Z-XII3      ASHTECH UZ-12  
9    \${P}/OL07SU\OBS\01142700.PSH    \${P}/OL07SU\OBS\01142700.PSO    2700    ASHTECH Z-XII3      ASHTECH Z-XII3  
10    \${P}/OL07SU\OBS\01142710.PSH    \${P}/OL07SU\OBS\01142710.PSO    2710    ASHTECH Z-XII3      ASHTECH Z-XII3  
11    \${P}/OL07SU\OBS\01142720.PSH    \${P}/OL07SU\OBS\01142720.PSO    2720    ASHTECH Z-XII3      ASHTECH Z-XII3  
12    \${P}/OL07SU\OBS\01152700.PSH    \${P}/OL07SU\OBS\01152700.PSO    2700    ASHTECH Z-XII3      ASHTECH Z-XII3  
13    \${P}/OL07SU\OBS\01152710.PSH    \${P}/OL07SU\OBS\01152710.PSO    2710    ASHTECH Z-XII3      ASHTECH Z-XII3  
14    \${P}/OL07SU\OBS\01152720.PSH    \${P}/OL07SU\OBS\01152720.PSO    2720    ASHTECH Z-XII3      ASHTECH Z-XII3  
15    \${P}/OL07SU\OBS\12112700.PSH    \${P}/OL07SU\OBS\12112700.PSO    2700    ASHTECH UZ-12      ASHTECH Z-XII3  
16    \${P}/OL07SU\OBS\12112710.PSH    \${P}/OL07SU\OBS\12112710.PSO    2710    ASHTECH UZ-12      ASHTECH Z-XII3  
17    \${P}/OL07SU\OBS\12112720.PSH    \${P}/OL07SU\OBS\12112720.PSO    2720    ASHTECH UZ-12      ASHTECH Z-XII3  
18    \${P}/OL07SU\OBS\12152700.PSH    \${P}/OL07SU\OBS\12152700.PSO    2700    ASHTECH UZ-12      ASHTECH Z-XII3  
19    \${P}/OL07SU\OBS\12152710.PSH    \${P}/OL07SU\OBS\12152710.PSO    2710    ASHTECH UZ-12      ASHTECH Z-XII3  
20    \${P}/OL07SU\OBS\12152720.PSH    \${P}/OL07SU\OBS\12152720.PSO    2720    ASHTECH UZ-12      ASHTECH Z-XII3  
21    \${P}/OL07SU\OBS\14112700.PSH    \${P}/OL07SU\OBS\14112700.PSO    2700    ASHTECH Z-XII3      ASHTECH Z-XII3

22	{P}/OL07SU\OBS\14112710.PSH	{P}/OL07SU\OBS\14112710.PSO	2710	ASHTECH Z-XII3	ASHTECH Z-XII3
23	{P}/OL07SU\OBS\14112720.PSH	{P}/OL07SU\OBS\14112720.PSO	2720	ASHTECH Z-XII3	ASHTECH Z-XII3
24	{P}/OL07SU\OBS\14152700.PSH	{P}/OL07SU\OBS\14152700.PSO	2700	ASHTECH Z-XII3	ASHTECH Z-XII3
25	{P}/OL07SU\OBS\14152710.PSH	{P}/OL07SU\OBS\14152710.PSO	2710	ASHTECH Z-XII3	ASHTECH Z-XII3
26	{P}/OL07SU\OBS\14152720.PSH	{P}/OL07SU\OBS\14152720.PSO	2720	ASHTECH Z-XII3	ASHTECH Z-XII3

FILE	TYP	FREQ.	STATION 1	STATION 2	SESS	FIRST	OBSERV.TIME	#EPO	DT	#EF	#CLK	ARC	#SAT	AMB.I.+S.			#CLUSTERS				RM	
														W	12	#AMB	L1	L2	L5			
1	P	L3	GPS1	GP11	2700	7-09-27	13:11:00	1298	30	0	E	E	1	30	N	Y	Y	41	15	15	41	0
2	P	L3	GPS1	GP11	2710	7-09-28	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	75	25	25	75	0
3	P	L3	GPS1	GP11	2720	7-09-29	0:00:30	1380	30	0	E	E	1	30	N	Y	Y	41	15	15	41	0
4	P	L3	GPS1	GP12	2700	7-09-27	11:34:30	1491	30	0	E	E	1	30	N	Y	Y	41	13	13	41	0
5	P	L3	GPS1	GP12	2710	7-09-28	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	73	23	23	73	0
6	P	L3	GPS1	GP12	2720	7-09-29	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	78	28	28	78	0
7	P	L3	GPS1	GP12	2730	7-09-30	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	76	26	26	76	0
8	P	L3	GPS1	GP12	2740	7-10-01	0:00:30	805	30	0	E	E	1	27	N	Y	Y	31	14	14	31	0
9	P	L3	GPS1	GP14	2700	7-09-27	12:41:30	1357	30	0	E	E	1	30	N	Y	Y	40	13	13	40	0
10	P	L3	GPS1	GP14	2710	7-09-28	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	74	25	25	74	0
11	P	L3	GPS1	GP14	2720	7-09-29	0:00:30	1336	30	0	E	E	1	30	N	Y	Y	38	12	12	38	0
12	P	L3	GPS1	GP15	2700	7-09-27	10:20:00	1640	30	0	E	E	1	30	N	Y	Y	50	20	20	50	0
13	P	L3	GPS1	GP15	2710	7-09-28	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	74	23	23	74	0
14	P	L3	GPS1	GP15	2720	7-09-29	0:00:30	1279	30	0	E	E	1	30	N	Y	Y	39	16	16	39	0
15	P	L3	GP12	GP11	2700	7-09-27	13:11:00	1298	30	0	E	E	1	30	N	Y	Y	39	13	13	39	0
16	P	L3	GP12	GP11	2710	7-09-28	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	82	32	32	82	0
17	P	L3	GP12	GP11	2720	7-09-29	0:00:30	1380	30	0	E	E	1	30	N	Y	Y	51	24	24	51	0
18	P	L3	GP12	GP15	2700	7-09-27	11:34:30	1491	30	0	E	E	1	30	N	Y	Y	42	14	14	42	0
19	P	L3	GP12	GP15	2710	7-09-28	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	74	22	22	74	0
20	P	L3	GP12	GP15	2720	7-09-29	0:00:30	1279	30	0	E	E	1	30	N	Y	Y	38	14	14	38	0
21	P	L3	GP14	GP11	2700	7-09-27	13:11:00	1298	30	0	E	E	1	30	N	Y	Y	40	14	14	40	0
22	P	L3	GP14	GP11	2710	7-09-28	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	86	36	36	86	0
23	P	L3	GP14	GP11	2720	7-09-29	0:00:30	1336	30	0	E	E	1	30	N	Y	Y	50	24	24	50	0
24	P	L3	GP14	GP15	2700	7-09-27	12:41:30	1357	30	0	E	E	1	30	N	Y	Y	43	16	16	43	0
25	P	L3	GP14	GP15	2710	7-09-28	0:00:30	2879	30	0	E	E	1	30	N	Y	Y	80	28	28	80	0
26	P	L3	GP14	GP15	2720	7-09-29	0:00:30	1279	30	0	E	E	1	30	N	Y	Y	40	16	16	40	0

SATELLITES:

-----

FILE #SAT SATELLITES

FILE	#SAT	SATELLITES																														
1	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
2	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
3	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
4	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
5	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
6	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
7	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
8	27	1	2	3	4	5	6	7	8	10	11	12	13	14	16	17	19	20	21	23	24	25	26	27	28	29	30	31				
9	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	



10	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
11	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
12	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
13	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
14	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
15	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
16	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
17	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
18	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
19	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
20	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
21	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
22	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
23	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
24	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
25	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
26	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

OBSERVATION SELECTION:

-----

SAMPLING RATE : 30 SEC  
 ELEVATION CUT-OFF ANGLE : 20 DEGREES  
 SATELLITE SYSTEM : GPS  
 SPECIAL DATA SELECTION : NO

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3. GENERAL OPTIONS

-----

TIDAL CORRECTION OF STATION COORDINATES : IERS CONVENTIONS 2000

A PRIORI SIGMA OF UNIT WEIGHT:

-----

A PRIORI SIGMA OF UNIT WEIGHT : 0.001 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)

MODEL FOR ELEVATION-DEPENDENT WEIGHTING : 1/COS(Z)

CORRELATIONS AND SESSIONS:

-----

STRATEGY : CORRELATIONS WITHIN BASELINE

AMBIGUITY RESOLUTION STRATEGY:

-----  
 AMBIGUITIES PRE-ELIMINATED EVERY 30 SECONDS

SYNCHRONIZATION ERRORS:

-----  
 STRATEGY : SYNCHRONIZATION ERRORS NOT APPLIED

4. STATIONS

-----  
 Local geodetic datum: \${X}/GEN\DATUM.

Datum name	Ell. param./ Scale	Shifts to WGS-84	Rotations to WGS-84
WGS - 84	A = 6378137.000 m 1/F= 298.2572236 SC = 0.00000D+00	DX = 0.0000 m DY = 0.0000 m DZ = 0.0000 m	RX = 0.00000 arcsec RY = 0.00000 arcsec RZ = 0.00000 arcsec

A priori station coordinates: \${P}/OL07SU\STA\OLKIU.CRD

num	Station name	obs e/f/h	A priori station coordinates WGS-84			A priori station coordinates Ellipsoidal in local geodetic datum			Height (m)
			X (m)	Y (m)	Z (m)	Latitude	Longitude		
1	GPS1	Y ESTIM	2863210.2855	1126271.3627	5568267.2028	61 14 22.748766	21 28 21.624778	30.5343	
2	GP11	Y ESTIM	2859164.4451	1133699.2391	5568849.3287	61 15 1.096558	21 37 44.500394	43.1905	
3	GP12	Y ESTIM	2861097.0631	1122358.5353	5570120.7180	61 16 27.780953	21 25 9.163734	21.8609	
4	GP14	Y ESTIM	2864514.8990	1133711.1997	5566120.9120	61 11 57.682867	21 35 33.201720	48.3365	
5	GP15	Y ESTIM	2866984.1300	1129664.4472	5565663.1052	61 11 27.618629	21 30 20.512380	37.5870	

A priori sigma:

num	Station name	Station coordinates a priori sigma in local geodetic datum		
		N (m)	E (m)	U (m)
1	GPS1	0.00001	0.00001	0.00001

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5. SATELLITE ORBITS

ARC CHARACTERISTICS:

ARC	START OF ARC	END OF ARC	SOURCE	#SAT	SATELLITES																		
1	07-09-27 00:00:00	07-10-02 00:00:00	PR2007.274	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	
					20	21	22	23	24	25	26	27	28	29	30	31	32						

OSCULATING ELEMENTS:

{P}/OL07SU\ORB\OL07SU.STD

REFERENCE SYSTEM: J2000.0  
 REFERENCE EPOCH : 54370.4305556 MJD (2007 9 27 10 20 0.00)

SAT	S.MAJ.AXIS	ECCENTRIC.	INCLINAT.	NODE	PERIGEE	M. ANOMALY	PER.PASS.TIME
1	26558469.9	0.00688947	56.793816	6.280571	-103.666525	133.597175	54370.2455450
2	26560355.2	0.00864511	54.121406	-117.140111	137.596607	-179.031433	54370.6785117
3	26561784.3	0.00983841	53.086648	177.466878	-315.833600	147.283852	54370.2265529
4	26561468.7	0.00782466	54.085746	-116.041127	16.026502	-27.249337	54370.4682979
5	26562431.7	0.00842940	53.926090	118.222037	68.618118	-58.926169	54370.5121771
6	26559061.2	0.00557905	53.516325	-178.958420	-96.589130	24.931867	54370.3960278
7	26560383.7	0.01021487	53.608642	179.583192	-94.724442	19.271695	54370.4038645
8	26561918.5	0.01022912	56.170850	66.044107	-199.516845	30.000375	54370.3890018
9	26558669.6	0.01934096	55.472519	61.107921	78.358884	9.283247	54370.4176996
10	26559521.9	0.00757725	55.370079	-55.258865	28.457268	-140.067088	54370.6245375
11	26559530.6	0.00714414	51.126346	-126.853894	28.993840	56.988069	54370.3516315
12	26562646.1	0.00312908	55.165686	123.247417	-63.669396	87.012405	54370.3100290
13	26559154.7	0.00344006	57.029583	5.560272	82.018489	-156.779261	54370.6476780
14	26558613.4	0.00355998	56.679486	4.653316	234.479413	-174.474860	54370.6721771
16	26559352.7	0.00403146	55.270206	124.157978	-33.009850	-64.244611	54370.5195284
17	26559115.0	0.00296372	55.017820	-176.280577	191.698321	-127.187785	54370.6066966
18	26560741.0	0.00886737	54.462092	-54.425638	213.918189	-59.597594	54370.5130992
19	26561119.4	0.00410372	54.893375	-172.968932	316.121316	-156.774220	54370.6476951
20	26562358.5	0.00322226	54.429371	-57.483931	76.497957	-61.719860	54370.5160464
21	26560016.2	0.01301804	53.713529	-115.058218	-159.928706	16.957933	54370.4070695
22	26559441.8	0.00505453	54.324030	-54.023203	259.782929	-139.214953	54370.6233564
23	26559508.5	0.00533012	55.658968	3.395068	-205.518244	159.607282	54370.2095122
24	26559066.8	0.00853180	54.664797	-113.801956	-45.026704	-69.204664	54370.5263961
25	26559960.6	0.01161416	55.097924	57.833664	-74.163440	-50.590292	54370.5006209
26	26562124.1	0.01828373	56.917965	5.526711	51.058843	117.564627	54370.2677139
27	26560754.7	0.02063591	55.360115	59.765960	-102.274032	-41.406262	54370.4879040
28	26560145.7	0.01286113	55.163840	124.670007	236.009015	-106.387571	54370.5778992
29	26562243.5	0.01029978	56.707070	3.459828	322.563669	-141.921843	54370.6271364
30	26562402.0	0.01026071	54.287159	121.080300	77.532078	-84.521247	54370.5476299

```

31 26560764.2 0.00634804 55.273935 63.020332 -75.822818 57.024178 54370.3515760
32 26557315.4 0.01493708 55.678925 -51.950025 -79.133636 170.115576 54370.1949882

```

SATELLITE PROBLEMS:

```

-----
SAT  PROBLEM TYPE  ACTION      FROM          TO
-----
105  BAD PHASE+CODE  OBS. REMOVED 06-07-09 00:00:00 99-12-31 23:59:59
119  BAD PHASE+CODE  OBS. REMOVED 07-07-05 00:00:00 07-11-07 23:59:59

```

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6. ATMOSPHERE

TROPOSPHERE MODEL

A priori troposphere model: Saastamoinen  
Meteo/Trop.delay values : Extrapolated

```

Reference height :      0.00 m   Temperature at ref. height: 18.00 C
                  Pressure   at ref. height: 1013.25 mbar
                  Humidity   at ref. height: 50.00 %

```

SITE-SPECIFIC TROPOSPHERE PARAMETERS

Mapping function used for delay estimation: 1/cos(zenith-distance)  
Troposphere gradient estimation : No

```

-----
Par  Station name  Reference epoch  sig_n (m)  sig_e (m)  sig_u (m)  abs/rel
-----
  1  GP11          2007 09 27 10 00 00          0.00000    abs
  2  GP11          2007 09 27 12 00 00          0.00000    rel
  3  GP11          2007 09 27 14 00 00          0.00000    rel
  4  GP11          2007 09 27 16 00 00          0.00000    rel
  5  GP11          2007 09 27 18 00 00          0.00000    rel
  6  GP11          2007 09 27 20 00 00          0.00000    rel
  7  GP11          2007 09 27 22 00 00          0.00000    rel
  8  GP11          2007 09 28 00 00 00          0.00000    rel
  9  GP11          2007 09 28 02 00 00          0.00000    rel
 10  GP11          2007 09 28 04 00 00          0.00000    rel
 11  GP11          2007 09 28 06 00 00          0.00000    rel

```

12	GP11	2007 09 28 08 00 00	0.00000	rel
13	GP11	2007 09 28 10 00 00	0.00000	rel
14	GP11	2007 09 28 12 00 00	0.00000	rel
15	GP11	2007 09 28 14 00 00	0.00000	rel
16	GP11	2007 09 28 16 00 00	0.00000	rel
17	GP11	2007 09 28 18 00 00	0.00000	rel
18	GP11	2007 09 28 20 00 00	0.00000	rel
19	GP11	2007 09 28 22 00 00	0.00000	rel
20	GP11	2007 09 29 00 00 00	0.00000	rel
21	GP11	2007 09 29 02 00 00	0.00000	rel
22	GP11	2007 09 29 04 00 00	0.00000	rel
23	GP11	2007 09 29 06 00 00	0.00000	rel
24	GP11	2007 09 29 08 00 00	0.00000	rel
25	GP11	2007 09 29 10 00 00	0.00000	rel
26	GP11	2007 09 29 12 00 00	0.00000	rel
27	GP11	2007 09 29 14 00 00	0.00000	rel
28	GP11	2007 09 29 16 00 00	0.00000	rel
29	GP11	2007 09 29 18 00 00	0.00000	rel
30	GP11	2007 09 29 20 00 00	0.00000	rel
31	GP11	2007 09 29 22 00 00	0.00000	rel
32	GP11	2007 09 30 00 00 00	0.00000	rel
33	GP11	2007 09 30 02 00 00	0.00000	rel
34	GP11	2007 09 30 04 00 00	0.00000	rel
35	GP11	2007 09 30 06 00 00	0.00000	rel
36	GP11	2007 09 30 08 00 00	0.00000	rel
37	GP11	2007 09 30 10 00 00	0.00000	rel
38	GP11	2007 09 30 12 00 00	0.00000	rel
39	GP11	2007 09 30 14 00 00	0.00000	rel
40	GP11	2007 09 30 16 00 00	0.00000	rel
41	GP11	2007 09 30 18 00 00	0.00000	rel
42	GP11	2007 09 30 20 00 00	0.00000	rel
43	GP11	2007 09 30 22 00 00	0.00000	rel
44	GP11	2007 10 01 00 00 00	0.00000	rel
45	GP11	2007 10 01 02 00 00	0.00000	rel
46	GP11	2007 10 01 04 00 00	0.00000	rel
47	GP11	2007 10 01 06 00 00	0.00000	rel
48	GP11	2007 10 01 08 00 00	0.00000	rel
49	GP12	2007 09 27 10 00 00	0.00000	abs
50	GP12	2007 09 27 12 00 00	0.00000	rel
51	GP12	2007 09 27 14 00 00	0.00000	rel
52	GP12	2007 09 27 16 00 00	0.00000	rel
53	GP12	2007 09 27 18 00 00	0.00000	rel
54	GP12	2007 09 27 20 00 00	0.00000	rel
55	GP12	2007 09 27 22 00 00	0.00000	rel
56	GP12	2007 09 28 00 00 00	0.00000	rel
57	GP12	2007 09 28 02 00 00	0.00000	rel
58	GP12	2007 09 28 04 00 00	0.00000	rel
59	GP12	2007 09 28 06 00 00	0.00000	rel
60	GP12	2007 09 28 08 00 00	0.00000	rel
61	GP12	2007 09 28 10 00 00	0.00000	rel
62	GP12	2007 09 28 12 00 00	0.00000	rel
63	GP12	2007 09 28 14 00 00	0.00000	rel
64	GP12	2007 09 28 16 00 00	0.00000	rel

65	GP12	2007 09 28 18 00 00	0.00000	rel
66	GP12	2007 09 28 20 00 00	0.00000	rel
67	GP12	2007 09 28 22 00 00	0.00000	rel
68	GP12	2007 09 29 00 00 00	0.00000	rel
69	GP12	2007 09 29 02 00 00	0.00000	rel
70	GP12	2007 09 29 04 00 00	0.00000	rel
71	GP12	2007 09 29 06 00 00	0.00000	rel
72	GP12	2007 09 29 08 00 00	0.00000	rel
73	GP12	2007 09 29 10 00 00	0.00000	rel
74	GP12	2007 09 29 12 00 00	0.00000	rel
75	GP12	2007 09 29 14 00 00	0.00000	rel
76	GP12	2007 09 29 16 00 00	0.00000	rel
77	GP12	2007 09 29 18 00 00	0.00000	rel
78	GP12	2007 09 29 20 00 00	0.00000	rel
79	GP12	2007 09 29 22 00 00	0.00000	rel
80	GP12	2007 09 30 00 00 00	0.00000	rel
81	GP12	2007 09 30 02 00 00	0.00000	rel
82	GP12	2007 09 30 04 00 00	0.00000	rel
83	GP12	2007 09 30 06 00 00	0.00000	rel
84	GP12	2007 09 30 08 00 00	0.00000	rel
85	GP12	2007 09 30 10 00 00	0.00000	rel
86	GP12	2007 09 30 12 00 00	0.00000	rel
87	GP12	2007 09 30 14 00 00	0.00000	rel
88	GP12	2007 09 30 16 00 00	0.00000	rel
89	GP12	2007 09 30 18 00 00	0.00000	rel
90	GP12	2007 09 30 20 00 00	0.00000	rel
91	GP12	2007 09 30 22 00 00	0.00000	rel
92	GP12	2007 10 01 00 00 00	0.00000	rel
93	GP12	2007 10 01 02 00 00	0.00000	rel
94	GP12	2007 10 01 04 00 00	0.00000	rel
95	GP12	2007 10 01 06 00 00	0.00000	rel
96	GP12	2007 10 01 08 00 00	0.00000	rel
97	GP14	2007 09 27 10 00 00	0.00000	abs
98	GP14	2007 09 27 12 00 00	0.00000	rel
99	GP14	2007 09 27 14 00 00	0.00000	rel
100	GP14	2007 09 27 16 00 00	0.00000	rel
101	GP14	2007 09 27 18 00 00	0.00000	rel
102	GP14	2007 09 27 20 00 00	0.00000	rel
103	GP14	2007 09 27 22 00 00	0.00000	rel
104	GP14	2007 09 28 00 00 00	0.00000	rel
105	GP14	2007 09 28 02 00 00	0.00000	rel
106	GP14	2007 09 28 04 00 00	0.00000	rel
107	GP14	2007 09 28 06 00 00	0.00000	rel
108	GP14	2007 09 28 08 00 00	0.00000	rel
109	GP14	2007 09 28 10 00 00	0.00000	rel
110	GP14	2007 09 28 12 00 00	0.00000	rel
111	GP14	2007 09 28 14 00 00	0.00000	rel
112	GP14	2007 09 28 16 00 00	0.00000	rel
113	GP14	2007 09 28 18 00 00	0.00000	rel
114	GP14	2007 09 28 20 00 00	0.00000	rel
115	GP14	2007 09 28 22 00 00	0.00000	rel
116	GP14	2007 09 29 00 00 00	0.00000	rel
117	GP14	2007 09 29 02 00 00	0.00000	rel

118	GP14	2007 09 29 04 00 00	0.00000	rel
119	GP14	2007 09 29 06 00 00	0.00000	rel
120	GP14	2007 09 29 08 00 00	0.00000	rel
121	GP14	2007 09 29 10 00 00	0.00000	rel
122	GP14	2007 09 29 12 00 00	0.00000	rel
123	GP14	2007 09 29 14 00 00	0.00000	rel
124	GP14	2007 09 29 16 00 00	0.00000	rel
125	GP14	2007 09 29 18 00 00	0.00000	rel
126	GP14	2007 09 29 20 00 00	0.00000	rel
127	GP14	2007 09 29 22 00 00	0.00000	rel
128	GP14	2007 09 30 00 00 00	0.00000	rel
129	GP14	2007 09 30 02 00 00	0.00000	rel
130	GP14	2007 09 30 04 00 00	0.00000	rel
131	GP14	2007 09 30 06 00 00	0.00000	rel
132	GP14	2007 09 30 08 00 00	0.00000	rel
133	GP14	2007 09 30 10 00 00	0.00000	rel
134	GP14	2007 09 30 12 00 00	0.00000	rel
135	GP14	2007 09 30 14 00 00	0.00000	rel
136	GP14	2007 09 30 16 00 00	0.00000	rel
137	GP14	2007 09 30 18 00 00	0.00000	rel
138	GP14	2007 09 30 20 00 00	0.00000	rel
139	GP14	2007 09 30 22 00 00	0.00000	rel
140	GP14	2007 10 01 00 00 00	0.00000	rel
141	GP14	2007 10 01 02 00 00	0.00000	rel
142	GP14	2007 10 01 04 00 00	0.00000	rel
143	GP14	2007 10 01 06 00 00	0.00000	rel
144	GP14	2007 10 01 08 00 00	0.00000	rel
145	GP15	2007 09 27 10 00 00	0.00000	abs
146	GP15	2007 09 27 12 00 00	0.00000	rel
147	GP15	2007 09 27 14 00 00	0.00000	rel
148	GP15	2007 09 27 16 00 00	0.00000	rel
149	GP15	2007 09 27 18 00 00	0.00000	rel
150	GP15	2007 09 27 20 00 00	0.00000	rel
151	GP15	2007 09 27 22 00 00	0.00000	rel
152	GP15	2007 09 28 00 00 00	0.00000	rel
153	GP15	2007 09 28 02 00 00	0.00000	rel
154	GP15	2007 09 28 04 00 00	0.00000	rel
155	GP15	2007 09 28 06 00 00	0.00000	rel
156	GP15	2007 09 28 08 00 00	0.00000	rel
157	GP15	2007 09 28 10 00 00	0.00000	rel
158	GP15	2007 09 28 12 00 00	0.00000	rel
159	GP15	2007 09 28 14 00 00	0.00000	rel
160	GP15	2007 09 28 16 00 00	0.00000	rel
161	GP15	2007 09 28 18 00 00	0.00000	rel
162	GP15	2007 09 28 20 00 00	0.00000	rel
163	GP15	2007 09 28 22 00 00	0.00000	rel
164	GP15	2007 09 29 00 00 00	0.00000	rel
165	GP15	2007 09 29 02 00 00	0.00000	rel
166	GP15	2007 09 29 04 00 00	0.00000	rel
167	GP15	2007 09 29 06 00 00	0.00000	rel
168	GP15	2007 09 29 08 00 00	0.00000	rel
169	GP15	2007 09 29 10 00 00	0.00000	rel
170	GP15	2007 09 29 12 00 00	0.00000	rel

171	GP15	2007 09 29 14 00 00	0.00000	rel
172	GP15	2007 09 29 16 00 00	0.00000	rel
173	GP15	2007 09 29 18 00 00	0.00000	rel
174	GP15	2007 09 29 20 00 00	0.00000	rel
175	GP15	2007 09 29 22 00 00	0.00000	rel
176	GP15	2007 09 30 00 00 00	0.00000	rel
177	GP15	2007 09 30 02 00 00	0.00000	rel
178	GP15	2007 09 30 04 00 00	0.00000	rel
179	GP15	2007 09 30 06 00 00	0.00000	rel
180	GP15	2007 09 30 08 00 00	0.00000	rel
181	GP15	2007 09 30 10 00 00	0.00000	rel
182	GP15	2007 09 30 12 00 00	0.00000	rel
183	GP15	2007 09 30 14 00 00	0.00000	rel
184	GP15	2007 09 30 16 00 00	0.00000	rel
185	GP15	2007 09 30 18 00 00	0.00000	rel
186	GP15	2007 09 30 20 00 00	0.00000	rel
187	GP15	2007 09 30 22 00 00	0.00000	rel
188	GP15	2007 10 01 00 00 00	0.00000	rel
189	GP15	2007 10 01 02 00 00	0.00000	rel
190	GP15	2007 10 01 04 00 00	0.00000	rel
191	GP15	2007 10 01 06 00 00	0.00000	rel
192	GP15	2007 10 01 08 00 00	0.00000	rel

IONOSPHERE MODELS:

-----

NO IONOSPHERE MODELS APPLIED

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8. POLE COORDINATES AND TIME INFORMATION

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A PRIORI POLE AND TIME INFORMATION FROM THE POLE FILE:

-----

DATUM	TIME	X-POLE (") EP-CPO (")	Y-POLE (") PS-CPO (")	UT1-UTC (S)	GPS-UTC (S)	RMS XP (") RMS EP (")	RMS YP (") RMS PS (")	RMS DT (S)
07-09-27	00:00:00	0.14406 0.00000	0.21306 0.00000	-0.182112	14.	0.00001 0.00014	0.00001 0.00022	0.000047
07-09-28	00:00:00	0.14152 0.00000	0.21121 0.00000	-0.183741	14.	0.00001 0.00016	0.00001 0.00024	0.000035
07-09-29	00:00:00	0.13869 0.00000	0.20952 0.00000	-0.185183	14.	0.00001 0.00016	0.00001 0.00024	0.000047
07-09-30	00:00:00	0.13612 0.00000	0.20782 0.00000	-0.186285	14.	0.00001 0.00015	0.00002 0.00021	0.000049



07-10-01 00:00:00	0.13362	0.20648	-0.187140	14.	0.00001	0.00001	0.000025
	0.00000	0.00000			0.00010	0.00014	
07-10-02 00:00:00	0.13060	0.20526	-0.187705	14.	0.00001	0.00001	0.000025
	0.00000	0.00000			0.00010	0.00014	

NUTATION MODEL: IAU2000  
 SUBDAILY POLE MODEL: IERS2000

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12. TEST OUTPUT

MIN. AND MAX. ELEVATION/NADIR ANGLES AND MAX. SYNCHRONIZATION ERRORS:

SESS	FILE	STATION NAME 1	STATION NAME 2	MIN/MAX ELEV.	MIN/MAX NADIR	SYNCH. ERR. (NS)
0001	1	GPS1	GP11	20.0 79.9	2.3 13.3	0.0
0002	2	GPS1	GP11	20.0 83.6	1.5 13.3	0.0
0003	3	GPS1	GP11	20.0 83.6	1.5 13.3	0.0
0004	4	GPS1	GP12	20.0 82.0	1.9 13.3	0.0
0005	5	GPS1	GP12	20.0 83.5	1.5 13.3	0.0
0006	6	GPS1	GP12	20.0 83.6	1.5 13.3	0.0
0007	7	GPS1	GP12	20.0 83.6	1.5 13.3	0.0
0008	8	GPS1	GP12	20.0 83.6	1.5 13.2	0.0
0009	9	GPS1	GP14	20.0 81.5	2.0 13.3	0.0
0010	10	GPS1	GP14	20.0 83.6	1.5 13.3	0.0
0011	11	GPS1	GP14	20.0 83.6	1.5 13.3	0.0
0012	12	GPS1	GP15	20.0 82.1	1.9 13.3	0.0
0013	13	GPS1	GP15	20.0 83.6	1.5 13.3	0.0
0014	14	GPS1	GP15	20.0 83.6	1.5 13.3	0.0
0015	15	GP12	GP11	20.0 79.9	2.3 13.3	0.0
0016	16	GP12	GP11	20.0 83.6	1.5 13.3	0.0
0017	17	GP12	GP11	20.0 83.6	1.5 13.3	0.0
0018	18	GP12	GP15	20.0 82.1	1.9 13.3	0.0
0019	19	GP12	GP15	20.0 83.6	1.5 13.3	0.0
0020	20	GP12	GP15	20.0 83.6	1.5 13.3	0.0
0021	21	GP14	GP11	20.0 80.0	2.3 13.3	0.0
0022	22	GP14	GP11	20.0 83.6	1.5 13.3	0.0
0023	23	GP14	GP11	20.0 83.6	1.5 13.3	0.0
0024	24	GP14	GP15	20.0 81.5	2.0 13.3	0.0
0025	25	GP14	GP15	20.0 83.6	1.5 13.3	0.0
0026	26	GP14	GP15	20.0 83.6	1.5 13.3	0.0

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13. RESULTS (PART 1)

NUMBER OF PARAMETERS (PART 1):

PARAMETER TYPE	#PARAMETERS	#PRE-ELIMINATED	#SET-UP	#NO-OBS	#REF	#SINGULAR
STATION COORDINATES	15	0	15	0	0	0
AMBIGUITIES	24	24 (BEFORE INV)	521	497	0	10
SITE-SPECIFIC TROPOSPHERE PARAMETERS	192	0	192	0	0	68
TOTAL NUMBER OF PARAMETERS	231	24	728	497	0	78

NUMBER OF OBSERVATIONS (PART 1):

TYPE	FREQUENCY	FILE	#OBSERVATIONS
PHASE	L3	ALL	277492
TOTAL NUMBER OF OBSERVATIONS			277492

A POSTERIORI SIGMA OF UNIT WEIGHT (PART 1):

A POSTERIORI SIGMA OF UNIT WEIGHT : 0.0009 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)  
 DEGREE OF FREEDOM (DOF) : 277339  
 CHI\*\*2/DOF : 0.84

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STATION COORDINATES:                    \${P}/OL07SU\STA\TOL07SU.CRD

NUM	STATION NAME	PARAMETER	A PRIORI VALUE	NEW VALUE	NEW- A PRIORI	RMS ERROR	3-D ELLIPSOID	2-D ELLIPSE
-----	--------------	-----------	----------------	-----------	---------------	-----------	---------------	-------------

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-----
1  GPS1      X      2863210.2855    2863210.2855    0.0000    0.0000
              Y      1126271.3627    1126271.3627    0.0000    0.0000
              Z      5568267.2028    5568267.2028    0.0000    0.0000

              HEIGHT      30.5343      30.5343    0.0000    0.0000    0.0000    0.0
              LATITUDE    61 14 22.748766    61 14 22.748766    0.0000    0.0000    0.0000    90.0    0.0000    90.0
              LONGITUDE    21 28 21.624778    21 28 21.624778    0.0000    0.0000    0.0000    0.0    0.0000

2  GP11      X      2859164.4451    2859164.4586    0.0135    0.0002
              Y      1133699.2391    1133699.2426    0.0035    0.0001
              Z      5568849.3287    5568849.3549    0.0262    0.0004

              HEIGHT      43.1905      43.2201    0.0296    0.0005    0.0005    0.6
              LATITUDE    61 15 1.096558    61 15 1.096571    0.0004    0.0001    0.0000    88.4    0.0000    88.4
              LONGITUDE    21 37 44.500394    21 37 44.500280    -0.0017    0.0000    0.0001    -0.1    0.0001

3  GP12      X      2861097.0631    2861097.0799    0.0168    0.0002
              Y      1122358.5353    1122358.5409    0.0056    0.0001
              Z      5570120.7180    5570120.7483    0.0303    0.0003

              HEIGHT      21.8609      21.8959    0.0350    0.0004    0.0004    0.5
              LATITUDE    61 16 27.780953    61 16 27.780923    -0.0009    0.0001    0.0000    88.8    0.0000    88.8
              LONGITUDE    21 25 9.163734    21 25 9.163670    -0.0009    0.0000    0.0001    0.0    0.0001

4  GP14      X      2864514.8990    2864514.9048    0.0058    0.0002
              Y      1133711.1997    1133711.2072    0.0075    0.0001
              Z      5566120.9120    5566120.9296    0.0176    0.0004

              HEIGHT      48.3365      48.3559    0.0194    0.0005    0.0005    0.6
              LATITUDE    61 11 57.682867    61 11 57.682911    0.0013    0.0001    0.0000    88.5    0.0000    88.4
              LONGITUDE    21 35 33.201720    21 35 33.202042    0.0048    0.0000    0.0001    -0.1    0.0001

5  GP15      X      2866984.1300    2866984.1383    0.0083    0.0002
              Y      1129664.4472    1129664.4534    0.0062    0.0001
              Z      5565663.1052    5565663.1266    0.0214    0.0004

              HEIGHT      37.5870      37.6106    0.0236    0.0005    0.0005    0.5
              LATITUDE    61 11 27.618629    61 11 27.618678    0.0015    0.0001    0.0000    88.7    0.0000    88.7
              LONGITUDE    21 30 20.512380    21 30 20.512561    0.0027    0.0000    0.0001    0.0    0.0001

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SITE-SPECIFIC TROPOSPHERE PARAMETERS: (NOT SAVED)

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REQU. STATION NAME      CORRECTIONS (M)      RMS ERRORS (M)      ZENITH VECTOR (")      ERROR ELLIPSE (M)
                        NORTH  EAST  ZENITH      NORTH  EAST  ZENITH      ANGLE  RMS  RATIO  AZI      MAX RMS  MIN RMS  AZI
-----

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---

1	GP11	0.00000	0.00000
2	GP11	-0.01414	0.00133
3	GP11	-0.00975	0.00042
4	GP11	-0.00808	0.00037
5	GP11	-0.01146	0.00037
6	GP11	-0.01409	0.00048
7	GP11	-0.00869	0.00040
8	GP11	-0.01287	0.00042
9	GP11	-0.00952	0.00041
10	GP11	-0.00934	0.00035
11	GP11	-0.00966	0.00035
12	GP11	-0.00986	0.00036
13	GP11	-0.00897	0.00037
14	GP11	-0.01061	0.00036
15	GP11	-0.00982	0.00036
16	GP11	-0.01070	0.00037
17	GP11	-0.00993	0.00037
18	GP11	-0.01534	0.00049
19	GP11	-0.00857	0.00040
20	GP11	-0.01384	0.00041
21	GP11	-0.01198	0.00040
22	GP11	-0.01271	0.00035
23	GP11	-0.01241	0.00035
24	GP11	-0.00997	0.00036
25	GP11	-0.00973	0.00039
26	GP11	-0.01270	0.00091
27	GP11	0.00000	0.00000
28	GP11	0.00000	0.00000
29	GP11	0.00000	0.00000
30	GP11	0.00000	0.00000
31	GP11	0.00000	0.00000
32	GP11	0.00000	0.00000
33	GP11	0.00000	0.00000
34	GP11	0.00000	0.00000
35	GP11	0.00000	0.00000
36	GP11	0.00000	0.00000
37	GP11	0.00000	0.00000
38	GP11	0.00000	0.00000
39	GP11	0.00000	0.00000
40	GP11	0.00000	0.00000
41	GP11	0.00000	0.00000
42	GP11	0.00000	0.00000
43	GP11	0.00000	0.00000
44	GP11	0.00000	0.00000
45	GP11	0.00000	0.00000
46	GP11	0.00000	0.00000
47	GP11	0.00000	0.00000
48	GP11	0.00000	0.00000
49	GP12	-0.00145	0.00452
50	GP12	-0.01616	0.00046
51	GP12	-0.01415	0.00035

52	GP12	-0.01741	0.00035
53	GP12	-0.01305	0.00036
54	GP12	-0.01672	0.00047
55	GP12	-0.01509	0.00039
56	GP12	-0.01931	0.00040
57	GP12	-0.01494	0.00039
58	GP12	-0.01481	0.00033
59	GP12	-0.01641	0.00033
60	GP12	-0.01538	0.00034
61	GP12	-0.01351	0.00036
62	GP12	-0.01767	0.00035
63	GP12	-0.01524	0.00034
64	GP12	-0.01601	0.00035
65	GP12	-0.01678	0.00036
66	GP12	-0.02151	0.00048
67	GP12	-0.01272	0.00039
68	GP12	-0.01935	0.00040
69	GP12	-0.01359	0.00039
70	GP12	-0.01326	0.00033
71	GP12	-0.01526	0.00033
72	GP12	-0.01378	0.00035
73	GP12	-0.01511	0.00036
74	GP12	-0.01490	0.00046
75	GP12	-0.01315	0.00048
76	GP12	-0.01733	0.00049
77	GP12	-0.01669	0.00050
78	GP12	-0.01381	0.00069
79	GP12	-0.01362	0.00056
80	GP12	-0.01887	0.00056
81	GP12	-0.01357	0.00053
82	GP12	-0.01418	0.00045
83	GP12	-0.01667	0.00046
84	GP12	-0.01373	0.00048
85	GP12	-0.01454	0.00049
86	GP12	-0.01797	0.00047
87	GP12	-0.01452	0.00049
88	GP12	-0.01668	0.00050
89	GP12	-0.01542	0.00050
90	GP12	-0.01575	0.00069
91	GP12	-0.01280	0.00056
92	GP12	-0.01623	0.00057
93	GP12	-0.01349	0.00053
94	GP12	-0.01324	0.00045
95	GP12	-0.01346	0.00053
96	GP12	-0.02276	0.00405
97	GP14	0.00000	0.00000
98	GP14	-0.00890	0.00083
99	GP14	-0.00987	0.00040
100	GP14	-0.00720	0.00036
101	GP14	-0.01070	0.00037
102	GP14	-0.00886	0.00048
103	GP14	-0.00944	0.00040
104	GP14	-0.00876	0.00042

105	GP14	-0.00959	0.00041
106	GP14	-0.00492	0.00035
107	GP14	-0.00780	0.00035
108	GP14	-0.00781	0.00036
109	GP14	-0.00285	0.00039
110	GP14	-0.00752	0.00037
111	GP14	-0.00697	0.00036
112	GP14	-0.00993	0.00037
113	GP14	-0.00560	0.00037
114	GP14	-0.00695	0.00049
115	GP14	-0.00975	0.00040
116	GP14	-0.01130	0.00041
117	GP14	-0.00911	0.00040
118	GP14	-0.00965	0.00035
119	GP14	-0.00992	0.00035
120	GP14	-0.00929	0.00036
121	GP14	-0.00343	0.00040
122	GP14	-0.01774	0.00137
123	GP14	0.00000	0.00000
124	GP14	0.00000	0.00000
125	GP14	0.00000	0.00000
126	GP14	0.00000	0.00000
127	GP14	0.00000	0.00000
128	GP14	0.00000	0.00000
129	GP14	0.00000	0.00000
130	GP14	0.00000	0.00000
131	GP14	0.00000	0.00000
132	GP14	0.00000	0.00000
133	GP14	0.00000	0.00000
134	GP14	0.00000	0.00000
135	GP14	0.00000	0.00000
136	GP14	0.00000	0.00000
137	GP14	0.00000	0.00000
138	GP14	0.00000	0.00000
139	GP14	0.00000	0.00000
140	GP14	0.00000	0.00000
141	GP14	0.00000	0.00000
142	GP14	0.00000	0.00000
143	GP14	0.00000	0.00000
144	GP14	0.00000	0.00000
145	GP15	-0.01071	0.00098
146	GP15	-0.01189	0.00042
147	GP15	-0.01183	0.00036
148	GP15	-0.00979	0.00036
149	GP15	-0.01094	0.00037
150	GP15	-0.01561	0.00048
151	GP15	-0.00744	0.00040
152	GP15	-0.01285	0.00042
153	GP15	-0.00934	0.00040
154	GP15	-0.00975	0.00035
155	GP15	-0.00853	0.00034
156	GP15	-0.01009	0.00036
157	GP15	-0.00814	0.00038

158	GP15	-0.01008	0.00036
159	GP15	-0.00908	0.00036
160	GP15	-0.01147	0.00036
161	GP15	-0.00643	0.00036
162	GP15	-0.01330	0.00049
163	GP15	-0.00816	0.00040
164	GP15	-0.01479	0.00041
165	GP15	-0.00849	0.00040
166	GP15	-0.01093	0.00035
167	GP15	-0.00985	0.00034
168	GP15	-0.01215	0.00036
169	GP15	-0.00658	0.00044
170	GP15	-0.00618	0.00344
171	GP15	0.00000	0.00000
172	GP15	0.00000	0.00000
173	GP15	0.00000	0.00000
174	GP15	0.00000	0.00000
175	GP15	0.00000	0.00000
176	GP15	0.00000	0.00000
177	GP15	0.00000	0.00000
178	GP15	0.00000	0.00000
179	GP15	0.00000	0.00000
180	GP15	0.00000	0.00000
181	GP15	0.00000	0.00000
182	GP15	0.00000	0.00000
183	GP15	0.00000	0.00000
184	GP15	0.00000	0.00000
185	GP15	0.00000	0.00000
186	GP15	0.00000	0.00000
187	GP15	0.00000	0.00000
188	GP15	0.00000	0.00000
189	GP15	0.00000	0.00000
190	GP15	0.00000	0.00000
191	GP15	0.00000	0.00000
192	GP15	0.00000	0.00000

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RMS ERRORS OF ELLIPS. COORDINATES AND COORDINATE DIFFER. IN MM (PART 1):  
-----

NUM		1	2	3	4	5
	B	0.0	0.1	0.1	0.1	0.1
1	L	0.0	0.0	0.0	0.0	0.0
	H	0.0	0.5	0.4	0.5	0.5
	B	0.1	0.1	0.1	0.1	0.1

2	L	0.0	0.0	0.0	0.0	0.0
	H	0.5	0.5	0.5	0.5	0.6
	B	0.1	0.1	0.1	0.1	0.1
3	L	0.0	0.0	0.0	0.0	0.0
	H	0.4	0.5	0.4	0.5	0.5
	B	0.1	0.1	0.1	0.1	0.1
4	L	0.0	0.0	0.0	0.0	0.0
	H	0.5	0.5	0.5	0.5	0.5
	B	0.1	0.1	0.1	0.1	0.1
5	L	0.0	0.0	0.0	0.0	0.0
	H	0.5	0.6	0.5	0.5	0.5

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SLOPE DISTANCES AND RMS ERRORS IN M (PART 1):

NUM		2 N	3 N	4 N	5 N
1	O	8478.2689	4817.8258	7852.3726	5704.0555
	N	8478.2673	4817.8256	7852.3758	5704.0549
	RMS	0.0000	0.0000	0.0001	0.0001
2	O		11574.2389	6005.9768	9358.3673
	N		11574.2379	6005.9738	9358.3634
	RMS		0.0000	0.0001	0.0001
3	O			12512.5153	10387.6955
	N			12512.5181	10387.6950
	RMS			0.0001	0.0001
4	O				4762.6563
	N				4762.6583
	RMS				0.0000



**Appendix VIa. Results of 16 measurements at Kivetty. Deviations of the vector lengths from their mean in millimeters. Unscaled observations.**

Vector	Mean length [mm]	Time [a]															RMS	
		96.3	96.8	97.3	97.8	98.3	98.8	99.3	99.8	1.3	1.8	2.8	3.8	4.8	5.8	6.8		7.8
GPS1-GPS2	659084.2	-0.8	0.2	0.8	-0.4	-0.2	-0.4	-0.4	0.2	0.3	0.4	1.1	0.6	0.6	0.1	-0.7	-1.2	±0.6
GPS1-GPS3	1613485.9	0.3	0.2	1.0	-0.5	0.2	-0.3	0.7	-0.9	0.1	0.0	0.0	0.4	0.0	0.3	-0.5	-0.8	0.5
GPS1-GPS4	1591096.5	0.0	-0.1	0.4	-0.9	0.0	-0.2	0.0	0.8	-0.7	-0.1	-1.0	0.4	-0.3	0.6	0.9	0.7	0.6
GPS1-GPS5	672046.7	0.4	0.2	0.2	0.6	-0.5	0.1	-0.5	-0.2	-0.3	0.1	-1.2	0.1	-0.9	0.1	0.2	0.9	0.5
GPS1-GPS6	1180588.9	-0.8	-0.6	-0.2	-0.6	-1.2	-0.2	-0.1	0.1	0.1	-0.7	0.3	0.2	0.4	0.7	1.1	2.1	0.8
GPS1-GPS7	735563.4	-0.9	-0.9	0.9	0.0	0.9	-0.1	0.1	0.4	0.5	1.0	-0.5	0.6	0.3	0.1	-0.9	-0.9	0.7
GPS2-GPS3	955938.5	1.1	-0.2	0.2	-0.3	0.5	0.2	1.3	-1.1	-0.3	-0.4	-1.0	-0.4	-0.5	0.2	0.3	0.4	0.6
GPS2-GPS4	1198884.4	-0.5	-1.0	-0.1	-1.6	0.3	0.7	0.4	1.2	-1.0	0.3	-0.9	0.5	-0.4	0.2	0.8	0.5	0.8
GPS2-GPS5	1167283.8	-0.8	0.3	1.3	0.3	-0.5	0.0	-0.6	0.5	0.1	0.6	0.3	0.8	-0.1	-0.2	-1.3	-1.3	0.7
GPS2-GPS6	1829811.1	-1.5	-0.2	0.8	-0.8	-1.2	-0.6	-0.5	0.3	0.3	-0.1	1.2	1.1	0.7	0.6	-0.2	0.1	0.8
GPS2-GPS7	901317.9	-0.8	0.0	0.5	-0.4	0.6	-0.5	-0.5	-0.9	0.4	0.6	-1.1	0.4	-0.1	0.7	0.0	0.5	0.6
GPS3-GPS4	1102332.3	-0.2	-0.6	0.4	-1.0	0.0	0.5	-0.7	-3.2	-0.6	1.4	-1.3	0.5	-0.3	1.4	1.3	2.0	1.2
GPS3-GPS5	2031115.0	0.4	0.4	1.7	0.5	-0.2	-0.2	0.2	-1.8	0.1	0.4	-0.8	0.3	-0.4	0.3	-0.7	-0.4	0.7
GPS3-GPS6	2770065.1	-0.3	-0.3	1.0	-0.9	-0.7	-0.6	0.6	-1.5	0.1	-0.4	0.2	0.5	0.2	0.9	0.1	0.5	0.7
GPS3-GPS7	1693397.9	-0.4	-0.1	0.3	-1.6	1.0	0.0	1.0	-0.4	0.2	-0.1	-0.8	0.3	-0.3	0.3	0.1	0.0	0.6
GPS4-GPS5	1608741.5	-0.1	0.4	1.3	0.4	-0.2	-0.4	0.1	1.1	-0.2	-0.2	-0.6	0.0	-0.1	-0.1	-0.3	-0.5	0.5
GPS4-GPS6	2462388.6	-0.3	-0.1	0.7	-0.5	-0.5	-0.7	0.2	1.4	-0.4	-0.7	0.0	0.4	0.3	0.1	0.2	-0.3	0.5
GPS4-GPS7	2089326.8	-1.1	-1.0	0.5	-1.7	0.9	0.1	0.0	0.5	-0.5	0.8	-2.2	0.8	-0.4	0.9	0.8	1.1	1.0
GPS5-GPS6	854745.6	-0.2	-0.6	-0.7	-1.0	-0.6	-0.2	0.2	0.5	-0.2	-1.1	0.7	0.6	0.8	0.4	0.9	0.5	0.6
GPS5-GPS7	1379384.5	-0.2	-0.6	1.2	0.7	0.2	-0.1	-0.2	0.4	0.0	1.0	-1.8	0.9	-0.6	0.3	-1.0	-0.3	0.8
GPS6-GPS7	1604963.1	-1.1	-1.3	0.9	0.0	-1.2	-0.5	0.0	0.6	0.3	0.2	-0.4	0.8	0.3	1.1	-0.3	1.2	0.8
Mean:		-0.4	-0.3	0.6	-0.5	-0.1	-0.2	0.1	-0.1	-0.1	0.2	-0.5	0.5	0.0	0.4	0.0	0.2	
St.dev.:		±0.6	0.5	0.6	0.7	0.7	0.4	0.5	1.1	0.4	0.6	0.9	0.3	0.4	0.4	0.7	0.9	
RMS:		±0.7	0.6	0.8	0.8	0.7	0.4	0.5	1.1	0.4	0.6	1.0	0.6	0.4	0.6	0.7	0.9	±0.7

**Appendix VIb. Results of 16 measurements at Kivetty. Deviations of the vector lengths from their mean in millimeters. Scaled observations.**

Vector	Mean length [mm]	Time [a]																RMS
		96.3	96.8	97.3	97.8	98.3	98.8	99.3	99.8	1.3	1.8	2.8	3.8	4.8	5.8	6.8	7.8	
GPS1-GPS2	659084.2	-0,6	0,3	0,5	-0,2	-0,2	-0,3	-0,4	0,3	0,3	0,3	1,3	0,4	0,6	-0,1	-0,7	-1,3	±0,6
GPS1-GPS3	1613485.9	0,8	0,5	0,3	0,0	0,3	-0,1	0,7	-0,8	0,2	-0,3	0,6	-0,2	0,0	-0,2	-0,5	-1,1	0,5
GPS1-GPS4	1591096.5	0,5	0,2	-0,3	-0,4	0,1	0,0	0,0	0,9	-0,6	-0,4	-0,4	-0,2	-0,3	0,1	0,9	0,4	0,4
GPS1-GPS5	672046.7	0,6	0,3	-0,1	0,8	-0,5	0,2	-0,5	-0,1	-0,3	0,0	-1,0	-0,1	-0,9	-0,1	0,2	0,8	0,5
GPS1-GPS6	1180588.9	-0,5	-0,3	-0,7	-0,2	-1,1	-0,1	-0,1	0,2	0,1	-0,9	0,7	-0,2	0,4	0,3	1,1	1,9	0,7
GPS1-GPS7	735563.4	-0,7	-0,7	0,6	0,2	0,9	0,0	0,1	0,5	0,5	0,9	-0,2	0,3	0,3	-0,1	-0,9	-1,0	0,6
GPS2-GPS3	955938.4	1,4	0,1	-0,2	0,1	0,6	0,3	1,3	-0,9	-0,2	-0,5	-0,6	-0,7	-0,4	-0,1	0,3	0,2	0,6
GPS2-GPS4	1198884.4	-0,2	-0,7	-0,6	-1,2	0,4	0,8	0,4	1,3	-1,0	0,1	-0,5	0,1	-0,4	-0,2	0,8	0,3	0,7
GPS2-GPS5	1167283.8	-0,5	0,6	0,8	0,7	-0,4	0,1	-0,6	0,6	0,1	0,4	0,7	0,4	-0,1	-0,6	-1,3	-1,5	0,7
GPS2-GPS6	1829811.1	-1,0	0,2	0,0	-0,2	-1,1	-0,4	-0,5	0,5	0,4	-0,4	1,8	0,4	0,7	0,0	-0,2	-0,2	0,7
GPS2-GPS7	901317.9	-0,5	0,2	0,1	-0,1	0,7	-0,4	-0,5	-0,8	0,4	0,5	-0,8	0,1	-0,1	0,4	0,0	0,4	0,5
GPS3-GPS4	1102332.3	0,1	-0,4	-0,1	-0,7	0,1	0,6	-0,7	-3,1	-0,6	1,2	-0,9	0,1	-0,3	1,1	1,3	1,8	1,1
GPS3-GPS5	2031115.0	1,0	0,8	0,8	1,1	-0,1	0,0	0,2	-1,6	0,2	0,1	-0,1	-0,4	-0,4	-0,3	-0,7	-0,7	0,7
GPS3-GPS6	2770065.1	0,5	0,3	-0,2	0,0	-0,5	-0,3	0,6	-1,3	0,2	-0,8	1,2	-0,5	0,3	0,0	0,1	0,1	0,6
GPS3-GPS7	1693397.9	0,1	0,3	-0,5	-1,1	1,1	0,2	1,0	-0,3	0,3	-0,4	-0,2	-0,3	-0,3	-0,2	0,1	-0,3	0,5
GPS4-GPS5	1608741.5	0,4	0,7	0,6	0,9	-0,1	-0,2	0,1	1,2	-0,1	-0,5	0,0	-0,6	-0,1	-0,6	-0,3	-0,8	0,6
GPS4-GPS6	2462388.6	0,4	0,4	-0,4	0,3	-0,4	-0,5	0,2	1,6	-0,3	-1,1	0,9	-0,5	0,4	-0,7	0,2	-0,7	0,7
GPS4-GPS7	2089326.8	-0,5	-0,6	-0,4	-1,0	1,0	0,3	0,0	0,7	-0,4	0,5	-1,5	0,0	-0,4	0,2	0,8	0,8	0,7
GPS5-GPS6	854745.6	0,0	-0,4	-1,1	-0,7	-0,5	-0,1	0,1	0,5	-0,2	-1,2	0,9	0,2	0,7	0,0	0,8	0,3	0,6
GPS5-GPS7	1379384.5	0,2	-0,3	0,6	1,1	0,3	0,0	-0,2	0,5	0,1	0,8	-1,3	0,4	-0,6	-0,1	-1,0	-0,5	0,6
GPS6-GPS7	1604963.1	-0,6	-1,0	0,2	0,5	-1,1	-0,3	0,0	0,7	0,4	-0,1	0,2	0,2	0,3	0,6	-0,3	0,9	0,6
Mean:		0,1	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	-0,1	0,0	-0,1	0,0	0,0	0,0	0,0	
St.dev.:		±0,6	0,5	0,5	0,7	0,7	0,3	0,5	1,1	0,4	0,7	0,9	0,4	0,4	0,4	0,7	0,9	
RMS:		±0,6	0,5	0,5	0,7	0,7	0,3	0,5	1,1	0,4	0,7	0,9	0,4	0,4	0,4	0,7	0,9	±0,6

## Appendix VII. Results of the measurements at Kivetty in 2007.

```
=====
Program : GPSEST                               Bernese GPS Software Version 5.0
Purpose : Parameter estimation
Campaign: ${P}/KIVE07S                          Default session: 2600 year 2007
Date    : 30-Jan-2008 11:09                     User name      : ja
=====
```

KIVE07S

-----

```
1${P}/KIVE07S                                PROGRAM GPSEST   30-JAN-08 11:09
KIVE07S                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

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-----

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7. CLOCK PARAMETERS
8. POLE COORDINATES AND TIME INFORMATION
9. ANTENNA PHASE CENTERS
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11. PARAMETER CHARACTERIZATION LIST
12. TEST OUTPUT
13. RESULTS (PART 1)
14. RESULTS (PART 2)

```
1${P}/KIVE07S                                PROGRAM GPSEST   30-JAN-08 11:09
KIVE07S                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

### INPUT AND OUTPUT FILENAMES

-----

-----

```
Session table          : ${P}/KIVE07S\STA\SESSIONS.SES
```

```

General constants      : ${X}/GEN\CONST.
Geodetic datum        : ${X}/GEN\DATUM.
Station information    : ${P}/KIVE07S\STA\KIVE07S.STA
Earth rotation parameters : ${P}/KIVE07S\ORB\C04_2007.ERP
Subdaily pole model   : ${X}/GEN\IERS2000.SUB
Nutation model        : ${X}/GEN\IAU2000.NUT
Satellite information  : ${X}/GEN\SATELLIT.
Receiver information   : ${X}/GEN\RECEIVER.
Satellite problems    : ${X}/GEN\SAT_2007.CRX
Phase center eccentricities : ${X}/GEN\PHAS_IGS.REL
SINEX general input file : ${X}/GEN\SINEX.
IONEX control file    : ${X}/GEN\IONEX.
Difference GPS-UTC    : ---
A priori station coordinates: ${P}/KIVE07S\STA\KIVE.CRD
GNSS standard orbits  : ${P}/KIVE07S\ORB\KIVE07S.STD
GNSS orbit partials  : ---
Ionosphere models     : ${P}/KIVE07S\ATM\KIVE07S.ION
Troposphere estimates : ---
Station sigma factors : ---
Station eccentricities : ---
Ocean loading tables  : ---
GNSS clock corrections : ---
Differential code biases : ---
Receiver antenna orientation: ---
Kinematic coordinates : ---
Kinematic velocities  : ---
Standard orbit(s)     : ---
Orbit partials        : ---
Attitude data          : ---
Precise orbit(s)       : ---
LEO orbital elements  : ---
Station coordinates   : ${P}/KIVE07S\STA\TKIVE07S.CRD
GNSS orbital elements : ---
Troposphere estimates : ---
Troposphere SINEX     : ---
Ionosphere models     : ---
IONEX                  : ---
Residuals              : ---
Coordinate covariance matrix: ---
Full covariance matrix : ---
Normal equations       : ---
Bernese ERP file       : ---
IERS ERP file          : ---
GNSS clock corrections : ---
Clock RINEX            : ---
Kinematic coordinates : ---
Differential code biases : ---
Phase center variations (gri: ---
Phase center variations (har: ---
Scratch file           : ${U}/WORK\GPSEST.SCR
Scratch files          : ${U}/WORK\GPSEST.SC1
Program output         : ${P}/KIVE07S\OUT\GPSEST.L12
Error message          : ${U}/WORK\ERROR.MSG

```

1\${P}/KIVE07S  
KIVE07S

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BERNESE GPS SOFTWARE VERSION 5.0

1. CAMPAIGNS

CAMPAIGN NAME	NUM	STATION NAME	NUM	STATION NAME	NUM	STATION NAME	NUM	STATION NAME	NUM	STATION NAME
\${P}/KIVE07S	1	GPS1	2	GPS2	5	GPS5	6	GPS6	7	GPS7
	3	GPS3	4	GPS4						

2. OBSERVATION FILES

\${P}/KIVE07S

MAIN CHARACTERISTICS:

FILE	OBSERVATION FILE HEADER	OBSERVATION FILE	SESS	RECEIVER 1	RECEIVER 2
1	\${P}/KIVE07S/OBS/01022590.PSH	\${P}/KIVE07S/OBS/01022590.PSO	2590	ASHTECH Z-XII3	ASHTECH Z-XII3
2	\${P}/KIVE07S/OBS/01022600.PSH	\${P}/KIVE07S/OBS/01022600.PSO	2600	ASHTECH Z-XII3	ASHTECH Z-XII3
3	\${P}/KIVE07S/OBS/01052590.PSH	\${P}/KIVE07S/OBS/01052590.PSO	2590	ASHTECH Z-XII3	ASHTECH Z-XII3
4	\${P}/KIVE07S/OBS/01052600.PSH	\${P}/KIVE07S/OBS/01052600.PSO	2600	ASHTECH Z-XII3	ASHTECH Z-XII3
5	\${P}/KIVE07S/OBS/01062590.PSH	\${P}/KIVE07S/OBS/01062590.PSO	2590	ASHTECH Z-XII3	ASHTECH Z-XII3
6	\${P}/KIVE07S/OBS/01062600.PSH	\${P}/KIVE07S/OBS/01062600.PSO	2600	ASHTECH Z-XII3	ASHTECH Z-XII3
7	\${P}/KIVE07S/OBS/01072590.PSH	\${P}/KIVE07S/OBS/01072590.PSO	2590	ASHTECH Z-XII3	ASHTECH Z-XII3
8	\${P}/KIVE07S/OBS/01072600.PSH	\${P}/KIVE07S/OBS/01072600.PSO	2600	ASHTECH Z-XII3	ASHTECH Z-XII3
9	\${P}/KIVE07S/OBS/02032590.PSH	\${P}/KIVE07S/OBS/02032590.PSO	2590	ASHTECH Z-XII3	ASHTECH Z-XII3
10	\${P}/KIVE07S/OBS/02032600.PSH	\${P}/KIVE07S/OBS/02032600.PSO	2600	ASHTECH Z-XII3	ASHTECH Z-XII3
11	\${P}/KIVE07S/OBS/02042590.PSH	\${P}/KIVE07S/OBS/02042590.PSO	2590	ASHTECH Z-XII3	ASHTECH Z-XII3
12	\${P}/KIVE07S/OBS/02042600.PSH	\${P}/KIVE07S/OBS/02042600.PSO	2600	ASHTECH Z-XII3	ASHTECH Z-XII3

FILE	TYP	FREQ.	STATION 1	STATION 2	SESS	FIRST	OBSERV.TIME	#EPO	DT	#EF	#CLK	ARC	#SAT	AMB.I.+S.			#CLUSTERS					
														W	12	#AMB	L1	L2	L5	RM		
1	P	L1,L2	GPS1	GPS2	2590	7-09-16	8:17:00	1886	30	0	E	E	1	28	N	Y	Y	55	22	22	55	0
2	P	L1,L2	GPS1	GPS2	2600	7-09-17	0:00:30	1163	30	0	E	E	1	28	N	Y	Y	36	15	15	36	0
3	P	L1,L2	GPS1	GPS5	2590	7-09-16	7:28:00	1984	30	0	E	E	1	28	N	Y	Y	57	22	22	57	0

4	P	L1,L2	GPS1	GPS5	2600	7-09-17	0:00:30	1259	30	0	E	E	1	27	N	Y	Y	35	12	12	35	0
5	P	L1,L2	GPS1	GPS6	2590	7-09-16	7:45:00	1950	30	0	E	E	1	27	N	Y	Y	52	17	17	52	0
6	P	L1,L2	GPS1	GPS6	2600	7-09-17	0:00:30	1115	30	0	E	E	1	26	N	Y	Y	38	14	15	38	0
7	P	L1,L2	GPS1	GPS7	2590	7-09-16	8:02:00	1916	30	0	E	E	1	27	N	Y	Y	45	10	10	45	0
8	P	L1,L2	GPS1	GPS7	2600	7-09-17	0:00:30	1139	30	0	E	E	1	27	N	Y	Y	29	7	7	29	0
9	P	L1,L2	GPS2	GPS3	2590	7-09-16	8:37:30	1845	30	0	E	E	1	28	N	Y	Y	50	17	17	50	0
10	P	L1,L2	GPS2	GPS3	2600	7-09-17	0:00:30	1163	30	0	E	E	1	26	N	Y	Y	39	15	15	39	0
11	P	L1,L2	GPS2	GPS4	2590	7-09-16	8:57:30	1805	30	0	E	E	1	28	N	Y	Y	62	24	24	62	0
12	P	L1,L2	GPS2	GPS4	2600	7-09-17	0:00:30	1163	30	0	E	E	1	28	N	Y	Y	40	18	18	40	0

SATELLITES:

-----

FILE #SAT SATELLITES

-----

1	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
3	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
4	27	1	2	3	4	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
5	27	1	2	3	4	5	6	8	9	11	12	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
6	26	1	2	3	4	5	6	8	11	12	13	14	16	17	18	19	20	22	23	24	25	26	27	28	29	30	31		
7	27	1	2	3	4	5	6	8	9	11	12	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
8	27	1	2	3	4	5	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
9	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
10	26	1	2	3	4	5	8	9	11	12	13	14	16	17	18	19	20	21	23	24	25	26	27	28	29	30	31		
11	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
12	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

OBSERVATION SELECTION:

-----

SAMPLING RATE : 30 SEC  
ELEVATION CUT-OFF ANGLE : 20 DEGREES  
SATELLITE SYSTEM : GPS  
SPECIAL DATA SELECTION : NO

1\${P}/KIVE07S  
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-----

3. GENERAL OPTIONS

-----

TIDAL CORRECTION OF STATION COORDINATES : IERS CONVENTIONS 2000

A PRIORI SIGMA OF UNIT WEIGHT:

-----

A PRIORI SIGMA OF UNIT WEIGHT : 0.001 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)  
 MODEL FOR ELEVATION-DEPENDENT WEIGHTING : 1/COS(Z)

CORRELATIONS AND SESSIONS:

STRATEGY : CORRELATIONS CORRECTLY MODELLED  
 TIME INTERVAL : 0.10000 SEC (TO IDENTIFY EPOCH)

SESS #FILE FILE NUMBERS

```

-----
2590 6 1 3 5 7 9 11
2600 6 2 4 6 8 10 12
  
```

AMBIGUITY RESOLUTION STRATEGY:

AMBIGUITIES PRE-ELIMINATED EVERY 30 SECONDS

SYNCHRONIZATION ERRORS:

STRATEGY : SYNCHRONIZATION ERRORS NOT APPLIED

4. STATIONS

Local geodetic datum: \${X}/GEN\DATUM.

Datum name	Ell. param./ Scale	Shifts to WGS-84	Rotations to WGS-84
WGS - 84	A = 6378137.000 m 1/F= 298.2572236 SC = 0.00000D+00	DX = 0.0000 m DY = 0.0000 m DZ = 0.0000 m	RX = 0.00000 arcsec RY = 0.00000 arcsec RZ = 0.00000 arcsec

A priori station coordinates: \${P}/KIVE07S\STA\KIVE.CRD

A priori station coordinates WGS-84                      A priori station coordinates  
 Ellipsoidal in local geodetic datum

num	Station name	obs e/f/h	X (m)	Y (m)	Z (m)	Latitude	Longitude	Height (m)
1	GPS1	Y ESTIM	2632277.3097	1266957.3328	5651027.6130	62 49 11.541281	25 42 8.131873	216.2605
2	GPS2	Y ESTIM	2632668.6713	1266433.2178	5650946.8226	62 49 6.746291	25 41 22.804861	201.6768
5	GPS5	Y ESTIM	2631669.9819	1266914.5590	5651312.1649	62 49 31.995017	25 42 24.011125	210.9794

6	GPS6	Y	ESTIM	2631400.1527	1267721.3486	5651229.2666	62 49 27.699096	25 43 23.611374	186.0792
7	GPS7	Y	ESTIM	2632837.9413	1267275.0647	5650672.9413	62 48 47.835455	25 42 11.178073	194.4937
3	GPS3	Y	ESTIM	2633182.4577	1265629.9428	5650879.0389	62 49 2.443920	25 40 15.973856	193.8849
4	GPS4	Y	ESTIM	2632226.4697	1265406.6777	5651380.4111	62 49 37.375281	25 40 31.010505	202.1775

A priori sigma:

Station coordinates a priori sigma  
in local geodetic datum

num	Station name	N (m)	E (m)	U (m)
1	GPS1	0.00001	0.00001	0.00001

1\${P}/KIVE07S  
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5. SATELLITE ORBITS

ARC CHARACTERISTICS:

ARC	START OF ARC	END OF ARC	SOURCE	#SAT	SATELLITES																		
1	07-09-16 00:00:00	07-09-18 00:00:00	PR2007.260	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	
					20	21	22	23	24	25	26	27	28	29	30	31	32						

OSCULATING ELEMENTS:                   \${P}/KIVE07S\ORB\KIVE07S.STD

REFERENCE SYSTEM: J2000.0  
REFERENCE EPOCH : 54359.3111111 MJD (2007 9 16 7 28 0.00)

SAT	S.MAJ.AXIS	ECCENTRIC.	INCLINAT.	NODE	PERIGEE	M. ANOMALY	PER.PASS.TIME
1	26555646.4	0.00680727	56.786214	6.705023	-104.048437	23.972811	54359.2779179
2	26560681.3	0.00863968	54.122018	-116.677037	-222.713512	72.232171	54359.2110687
3	26558389.8	0.00978845	53.079175	177.923525	43.461806	38.966729	54359.2571487
4	26558933.5	0.00781025	54.084418	-115.578016	16.048964	-136.369522	54359.4999659
5	26559396.8	0.00840702	53.927313	118.680644	68.651077	-167.593457	54359.5432132
6	26562381.6	0.00567331	53.512613	-178.505188	263.001840	-83.425464	54359.4266675
7	26561055.0	0.01041387	53.605295	-179.964918	264.977358	-89.521684	54359.4351023
8	26558613.4	0.01015890	56.158944	66.487456	160.466238	-78.759593	54359.4201814





SITE-SPECIFIC TROPOSPHERE PARAMETERS

Mapping function used for delay estimation: 1/cos(zenith-distance)  
 Troposphere gradient estimation : No

Par	Station name	Reference epoch	sig_n (m)	sig_e (m)	sig_u (m)	abs/rel
1	GPS2	2007 09 16 06 00 00			0.00000	abs
2	GPS2	2007 09 16 08 00 00			0.00000	rel
3	GPS2	2007 09 16 10 00 00			0.00000	rel
4	GPS2	2007 09 16 12 00 00			0.00000	rel
5	GPS2	2007 09 16 14 00 00			0.00000	rel
6	GPS2	2007 09 16 16 00 00			0.00000	rel
7	GPS2	2007 09 16 18 00 00			0.00000	rel
8	GPS2	2007 09 16 20 00 00			0.00000	rel
9	GPS2	2007 09 16 22 00 00			0.00000	rel
10	GPS2	2007 09 17 00 00 00			0.00000	rel
11	GPS2	2007 09 17 02 00 00			0.00000	rel
12	GPS2	2007 09 17 04 00 00			0.00000	rel
13	GPS2	2007 09 17 06 00 00			0.00000	rel
14	GPS2	2007 09 17 08 00 00			0.00000	rel
15	GPS2	2007 09 17 10 00 00			0.00000	rel
16	GPS2	2007 09 17 12 00 00			0.00000	rel
17	GPS5	2007 09 16 06 00 00			0.00000	abs
18	GPS5	2007 09 16 08 00 00			0.00000	rel
19	GPS5	2007 09 16 10 00 00			0.00000	rel
20	GPS5	2007 09 16 12 00 00			0.00000	rel
21	GPS5	2007 09 16 14 00 00			0.00000	rel
22	GPS5	2007 09 16 16 00 00			0.00000	rel
23	GPS5	2007 09 16 18 00 00			0.00000	rel
24	GPS5	2007 09 16 20 00 00			0.00000	rel
25	GPS5	2007 09 16 22 00 00			0.00000	rel
26	GPS5	2007 09 17 00 00 00			0.00000	rel
27	GPS5	2007 09 17 02 00 00			0.00000	rel
28	GPS5	2007 09 17 04 00 00			0.00000	rel
29	GPS5	2007 09 17 06 00 00			0.00000	rel
30	GPS5	2007 09 17 08 00 00			0.00000	rel
31	GPS5	2007 09 17 10 00 00			0.00000	rel
32	GPS5	2007 09 17 12 00 00			0.00000	rel
33	GPS6	2007 09 16 06 00 00			0.00000	abs
34	GPS6	2007 09 16 08 00 00			0.00000	rel
35	GPS6	2007 09 16 10 00 00			0.00000	rel
36	GPS6	2007 09 16 12 00 00			0.00000	rel
37	GPS6	2007 09 16 14 00 00			0.00000	rel
38	GPS6	2007 09 16 16 00 00			0.00000	rel
39	GPS6	2007 09 16 18 00 00			0.00000	rel
40	GPS6	2007 09 16 20 00 00			0.00000	rel
41	GPS6	2007 09 16 22 00 00			0.00000	rel
42	GPS6	2007 09 17 00 00 00			0.00000	rel

43	GPS6	2007 09 17 02 00 00	0.00000	rel
44	GPS6	2007 09 17 04 00 00	0.00000	rel
45	GPS6	2007 09 17 06 00 00	0.00000	rel
46	GPS6	2007 09 17 08 00 00	0.00000	rel
47	GPS6	2007 09 17 10 00 00	0.00000	rel
48	GPS6	2007 09 17 12 00 00	0.00000	rel
49	GPS7	2007 09 16 06 00 00	0.00000	abs
50	GPS7	2007 09 16 08 00 00	0.00000	rel
51	GPS7	2007 09 16 10 00 00	0.00000	rel
52	GPS7	2007 09 16 12 00 00	0.00000	rel
53	GPS7	2007 09 16 14 00 00	0.00000	rel
54	GPS7	2007 09 16 16 00 00	0.00000	rel
55	GPS7	2007 09 16 18 00 00	0.00000	rel
56	GPS7	2007 09 16 20 00 00	0.00000	rel
57	GPS7	2007 09 16 22 00 00	0.00000	rel
58	GPS7	2007 09 17 00 00 00	0.00000	rel
59	GPS7	2007 09 17 02 00 00	0.00000	rel
60	GPS7	2007 09 17 04 00 00	0.00000	rel
61	GPS7	2007 09 17 06 00 00	0.00000	rel
62	GPS7	2007 09 17 08 00 00	0.00000	rel
63	GPS7	2007 09 17 10 00 00	0.00000	rel
64	GPS7	2007 09 17 12 00 00	0.00000	rel
65	GPS3	2007 09 16 06 00 00	0.00000	abs
66	GPS3	2007 09 16 08 00 00	0.00000	rel
67	GPS3	2007 09 16 10 00 00	0.00000	rel
68	GPS3	2007 09 16 12 00 00	0.00000	rel
69	GPS3	2007 09 16 14 00 00	0.00000	rel
70	GPS3	2007 09 16 16 00 00	0.00000	rel
71	GPS3	2007 09 16 18 00 00	0.00000	rel
72	GPS3	2007 09 16 20 00 00	0.00000	rel
73	GPS3	2007 09 16 22 00 00	0.00000	rel
74	GPS3	2007 09 17 00 00 00	0.00000	rel
75	GPS3	2007 09 17 02 00 00	0.00000	rel
76	GPS3	2007 09 17 04 00 00	0.00000	rel
77	GPS3	2007 09 17 06 00 00	0.00000	rel
78	GPS3	2007 09 17 08 00 00	0.00000	rel
79	GPS3	2007 09 17 10 00 00	0.00000	rel
80	GPS3	2007 09 17 12 00 00	0.00000	rel
81	GPS4	2007 09 16 06 00 00	0.00000	abs
82	GPS4	2007 09 16 08 00 00	0.00000	rel
83	GPS4	2007 09 16 10 00 00	0.00000	rel
84	GPS4	2007 09 16 12 00 00	0.00000	rel
85	GPS4	2007 09 16 14 00 00	0.00000	rel
86	GPS4	2007 09 16 16 00 00	0.00000	rel
87	GPS4	2007 09 16 18 00 00	0.00000	rel
88	GPS4	2007 09 16 20 00 00	0.00000	rel
89	GPS4	2007 09 16 22 00 00	0.00000	rel
90	GPS4	2007 09 17 00 00 00	0.00000	rel
91	GPS4	2007 09 17 02 00 00	0.00000	rel
92	GPS4	2007 09 17 04 00 00	0.00000	rel
93	GPS4	2007 09 17 06 00 00	0.00000	rel
94	GPS4	2007 09 17 08 00 00	0.00000	rel
95	GPS4	2007 09 17 10 00 00	0.00000	rel

96 GPS4

2007 09 17 12 00 00

0.00000 rel

IONOSPHERE MODELS: \${P}/KIVE07S\ATM\KIVE07S.ION

TYPE OF IONOSPHERE MODELS : LOCAL
RADIUS OF THE EARTH : 6378.14 KM

Table with columns: MODEL, DEG. OF DEVELOP. (TIME, LAT., MIXED), VALIDITY START, VALIDITY END, ORIGIN OF DEVELOPMENT (LOCAL TIME, LAT. (D), LONG. (D)), HEIGHT (KM), NORMAIZATION FACTORS (TIME (H), LAT. (D), ELE. CONT.).

Table with columns: MODEL, TERM, POL. DEGREE IN (TIME, LATIT.), COEFFICIENT, SIGMA.

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8. POLE COORDINATES AND TIME INFORMATION

A PRIORI POLE AND TIME INFORMATION FROM THE POLE FILE:

DATUM	TIME	X-POLE (" EP-CPO ("	Y-POLE (" PS-CPO ("	UT1-UTC (S)	GPS-UTC (S)	RMS XP (" RMS EP ("	RMS YP (" RMS PS ("	RMS DT (S)
07-09-16	00:00:00	0.17237 0.00000	0.23225 0.00000	-0.173872	14.	0.00001 0.00018	0.00003 0.00020	0.000056
07-09-17	00:00:00	0.16964 0.00000	0.23033 0.00000	-0.174345	14.	0.00001 0.00009	0.00002 0.00011	0.000033
07-09-18	00:00:00	0.16725 0.00000	0.22855 0.00000	-0.174716	14.	0.00002 0.00010	0.00001 0.00012	0.000022

NUTATION MODEL: IAU2000  
SUBDAILY POLE MODEL: IERS2000

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12. TEST OUTPUT

MIN. AND MAX. ELEVATION/NADIR ANGLES AND MAX. SYNCHRONIZATION ERRORS:

SESS	FILE	STATION NAME 1	STATION NAME 2	MIN/MAX ELEV.	MIN/MAX NADIR	SYNCH. ERR. (NS)
2590	1	GPS1	GPS2	20.0 79.7	2.4 13.3	0.0
2600	2	GPS1	GPS2	20.0 82.1	1.9 13.2	0.0
2590	3	GPS1	GPS5	20.0 79.7	2.4 13.3	0.0
2600	4	GPS1	GPS5	20.0 82.1	1.9 13.2	0.0
2590	5	GPS1	GPS6	20.0 79.7	2.4 13.3	0.0
2600	6	GPS1	GPS6	20.0 82.1	1.9 13.2	0.0
2590	7	GPS1	GPS7	20.0 79.7	2.4 13.3	0.0
2600	8	GPS1	GPS7	20.0 82.1	1.9 13.2	0.0
2590	9	GPS2	GPS3	20.0 79.7	2.4 13.3	0.0
2600	10	GPS2	GPS3	20.0 82.1	1.9 13.1	0.0

2590	11	GPS2	GPS4	20.0	79.7	2.4	13.3	0.0
2600	12	GPS2	GPS4	20.0	82.1	1.9	13.2	0.0

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13. RESULTS (PART 1)

NUMBER OF PARAMETERS (PART 1):

PARAMETER TYPE	#PARAMETERS	#PRE-ELIMINATED	#SET-UP	#NO-OBS	#REF	#SINGULAR
STATION COORDINATES	21	0	21	0	0	0
AMBIGUITIES	27	27 (BEFORE INV)	387	360	0	3
SITE-SPECIFIC TROPOSPHERE PARAMETERS	96	0	96	0	0	9
TOTAL NUMBER OF PARAMETERS	144	27	504	360	0	12

NUMBER OF OBSERVATIONS (PART 1):

TYPE	FREQUENCY	FILE	#OBSERVATIONS
PHASE	L1	ALL	93133
PHASE	L2	ALL	93133
TOTAL NUMBER OF OBSERVATIONS			186266

A POSTERIORI SIGMA OF UNIT WEIGHT (PART 1):

A POSTERIORI SIGMA OF UNIT WEIGHT : 0.0030 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)

DEGREE OF FREEDOM (DOF) : 186134

CHI\*\*2/DOF : 8.95

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## STATION COORDINATES:

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NUM	STATION NAME	PARAMETER	A PRIORI VALUE	NEW VALUE	NEW- A PRIORI	RMS ERROR	3-D ELLIPSOID		2-D ELLIPSE	
1	GPS1	X	2632277.3097	2632277.3097	0.0000	0.0000				
		Y	1266957.3328	1266957.3328	0.0000	0.0000				
		Z	5651027.6130	5651027.6130	0.0000	0.0000				
		HEIGHT	216.2605	216.2605	0.0000	0.0000	0.0000	0.0		
		LATITUDE	62 49 11.541281	62 49 11.541281	0.0000	0.0000	0.0000	90.0	0.0000	90.0
		LONGITUDE	25 42 8.131873	25 42 8.131873	0.0000	0.0000	0.0000	0.0	0.0000	0.0000
2	GPS2	X	2632668.6713	2632668.6691	-0.0022	0.0003				
		Y	1266433.2178	1266433.2138	-0.0040	0.0002				
		Z	5650946.8226	5650946.8197	-0.0029	0.0007				
		HEIGHT	201.6768	201.6725	-0.0043	0.0008	0.0008	0.5		
		LATITUDE	62 49 6.746291	62 49 6.746354	0.0020	0.0001	0.0001	90.6	0.0001	90.5
		LONGITUDE	25 41 22.804861	25 41 22.804676	-0.0026	0.0001	0.0001	-0.1	0.0001	0.0001
5	GPS5	X	2631669.9819	2631669.9791	-0.0028	0.0003				
		Y	1266914.5590	1266914.5581	-0.0009	0.0002				
		Z	5651312.1649	5651312.1610	-0.0039	0.0007				
		HEIGHT	210.9794	210.9746	-0.0048	0.0008	0.0008	0.5		
		LATITUDE	62 49 31.995017	62 49 31.995045	0.0009	0.0001	0.0001	90.9	0.0001	90.8
		LONGITUDE	25 42 24.011125	25 42 24.011153	0.0004	0.0001	0.0001	-0.1	0.0001	0.0001
6	GPS6	X	2631400.1527	2631400.1411	-0.0116	0.0003				
		Y	1267721.3486	1267721.3440	-0.0046	0.0002				
		Z	5651229.2666	5651229.2484	-0.0182	0.0007				
		HEIGHT	186.0792	186.0574	-0.0219	0.0008	0.0008	0.5		
		LATITUDE	62 49 27.699096	62 49 27.699184	0.0027	0.0001	0.0001	90.5	0.0001	90.5
		LONGITUDE	25 43 23.611374	25 43 23.611438	0.0009	0.0001	0.0001	-0.1	0.0001	0.0001
7	GPS7	X	2632837.9413	2632837.9404	-0.0009	0.0003				
		Y	1267275.0647	1267275.0644	-0.0003	0.0002				
		Z	5650672.9413	5650672.9410	-0.0003	0.0007				
		HEIGHT	194.4937	194.4930	-0.0007	0.0008	0.0008	0.5		
		LATITUDE	62 48 47.835455	62 48 47.835478	0.0007	0.0001	0.0001	90.7	0.0001	90.5
		LONGITUDE	25 42 11.178073	25 42 11.178082	0.0001	0.0001	0.0001	-0.2	0.0001	0.0001
3	GPS3	X	2633182.4577	2633182.4584	0.0007	0.0003				
		Y	1265629.9428	1265629.9421	-0.0007	0.0002				
		Z	5650879.0389	5650879.0391	0.0002	0.0007				
		HEIGHT	193.8849	193.8852	0.0003	0.0008	0.0008	0.5		

	LATITUDE	62 49 2.443920	62 49 2.443914	-0.0002	0.0001	0.0001	90.4	0.0001	90.3
	LONGITUDE	25 40 15.973856	25 40 15.973792	-0.0009	0.0001	0.0001	-0.1	0.0001	
4	GPS4	X	2632226.4697	2632226.4650	-0.0047	0.0003			
		Y	1265406.6777	1265406.6742	-0.0035	0.0002			
		Z	5651380.4111	5651380.4061	-0.0050	0.0007			
	HEIGHT	202.1775	202.1705	-0.0071	0.0008	0.0008	0.5		
	LATITUDE	62 49 37.375281	62 49 37.375373	0.0028	0.0001	0.0001	90.0	0.0001	90.0
	LONGITUDE	25 40 31.010505	25 40 31.010428	-0.0011	0.0001	0.0001	-0.1	0.0001	

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SITE-SPECIFIC TROPOSPHERE PARAMETERS: (NOT SAVED)  
-----

REQU.	STATION NAME	CORRECTIONS (M)			RMS ERRORS (M)			ZENITH VECTOR (")				ERROR ELLIPSE (M)		
		NORTH	EAST	ZENITH	NORTH	EAST	ZENITH	ANGLE	RMS	RATIO	AZI	MAX RMS	MIN RMS	AZI
1	GPS2			0.00000			0.00000							
2	GPS2			0.00593			0.00072							
3	GPS2			0.00674			0.00049							
4	GPS2			0.00792			0.00051							
5	GPS2			0.00644			0.00047							
6	GPS2			0.00894			0.00051							
7	GPS2			0.00434			0.00062							
8	GPS2			0.00672			0.00047							
9	GPS2			0.00830			0.00048							
10	GPS2			0.00699			0.00054							
11	GPS2			0.01028			0.00051							
12	GPS2			0.00421			0.00049							
13	GPS2			0.00801			0.00047							
14	GPS2			0.00737			0.00050							
15	GPS2			0.00375			0.00069							
16	GPS2			0.00000			0.00000							
17	GPS5			-0.00870			0.00403							
18	GPS5			0.00307			0.00059							
19	GPS5			0.00095			0.00047							
20	GPS5			0.00259			0.00049							
21	GPS5			0.00095			0.00046							
22	GPS5			0.00304			0.00049							
23	GPS5			-0.00077			0.00061							
24	GPS5			0.00434			0.00047							
25	GPS5			0.00140			0.00047							
26	GPS5			0.00243			0.00053							
27	GPS5			0.00248			0.00050							
28	GPS5			0.00023			0.00048							
29	GPS5			0.00234			0.00046							



30	GPS5	0.00333	0.00048
31	GPS5	0.00164	0.00057
32	GPS5	0.01582	0.00486
33	GPS6	-0.17705	0.01107
34	GPS6	0.01183	0.00063
35	GPS6	0.01303	0.00050
36	GPS6	0.01136	0.00052
37	GPS6	0.01447	0.00048
38	GPS6	0.00960	0.00052
39	GPS6	0.01378	0.00064
40	GPS6	0.00633	0.00048
41	GPS6	0.00683	0.00051
42	GPS6	0.01111	0.00055
43	GPS6	0.01392	0.00052
44	GPS6	0.00752	0.00050
45	GPS6	0.01409	0.00049
46	GPS6	0.00618	0.00052
47	GPS6	0.03182	0.00100
48	GPS6	0.00000	0.00000
49	GPS7	0.00000	0.00000
50	GPS7	0.00221	0.00066
51	GPS7	0.00260	0.00048
52	GPS7	-0.00020	0.00050
53	GPS7	0.00016	0.00046
54	GPS7	0.00110	0.00050
55	GPS7	0.00018	0.00062
56	GPS7	-0.00017	0.00047
57	GPS7	0.00052	0.00047
58	GPS7	0.00056	0.00053
59	GPS7	0.00160	0.00050
60	GPS7	0.00063	0.00048
61	GPS7	0.00222	0.00046
62	GPS7	-0.00056	0.00050
63	GPS7	0.00206	0.00078
64	GPS7	0.00000	0.00000
65	GPS3	0.00000	0.00000
66	GPS3	0.00393	0.00085
67	GPS3	0.00174	0.00051
68	GPS3	0.00295	0.00052
69	GPS3	0.00123	0.00047
70	GPS3	0.00311	0.00051
71	GPS3	0.00023	0.00062
72	GPS3	0.00155	0.00047
73	GPS3	0.00392	0.00048
74	GPS3	-0.00118	0.00054
75	GPS3	0.00561	0.00051
76	GPS3	0.00093	0.00049
77	GPS3	0.00289	0.00047
78	GPS3	0.00235	0.00050
79	GPS3	0.00123	0.00069
80	GPS3	0.00000	0.00000
81	GPS4	0.00000	0.00000
82	GPS4	-0.00660	0.00146

83	GPS4	0.01424	0.00054
84	GPS4	0.00587	0.00052
85	GPS4	0.01133	0.00047
86	GPS4	0.00943	0.00051
87	GPS4	0.00533	0.00062
88	GPS4	0.00654	0.00047
89	GPS4	0.00705	0.00048
90	GPS4	0.00349	0.00054
91	GPS4	0.01261	0.00052
92	GPS4	0.00725	0.00049
93	GPS4	0.00543	0.00048
94	GPS4	0.00893	0.00052
95	GPS4	0.00838	0.00070
96	GPS4	0.00000	0.00000

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RMS ERRORS OF ELLIP. COORDINATES AND COORDINATE DIFFER. IN MM (PART 1):  
-----

NUM		1	2	5	6	7	3	4
1	B	0.0	0.1	0.1	0.1	0.1	0.1	0.1
1	L	0.0	0.1	0.1	0.1	0.1	0.1	0.1
1	H	0.0	0.8	0.8	0.8	0.8	0.8	0.8
2	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2	L	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2	H	0.8	0.8	0.8	0.8	0.8	0.8	0.8
5	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
5	L	0.1	0.1	0.1	0.1	0.1	0.1	0.1
5	H	0.8	0.8	0.8	0.8	0.8	0.8	0.8
6	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
6	L	0.1	0.1	0.1	0.1	0.1	0.1	0.1
6	H	0.8	0.8	0.8	0.8	0.8	0.8	0.8
7	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
7	L	0.1	0.1	0.1	0.1	0.1	0.1	0.1
7	H	0.8	0.8	0.8	0.8	0.8	0.8	0.8
3	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3	L	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3	H	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4	L	0.1	0.1	0.1	0.1	0.1	0.1	0.1

| H | 0.8 0.8 0.8 0.8 0.8 0.8 0.8 |

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SLOPE DISTANCES AND RMS ERRORS IN M (PART 1):

NUM		2 N	5 N	6 N	7 N	3 N	4 N
1	O	659.0808	672.0465	1180.5883	735.5633	1613.4842	1591.0947
	N	659.0830	672.0474	1180.5908	735.5626	1613.4852	1591.0972
	RMS	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
2	O		1167.2810	1829.8074	901.3154	955.9403	1198.8852
	N		1167.2825	1829.8111	901.3183	955.9389	1198.8850
	RMS		0.0001	0.0001	0.0001	0.0001	0.0001
5	O			854.7452	1379.3840	2031.1130	1608.7393
	N			854.7459	1379.3842	2031.1146	1608.7410
	RMS			0.0001	0.0001	0.0001	0.0001
6	O				1604.9621	2770.0630	2462.3862
	N				1604.9642	2770.0656	2462.3883
	RMS				0.0001	0.0001	0.0001
7	O					1693.3971	2089.3255
	N					1693.3979	2089.3279
	RMS					0.0001	0.0001
3	O						1102.3314
	N						1102.3343
	RMS						0.0001

**Appendix VIIIa. Results of 16 measurements at Romuvaara. Deviations of the vector lengths from their mean in millimeters. Unscaled observations.**

Vector	Mean length [mm]	Time [a]															RMS	
		96.3	96.8	97.3	97.8	98.3	98.8	99.3	99.8	1.3	1.8	2.8	3.8	4.8	5.8	6.8		7.8
GPS1-GPS2	1176417.6	-0.6	-0.9	1.5	-1.3	-0.3	-0.2	0.0	1.4	0.9	0.4	2.7	-0.4	-0.3	-1.3	-0.4	-1.4	±1.1
GPS1-GPS3	541204.9	1.1	-0.6	0.6	-0.4	0.3	-0.4	0.5	0.1	0.6	-0.3	1.5	-0.7	-0.2	-0.6	-0.2	-1.1	0.7
GPS1-GPS4	731897.0	-3.1	-0.1	-1.0	0.1	-2.4	0.3	-0.1	0.7	0.9	1.3	1.4	0.4	0.7	0.1	0.6	0.5	1.2
GPS1-GPS5	614734.5	0.8	-0.3	0.2	-0.7	-0.1	-0.6	0.2	-0.4	0.1	0.4	0.3	0.1	-0.2	-0.2	-0.1	0.5	0.4
GPS1-GPS6	678196.2	0.0	1.1	0.2	0.4	-0.3	-0.3	-1.1	0.8	-0.6	0.0	1.7	0.1	-0.1	-1.1	-0.2	-0.4	0.7
GPS1-GPS7	1222388.7	-0.5	0.9	-0.1	0.0	-0.8	-0.9	-0.3	1.0	-0.2	0.2	1.8	0.1	0.3	-0.8	0.0	-0.4	0.7
GPS2-GPS3	783976.4	-1.5	-0.3	0.8	-1.2	0.0	-0.3	0.0	1.1	0.3	0.5	0.9	0.6	-0.2	-0.7	-0.2	0.7	0.7
GPS2-GPS4	692375.0	-1.7	-0.2	1.7	0.2	-1.5	-1.1	-0.4	0.9	0.3	0.3	2.5	0.3	0.3	-0.5	0.2	-1.3	1.1
GPS2-GPS5	1397223.6	-0.5	-0.2	0.1	-1.7	-0.7	-0.9	-0.1	1.7	0.4	0.9	2.0	0.1	0.1	-0.8	-0.4	0.1	0.9
GPS2-GPS6	1686681.6	-0.4	-0.4	2.2	-1.2	-0.7	-0.6	-0.7	1.9	0.8	0.0	4.7	-0.5	-0.7	-2.5	-0.6	-1.9	1.7
GPS2-GPS7	1940414.0	-1.0	-0.3	2.0	-1.0	-1.3	-0.7	-0.4	1.8	1.1	-0.2	5.4	-0.4	-0.4	-2.2	-0.6	-2.4	1.8
GPS3-GPS4	717507.9	-4.0	0.3	-0.9	0.5	-2.7	-1.1	-0.1	0.4	0.7	1.1	1.2	1.1	1.0	0.6	1.0	0.9	1.4
GPS3-GPS5	616536.1	1.0	0.1	-0.6	-0.5	-0.8	-0.5	-0.1	0.6	0.1	0.5	1.1	-0.5	0.4	-0.1	-0.1	-0.5	0.6
GPS3-GPS6	1204804.7	1.1	0.5	0.8	-0.1	0.1	-0.8	-0.5	0.9	0.3	-0.4	3.1	-0.6	-0.4	-1.8	-0.4	-1.8	1.1
GPS3-GPS7	1679302.0	0.3	0.4	0.6	-0.5	-0.4	-1.4	0.2	1.0	0.6	-0.3	3.2	-0.4	-0.1	-1.4	-0.3	-1.8	1.1
GPS4-GPS5	1225012.3	-3.3	0.3	-1.6	-0.1	-3.4	-0.9	-0.3	0.6	0.6	1.9	1.5	0.9	1.2	0.6	1.0	1.4	1.5
GPS4-GPS6	1045309.6	-0.4	-0.2	0.1	-0.9	-0.7	0.4	-0.3	1.0	1.0	0.3	2.7	-0.4	-0.5	-1.6	-0.3	-0.3	1.0
GPS4-GPS7	1248362.4	0.9	-0.1	0.3	-1.2	0.3	0.4	0.1	1.0	0.8	-0.5	2.9	-0.6	-0.7	-1.6	-0.7	-1.1	1.1
GPS5-GPS6	1188022.1	0.7	0.8	0.4	0.3	0.0	-0.4	-0.9	0.0	-0.5	0.3	1.5	-0.1	-0.4	-1.2	-0.1	-0.6	0.7
GPS5-GPS7	1795939.9	0.5	0.6	0.3	-0.4	-0.6	-1.3	-0.1	0.3	-0.1	0.5	1.7	0.0	0.0	-0.9	0.0	-0.5	0.7
GPS6-GPS7	636487.9	-0.1	-0.2	0.1	-0.7	-0.4	-1.0	0.8	0.3	0.5	0.3	0.3	-0.1	0.2	0.1	0.3	0.2	0.4
Mean:		-0.5	0.1	0.4	-0.5	-0.8	-0.6	-0.2	0.8	0.4	0.3	2.1	-0.1	0.0	-0.9	-0.1	-0.5	
St.dev.:		±1.5	0.5	1.0	0.6	1.0	0.5	0.4	0.6	0.5	0.6	1.3	0.5	0.5	0.8	0.5	1.0	
RMS:		±1.5	0.5	1.0	0.8	1.2	0.8	0.5	1.0	0.6	0.7	2.5	0.5	0.5	1.2	0.5	1.1	±1.1

**Appendix VIIIb. Results of 16 measurements at Romuvaara. Deviations of the vector lengths from their mean in millimeters. Scaled observations.**

Vector	Mean length [mm]	Time [a]																RMS
		96.3	96.8	97.3	97.8	98.3	98.8	99.3	99.8	1.3	1.8	2.8	3.8	4.8	5.8	6.8	7.8	
GPS1-GPS2	1176417.6	0.1	-0.9	1.2	-0.8	0.7	0.5	0.2	0.5	0.4	-0.1	0.5	-0.4	-0.4	-0.5	-0.4	-0.9	±0.6
GPS1-GPS3	541204.9	1.4	-0.6	0.5	-0.2	0.7	-0.1	0.6	-0.3	0.4	-0.5	0.5	-0.7	-0.2	-0.2	-0.2	-0.9	0.6
GPS1-GPS4	731897.0	-2.7	-0.1	-1.2	0.4	-1.8	0.7	0.0	0.2	0.6	1.0	0.0	0.4	0.7	0.6	0.6	0.8	1.0
GPS1-GPS5	614734.5	1.1	-0.3	-0.1	-0.4	0.4	-0.2	0.2	-0.8	-0.2	0.1	-1.0	0.0	-0.2	0.2	-0.1	0.7	0.5
GPS1-GPS6	678196.2	0.4	1.1	0.0	0.7	0.3	0.1	-1.0	0.3	-0.9	-0.3	0.4	0.1	-0.1	-0.6	-0.2	-0.1	0.5
GPS1-GPS7	1222388.7	0.2	0.9	-0.4	0.6	0.2	-0.2	-0.1	0.1	-0.7	-0.3	-0.5	0.1	0.2	0.1	0.0	0.1	0.4
GPS2-GPS3	783976.4	-1.1	-0.3	0.6	-0.8	0.7	0.2	0.1	0.5	0.0	0.2	-0.6	0.6	-0.2	-0.1	-0.2	1.0	0.6
GPS2-GPS4	692375.0	-1.3	-0.2	1.5	0.5	-0.9	-0.7	-0.3	0.4	0.0	0.0	1.2	0.3	0.3	0.0	0.2	-1.0	0.7
GPS2-GPS5	1397223.6	0.3	-0.2	-0.3	-1.1	0.5	-0.1	0.1	0.7	-0.2	0.4	-0.6	0.1	0.0	0.2	-0.4	0.7	0.5
GPS2-GPS6	1686681.6	0.6	-0.4	1.7	-0.4	0.7	0.4	-0.5	0.7	0.1	-0.6	1.5	-0.5	-0.8	-1.3	-0.6	-1.2	0.9
GPS2-GPS7	1940414.0	0.1	-0.3	1.5	-0.1	0.3	0.5	-0.1	0.4	0.3	-0.9	1.7	-0.4	-0.5	-0.8	-0.6	-1.6	0.8
GPS3-GPS4	717507.9	-3.6	0.3	-1.1	0.8	-2.1	-0.7	0.0	-0.1	0.4	0.8	-0.2	1.1	1.0	1.1	1.0	1.2	1.3
GPS3-GPS5	616536.1	1.4	0.1	-0.8	-0.2	-0.3	-0.1	0.0	0.1	-0.1	0.3	-0.1	-0.5	0.4	0.3	-0.1	-0.2	0.5
GPS3-GPS6	1204804.7	1.8	0.5	0.5	0.4	1.1	-0.1	-0.3	0.0	-0.2	-0.9	0.8	-0.6	-0.5	-0.9	-0.4	-1.3	0.8
GPS3-GPS7	1679302.0	1.3	0.4	0.1	0.3	1.0	-0.4	0.4	-0.2	-0.1	-0.9	0.0	-0.4	-0.2	-0.2	-0.3	-1.1	0.6
GPS4-GPS5	1225012.3	-2.6	0.3	-1.9	0.5	-2.4	-0.2	-0.1	-0.3	0.1	1.4	-0.8	0.9	1.1	1.5	1.0	1.9	1.3
GPS4-GPS6	1045309.6	0.2	-0.2	-0.2	-0.4	0.2	1.0	-0.2	0.2	0.6	-0.1	0.7	-0.4	-0.6	-0.9	-0.3	0.1	0.5
GPS4-GPS7	1248362.4	1.6	-0.1	0.0	-0.6	1.3	1.1	0.3	0.1	0.3	-1.0	0.5	-0.6	-0.8	-0.7	-0.7	-0.6	0.8
GPS5-GPS6	1188022.1	1.4	0.8	0.1	0.8	1.0	0.3	-0.7	-0.9	-1.0	-0.2	-0.7	-0.1	-0.5	-0.4	-0.1	-0.1	0.7
GPS5-GPS7	1795939.9	1.5	0.6	-0.2	0.4	0.9	-0.2	0.1	-1.0	-0.8	-0.2	-1.7	0.0	-0.1	0.4	0.0	0.2	0.7
GPS6-GPS7	636487.9	0.3	-0.2	-0.1	-0.4	0.1	-0.6	0.9	-0.2	0.2	0.1	-0.9	-0.1	0.2	0.6	0.3	0.5	0.4
Mean:		0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	
St.dev.:		±1.5	0.5	0.9	0.6	1.1	0.5	0.4	0.5	0.5	0.6	0.9	0.5	0.5	0.7	0.5	0.9	
RMS:		±1.5	0.5	0.9	0.6	1.1	0.5	0.4	0.5	0.5	0.6	0.9	0.5	0.5	0.7	0.5	0.9	±0.7

## Appendix IX. Results of the measurements at Romuvaara in 2007.

```
=====
Program : GPSEST                               Bernese GPS Software Version 5.0
Purpose : Parameter estimation
Campaign: ${P}/ROMU07S                         Default session: 2560 year 2007
Date    : 29-Jan-2008 14:22                   User name      : ja
=====
```

ROMU07S

-----

```
1${P}/ROMU07S                                PROGRAM GPSEST   29-JAN-08 14:22
ROMU07S                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

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-----

1. CAMPAIGNS
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9. ANTENNA PHASE CENTERS
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12. TEST OUTPUT
13. RESULTS (PART 1)
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```
1${P}/ROMU07S                                PROGRAM GPSEST   29-JAN-08 14:22
ROMU07S                                       BERNESE GPS SOFTWARE VERSION 5.0
-----
```

### INPUT AND OUTPUT FILENAMES

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-----

```
Session table          : ${P}/ROMU07S\STA\SESSIONS.SES
```

```

General constants      : ${X}/GEN\CONST.
Geodetic datum        : ${X}/GEN\DATUM.
Station information    : ${P}/ROMU07S\STA\ROMU07S.STA
Earth rotation parameters : ${P}/ROMU07S\ORB\C04_2007.ERP
Subdaily pole model   : ${X}/GEN\IERS2000.SUB
Nutation model        : ${X}/GEN\IAU2000.NUT
Satellite information  : ${X}/GEN\SATELLIT.
Receiver information   : ${X}/GEN\RECEIVER.
Satellite problems    : ${X}/GEN\SAT_2007.CRX
Phase center eccentricities : ${X}/GEN\PHAS_IGS.REL
SINEX general input file : ${X}/GEN\SINEX.
IONEX control file    : ${X}/GEN\IONEX.
Difference GPS-UTC    : ---
A priori station coordinates: ${P}/ROMU07S\STA\ROMU.CRD
GNSS standard orbits  : ${P}/ROMU07S\ORB\ROMU07S.STD
GNSS orbit partials   : ---
Ionosphere models     : ${P}/ROMU07S\ATM\ROMU07S.ION
Troposphere estimates : ---
Station sigma factors : ---
Station eccentricities : ---
Ocean loading tables  : ---
GNSS clock corrections : ---
Differential code biases : ---
Receiver antenna orientation: ---
Kinematic coordinates : ---
Kinematic velocities  : ---
Standard orbit(s)     : ---
Orbit partials        : ---
Attitude data         : ---
Precise orbit(s)      : ---
LEO orbital elements  : ---
Station coordinates   : ${P}/ROMU07S\STA\TROMU07S.CRD
GNSS orbital elements : ---
Troposphere estimates : ---
Troposphere SINEX     : ---
Ionosphere models     : ---
IONEX                 : ---
Residuals             : ---
Coordinate covariance matrix: ---
Full covariance matrix : ---
Normal equations      : ---
Bernese ERP file      : ---
IERS ERP file         : ---
GNSS clock corrections : ---
Clock RINEX           : ---
Kinematic coordinates : ---
Differential code biases : ---
Phase center variations (gri: ---
Phase center variations (har: ---
Scratch file          : ${U}/WORK\GPSEST.SCR
Scratch files         : ${U}/WORK\GPSEST.SC1
Program output        : ${P}/ROMU07S\OUT\GPSEST.L14
Error message         : ${U}/WORK\ERROR.MSG

```

1\${P}/ROMU07S  
ROMU07S

PROGRAM GPSEST 29-JAN-08 14:22  
BERNESE GPS SOFTWARE VERSION 5.0

1. CAMPAIGNS

CAMPAIGN NAME	NUM STATION NAME	NUM STATION NAME	NUM STATION NAME	NUM STATION NAME	NUM STATION NAME
\${P}/ROMU07S	1 GPS1	3 GPS3	4 GPS4	5 GPS5	6 GPS6
	2 GPS2	7 GPS7			

2. OBSERVATION FILES

\${P}/ROMU07S

MAIN CHARACTERISTICS:

FILE	OBSERVATION FILE HEADER	OBSERVATION FILE	SESS	RECEIVER 1	RECEIVER 2
1	\${P}/ROMU07S/OBS/01032550.PSH	\${P}/ROMU07S/OBS/01032550.PSO	2550	ASHTECH Z-XII3	ASHTECH Z-XII3
2	\${P}/ROMU07S/OBS/01032560.PSH	\${P}/ROMU07S/OBS/01032560.PSO	2560	ASHTECH Z-XII3	ASHTECH Z-XII3
3	\${P}/ROMU07S/OBS/01042550.PSH	\${P}/ROMU07S/OBS/01042550.PSO	2550	ASHTECH Z-XII3	ASHTECH Z-XII3
4	\${P}/ROMU07S/OBS/01042560.PSH	\${P}/ROMU07S/OBS/01042560.PSO	2560	ASHTECH Z-XII3	ASHTECH Z-XII3
5	\${P}/ROMU07S/OBS/01052550.PSH	\${P}/ROMU07S/OBS/01052550.PSO	2550	ASHTECH Z-XII3	ASHTECH Z-XII3
6	\${P}/ROMU07S/OBS/01052560.PSH	\${P}/ROMU07S/OBS/01052560.PSO	2560	ASHTECH Z-XII3	ASHTECH Z-XII3
7	\${P}/ROMU07S/OBS/01062550.PSH	\${P}/ROMU07S/OBS/01062550.PSO	2550	ASHTECH Z-XII3	ASHTECH Z-XII3
8	\${P}/ROMU07S/OBS/01062560.PSH	\${P}/ROMU07S/OBS/01062560.PSO	2560	ASHTECH Z-XII3	ASHTECH Z-XII3
9	\${P}/ROMU07S/OBS/03022550.PSH	\${P}/ROMU07S/OBS/03022550.PSO	2550	ASHTECH Z-XII3	ASHTECH Z-XII3
10	\${P}/ROMU07S/OBS/03022560.PSH	\${P}/ROMU07S/OBS/03022560.PSO	2560	ASHTECH Z-XII3	ASHTECH Z-XII3
11	\${P}/ROMU07S/OBS/06072550.PSH	\${P}/ROMU07S/OBS/06072550.PSO	2550	ASHTECH Z-XII3	ASHTECH Z-XII3
12	\${P}/ROMU07S/OBS/06072560.PSH	\${P}/ROMU07S/OBS/06072560.PSO	2560	ASHTECH Z-XII3	ASHTECH Z-XII3

FILE	TYP	FREQ.	STATION 1	STATION 2	SESS	FIRST OBSERV.TIME	#EPO	DT	#EF	#CLK	ARC	#SAT	AMB.I.+S.			#CLUSTERS					
													W	12	#AMB	L1	L2	L5	RM		
1	P	L1,L2	GPS1	GPS3	2550	7-09-12 10:28:00	1624	30	0	E	E	1	28	N	Y	Y	47	14	14	47	0
2	P	L1,L2	GPS1	GPS3	2560	7-09-13 0:00:30	1507	30	0	E	E	1	28	N	Y	Y	44	16	16	44	0
3	P	L1,L2	GPS1	GPS4	2550	7-09-12 11:36:00	1488	30	0	E	E	1	28	N	Y	Y	37	10	10	37	0



4	P	L1,L2	GPS1	GPS4	2560	7-09-13	0:00:30	1533	30	0	E	E	1	28	N	Y	Y	45	16	16	45	0
5	P	L1,L2	GPS1	GPS5	2550	7-09-12	7:38:00	1964	30	0	E	E	1	28	N	Y	Y	52	15	15	52	0
6	P	L1,L2	GPS1	GPS5	2560	7-09-13	0:00:30	1392	30	0	E	E	1	28	N	Y	Y	36	11	11	36	0
7	P	L1,L2	GPS1	GPS6	2550	7-09-12	9:28:00	1744	30	0	E	E	1	28	N	Y	Y	43	10	10	43	0
8	P	L1,L2	GPS1	GPS6	2560	7-09-13	0:00:30	1575	30	0	E	E	1	28	N	Y	Y	44	13	13	44	0
9	P	L1,L2	GPS3	GPS2	2550	7-09-12	10:28:00	1624	30	0	E	E	1	28	N	Y	Y	61	26	26	61	0
10	P	L1,L2	GPS3	GPS2	2560	7-09-13	0:00:30	1470	30	0	E	E	1	28	N	Y	Y	51	20	20	51	0
11	P	L1,L2	GPS6	GPS7	2550	7-09-12	9:56:30	1687	30	0	E	E	1	28	N	Y	Y	42	9	9	42	0
12	P	L1,L2	GPS6	GPS7	2560	7-09-13	0:00:30	1556	30	0	E	E	1	28	N	Y	Y	44	13	13	44	0

SATELLITES:

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FILE #SAT SATELLITES

-----

1	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
3	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
4	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
5	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
6	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
7	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
8	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
9	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
10	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
11	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
12	28	1	2	3	4	5	6	8	9	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

OBSERVATION SELECTION:

-----

SAMPLING RATE : 30 SEC  
ELEVATION CUT-OFF ANGLE : 20 DEGREES  
SATELLITE SYSTEM : GPS  
SPECIAL DATA SELECTION : NO

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3. GENERAL OPTIONS

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TIDAL CORRECTION OF STATION COORDINATES : IERS CONVENTIONS 2000

A PRIORI SIGMA OF UNIT WEIGHT:

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A PRIORI SIGMA OF UNIT WEIGHT : 0.001 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)  
 MODEL FOR ELEVATION-DEPENDENT WEIGHTING : 1/COS(Z)

CORRELATIONS AND SESSIONS:

STRATEGY : CORRELATIONS CORRECTLY MODELLED  
 TIME INTERVAL : 0.10000 SEC (TO IDENTIFY EPOCH)

SESS #FILE FILE NUMBERS

```
-----
2550  6    1  3  5  7  9 11
2560  6    2  4  6  8 10 12
-----
```

AMBIGUITY RESOLUTION STRATEGY:

AMBIGUITIES PRE-ELIMINATED EVERY 30 SECONDS

SYNCHRONIZATION ERRORS:

STRATEGY : SYNCHRONIZATION ERRORS NOT APPLIED

4. STATIONS

Local geodetic datum: \${X}/GEN\DATUM.

Datum name	Ell. param./ Scale	Shifts to WGS-84	Rotations to WGS-84
WGS - 84	A = 6378137.000 m 1/F= 298.2572236 SC = 0.00000D+00	DX = 0.0000 m DY = 0.0000 m DZ = 0.0000 m	RX = 0.00000 arcsec RY = 0.00000 arcsec RZ = 0.00000 arcsec

A priori station coordinates: \${P}/ROMU07S\STA\ROMU.CRD

A priori station coordinates WGS-84                      A priori station coordinates  
 Ellipsoidal in local geodetic datum

num	Station name	obs e/f/h	X (m)	Y (m)	Z (m)	Latitude	Longitude	Height (m)
1	GPS1	Y ESTIM	2410839.3072	1388069.5136	5720515.2143	64 13 2.630039	29 55 54.118509	241.6600
3	GPS3	Y ESTIM	2410512.9957	1387690.3887	5720721.8220	64 13 19.254883	29 55 41.827606	222.4407
4	GPS4	Y ESTIM	2410183.6629	1388327.7870	5720712.9448	64 13 18.179839	29 56 34.977031	228.6607

5	GPS5	Y	ESTIM	2411065.8443	1387498.1880	5720528.0899	64	13	5.389555	29	55	9.024823	214.6804
6	GPS6	Y	ESTIM	2411071.3051	1388657.9331	5720270.4931	64	12	44.808990	29	56	23.339861	236.4912
2	GPS2	Y	ESTIM	2409792.7492	1387832.0097	5720997.1485	64	13	39.216043	29	56	17.584812	229.6879
7	GPS7	Y	ESTIM	2410852.0692	1389251.9113	5720205.3683	64	12	40.796407	29	57	9.606445	224.2017

A priori sigma:

Station coordinates a priori sigma  
in local geodetic datum

num	Station name	N (m)	E (m)	U (m)
1	GPS1	0.00001	0.00001	0.00001

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5. SATELLITE ORBITS

ARC CHARACTERISTICS:

ARC	START OF ARC	END OF ARC	SOURCE	#SAT	SATELLITES																		
1	07-09-12 00:00:00	07-09-14 00:00:00	PR2007.256	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	
					20	21	22	23	24	25	26	27	28	29	30	31	32						

OSCULATING ELEMENTS:                   \${P}/ROMU07S\ORB\ROMU07S.STD

REFERENCE SYSTEM: J2000.0  
REFERENCE EPOCH : 54355.3180556 MJD (2007 9 12 7 38 0.00)

SAT	S.MAJ.AXIS	ECCENTRIC.	INCLINAT.	NODE	PERIGEE	M. ANOMALY	PER.PASS.TIME
1	26555524.8	0.00678519	56.785571	6.854163	-103.858248	20.165347	54355.2901344
2	26560833.8	0.00864128	54.116207	-116.510490	-222.772582	69.016696	54355.2224658
3	26558356.3	0.00975656	53.083095	178.086584	43.348889	35.821261	54355.2684492
4	26559166.0	0.00778944	54.078696	-115.410841	15.878790	-139.494703	54355.5112409
5	26559512.1	0.00839431	53.932095	118.849168	68.453790	-170.530982	54355.5542274
6	26562452.4	0.00567801	53.515524	-178.344652	262.931086	-86.508365	54355.4378827
7	26561100.1	0.01041923	53.608512	-179.804613	264.911956	-92.818149	54355.4466129
8	26558773.6	0.01015583	56.150849	66.645459	160.246171	-81.721699	54355.4312289

9	26561560.5	0.01937478	55.455303	61.718204	78.056036	-102.311617	54355.4597654
10	26560534.3	0.00755007	55.394186	-54.654111	28.488068	108.047085	54355.1684103
11	26562079.4	0.00711678	51.119683	-126.187386	28.433482	-54.277090	54355.3932359
12	26559807.6	0.00313112	55.173830	123.851416	-64.387863	-23.585957	54355.3507208
13	26562889.1	0.00341215	57.025733	6.132177	82.076367	91.718794	54355.1910081
14	26559107.3	0.00344689	56.674539	5.227112	-126.128004	73.800632	54355.2158499
16	26561701.4	0.00404689	55.283212	124.759954	326.078098	-174.982268	54355.5604221
17	26560170.0	0.00291165	55.014423	-175.693112	-168.559534	121.064737	54355.1503843
18	26560126.4	0.00880807	54.484108	-53.802384	213.409770	-171.414664	54355.5554595
19	26559359.3	0.00415463	54.886860	-172.373153	-45.047121	91.937058	54355.1907311
20	26559347.6	0.00324758	54.449135	-56.862382	77.766017	-174.668165	54355.5599548
21	26558386.6	0.01297671	53.706813	-114.426646	199.983150	-95.435316	54355.4502175
22	26562029.9	0.00497064	54.348592	-53.398975	-100.210236	108.764430	54355.1674040
23	26560986.9	0.00533195	55.655429	3.989062	-206.136587	47.886744	54355.2517307
24	26560238.1	0.00856987	54.660817	-113.185749	-45.495485	179.140246	54355.0699504
25	26560059.9	0.01163507	55.077333	58.445891	285.745602	-162.326450	54355.5428718
26	26559382.4	0.01825320	56.910508	6.102912	50.849213	5.906824	54355.3098751
27	26558889.9	0.02063500	55.338513	60.376075	257.602066	-153.334097	54355.5304036
28	26562042.2	0.01278363	55.175847	125.277002	-124.033208	141.838043	54355.1215931
29	26558780.4	0.01031389	56.700544	4.037360	-37.810327	106.578231	54355.1704593
30	26560123.0	0.01022634	54.294565	121.702323	-282.632047	163.902403	54355.0910559
31	26558965.7	0.00630223	55.254363	63.637476	-76.005807	-55.460823	54355.3948620
32	26560328.8	0.01488111	55.704039	-51.349322	-79.192971	57.386513	54355.2385761

SATELLITE PROBLEMS:

SAT	PROBLEM	TYPE	ACTION	FROM	TO
105	BAD PHASE+CODE	OBS. REMOVED		06-07-09 00:00:00	99-12-31 23:59:59
119	BAD PHASE+CODE	OBS. REMOVED		07-07-05 00:00:00	07-11-07 23:59:59
123	BAD PHASE+CODE	OBS. REMOVED		07-09-13 00:00:00	07-09-14 23:59:59

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6. ATMOSPHERE

TROPOSPHERE MODEL

A priori troposphere model: Saastamoinen  
Meteo/Trop.delay values : Extrapolated

Reference height : 0.00 m  
Temperature at ref. height: 18.00 C  
Pressure at ref. height: 1013.25 mbar  
Humidity at ref. height: 50.00 %

SITE-SPECIFIC TROPOSPHERE PARAMETERS

Mapping function used for delay estimation: 1/cos(zenith-distance)  
 Troposphere gradient estimation : No

Par	Station name	Reference epoch	sig_n (m)	sig_e (m)	sig_u (m)	abs/rel
1	GPS3	2007 09 12 06 00 00			0.00000	abs
2	GPS3	2007 09 12 08 00 00			0.00000	rel
3	GPS3	2007 09 12 10 00 00			0.00000	rel
4	GPS3	2007 09 12 12 00 00			0.00000	rel
5	GPS3	2007 09 12 14 00 00			0.00000	rel
6	GPS3	2007 09 12 16 00 00			0.00000	rel
7	GPS3	2007 09 12 18 00 00			0.00000	rel
8	GPS3	2007 09 12 20 00 00			0.00000	rel
9	GPS3	2007 09 12 22 00 00			0.00000	rel
10	GPS3	2007 09 13 00 00 00			0.00000	rel
11	GPS3	2007 09 13 02 00 00			0.00000	rel
12	GPS3	2007 09 13 04 00 00			0.00000	rel
13	GPS3	2007 09 13 06 00 00			0.00000	rel
14	GPS3	2007 09 13 08 00 00			0.00000	rel
15	GPS3	2007 09 13 10 00 00			0.00000	rel
16	GPS3	2007 09 13 12 00 00			0.00000	rel
17	GPS3	2007 09 13 14 00 00			0.00000	rel
18	GPS4	2007 09 12 06 00 00			0.00000	abs
19	GPS4	2007 09 12 08 00 00			0.00000	rel
20	GPS4	2007 09 12 10 00 00			0.00000	rel
21	GPS4	2007 09 12 12 00 00			0.00000	rel
22	GPS4	2007 09 12 14 00 00			0.00000	rel
23	GPS4	2007 09 12 16 00 00			0.00000	rel
24	GPS4	2007 09 12 18 00 00			0.00000	rel
25	GPS4	2007 09 12 20 00 00			0.00000	rel
26	GPS4	2007 09 12 22 00 00			0.00000	rel
27	GPS4	2007 09 13 00 00 00			0.00000	rel
28	GPS4	2007 09 13 02 00 00			0.00000	rel
29	GPS4	2007 09 13 04 00 00			0.00000	rel
30	GPS4	2007 09 13 06 00 00			0.00000	rel
31	GPS4	2007 09 13 08 00 00			0.00000	rel
32	GPS4	2007 09 13 10 00 00			0.00000	rel
33	GPS4	2007 09 13 12 00 00			0.00000	rel
34	GPS4	2007 09 13 14 00 00			0.00000	rel
35	GPS5	2007 09 12 06 00 00			0.00000	abs
36	GPS5	2007 09 12 08 00 00			0.00000	rel
37	GPS5	2007 09 12 10 00 00			0.00000	rel
38	GPS5	2007 09 12 12 00 00			0.00000	rel
39	GPS5	2007 09 12 14 00 00			0.00000	rel
40	GPS5	2007 09 12 16 00 00			0.00000	rel
41	GPS5	2007 09 12 18 00 00			0.00000	rel
42	GPS5	2007 09 12 20 00 00			0.00000	rel

43	GPS5	2007 09 12 22 00 00	0.00000	rel
44	GPS5	2007 09 13 00 00 00	0.00000	rel
45	GPS5	2007 09 13 02 00 00	0.00000	rel
46	GPS5	2007 09 13 04 00 00	0.00000	rel
47	GPS5	2007 09 13 06 00 00	0.00000	rel
48	GPS5	2007 09 13 08 00 00	0.00000	rel
49	GPS5	2007 09 13 10 00 00	0.00000	rel
50	GPS5	2007 09 13 12 00 00	0.00000	rel
51	GPS5	2007 09 13 14 00 00	0.00000	rel
52	GPS6	2007 09 12 06 00 00	0.00000	abs
53	GPS6	2007 09 12 08 00 00	0.00000	rel
54	GPS6	2007 09 12 10 00 00	0.00000	rel
55	GPS6	2007 09 12 12 00 00	0.00000	rel
56	GPS6	2007 09 12 14 00 00	0.00000	rel
57	GPS6	2007 09 12 16 00 00	0.00000	rel
58	GPS6	2007 09 12 18 00 00	0.00000	rel
59	GPS6	2007 09 12 20 00 00	0.00000	rel
60	GPS6	2007 09 12 22 00 00	0.00000	rel
61	GPS6	2007 09 13 00 00 00	0.00000	rel
62	GPS6	2007 09 13 02 00 00	0.00000	rel
63	GPS6	2007 09 13 04 00 00	0.00000	rel
64	GPS6	2007 09 13 06 00 00	0.00000	rel
65	GPS6	2007 09 13 08 00 00	0.00000	rel
66	GPS6	2007 09 13 10 00 00	0.00000	rel
67	GPS6	2007 09 13 12 00 00	0.00000	rel
68	GPS6	2007 09 13 14 00 00	0.00000	rel
69	GPS2	2007 09 12 06 00 00	0.00000	abs
70	GPS2	2007 09 12 08 00 00	0.00000	rel
71	GPS2	2007 09 12 10 00 00	0.00000	rel
72	GPS2	2007 09 12 12 00 00	0.00000	rel
73	GPS2	2007 09 12 14 00 00	0.00000	rel
74	GPS2	2007 09 12 16 00 00	0.00000	rel
75	GPS2	2007 09 12 18 00 00	0.00000	rel
76	GPS2	2007 09 12 20 00 00	0.00000	rel
77	GPS2	2007 09 12 22 00 00	0.00000	rel
78	GPS2	2007 09 13 00 00 00	0.00000	rel
79	GPS2	2007 09 13 02 00 00	0.00000	rel
80	GPS2	2007 09 13 04 00 00	0.00000	rel
81	GPS2	2007 09 13 06 00 00	0.00000	rel
82	GPS2	2007 09 13 08 00 00	0.00000	rel
83	GPS2	2007 09 13 10 00 00	0.00000	rel
84	GPS2	2007 09 13 12 00 00	0.00000	rel
85	GPS2	2007 09 13 14 00 00	0.00000	rel
86	GPS7	2007 09 12 06 00 00	0.00000	abs
87	GPS7	2007 09 12 08 00 00	0.00000	rel
88	GPS7	2007 09 12 10 00 00	0.00000	rel
89	GPS7	2007 09 12 12 00 00	0.00000	rel
90	GPS7	2007 09 12 14 00 00	0.00000	rel
91	GPS7	2007 09 12 16 00 00	0.00000	rel
92	GPS7	2007 09 12 18 00 00	0.00000	rel
93	GPS7	2007 09 12 20 00 00	0.00000	rel
94	GPS7	2007 09 12 22 00 00	0.00000	rel
95	GPS7	2007 09 13 00 00 00	0.00000	rel



6	1	0	0	0.940152E+00	0.397678E-02
	2	1	0	0.598648E-01	0.928185E-03
	3	2	0	-0.490937E-01	0.851079E-03
	4	0	1	-0.119024E+00	0.148864E-02
	5	1	1	-0.188971E-01	0.151688E-02
7	1	0	0	0.760567E+00	0.508149E-02
	2	1	0	-0.480930E-01	0.123088E-02
	3	2	0	-0.311740E-01	0.109947E-02
	4	0	1	-0.144446E+00	0.174395E-02
	5	1	1	-0.709308E-01	0.155849E-02

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8. POLE COORDINATES AND TIME INFORMATION

A PRIORI POLE AND TIME INFORMATION FROM THE POLE FILE:

DATUM	TIME	X-POLE (") EP-CPO (")	Y-POLE (") PS-CPO (")	UT1-UTC (S)	GPS-UTC (S)	RMS XP (") RMS EP (")	RMS YP (") RMS PS (")	RMS DT (S)
07-09-12	00:00:00	0.18107 0.00000	0.24054 0.00000	-0.170603	14.	0.00001 0.00017	0.00002 0.00018	0.000023
07-09-13	00:00:00	0.17924 0.00000	0.23846 0.00000	-0.171546	14.	0.00002 0.00017	0.00001 0.00019	0.000037
07-09-14	00:00:00	0.17736 0.00000	0.23637 0.00000	-0.172457	14.	0.00002 0.00024	0.00001 0.00025	0.000029

NUTATION MODEL: IAU2000  
SUBDAILY POLE MODEL: IERS2000

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12. TEST OUTPUT

MIN. AND MAX. ELEVATION/NADIR ANGLES AND MAX. SYNCHRONIZATION ERRORS:



SESS	FILE	STATION NAME 1	STATION NAME 2	MIN/MAX ELEV.	MIN/MAX NADIR	SYNCH. ERR. (NS)
2550	1	GPS1	GPS3	20.0 77.4	2.9 13.3	0.0
2560	2	GPS1	GPS3	20.0 80.5	2.2 13.2	0.0
2550	3	GPS1	GPS4	20.0 77.4	2.9 13.3	0.0
2560	4	GPS1	GPS4	20.0 80.5	2.2 13.2	0.0
2550	5	GPS1	GPS5	20.0 77.9	2.9 13.3	0.0
2560	6	GPS1	GPS5	20.0 80.5	2.2 13.2	0.0
2550	7	GPS1	GPS6	20.0 77.5	2.9 13.3	0.0
2560	8	GPS1	GPS6	20.0 80.5	2.2 13.2	0.0
2550	9	GPS3	GPS2	20.0 77.4	2.9 13.3	0.0
2560	10	GPS3	GPS2	20.0 80.5	2.2 13.2	0.0
2550	11	GPS6	GPS7	20.0 77.5	2.9 13.3	0.0
2560	12	GPS6	GPS7	20.0 80.5	2.2 13.2	0.0

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13. RESULTS (PART 1)

NUMBER OF PARAMETERS (PART 1):

PARAMETER TYPE	#PARAMETERS	#PRE-ELIMINATED	#SET-UP	#NO-OBS	#REF	#SINGULAR
STATION COORDINATES	21	0	21	0	0	0
AMBIGUITIES	9	9 (BEFORE INV)	346	337	0	0
SITE-SPECIFIC TROPOSPHERE PARAMETERS	102	0	102	0	0	9
TOTAL NUMBER OF PARAMETERS	132	9	469	337	0	9

NUMBER OF OBSERVATIONS (PART 1):

TYPE	FREQUENCY	FILE	#OBSERVATIONS
PHASE	L1	ALL	98597
PHASE	L2	ALL	98597
TOTAL NUMBER OF OBSERVATIONS			197194

A POSTERIORI SIGMA OF UNIT WEIGHT (PART 1):

A POSTERIORI SIGMA OF UNIT WEIGHT : 0.0021 M (SIGMA OF ONE-WAY L1 PHASE OBSERVABLE AT ZENITH)  
 DEGREE OF FREEDOM (DOF) : 197071  
 CHI\*\*2/DOF : 4.28

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STATION COORDINATES: \${P}/ROMU07S\STA\TROMU07S.CRD

NUM	STATION NAME	PARAMETER	A PRIORI VALUE	NEW VALUE	NEW- A PRIORI	RMS ERROR	3-D ELLIPSOID		2-D ELLIPSE	
1	GPS1	X	2410839.3072	2410839.3072	0.0000	0.0000				
		Y	1388069.5136	1388069.5136	0.0000	0.0000				
		Z	5720515.2143	5720515.2143	0.0000	0.0000				
		HEIGHT	241.6600	241.6600	0.0000	0.0000	0.0000	0.0		
		LATITUDE	64 13 2.630039	64 13 2.630039	0.0000	0.0000	0.0000	90.0	0.0000	90.0
		LONGITUDE	29 55 54.118509	29 55 54.118509	0.0000	0.0000	0.0000	0.0	0.0000	
3	GPS3	X	2410512.9957	2410512.9905	-0.0052	0.0002				
		Y	1387690.3887	1387690.3856	-0.0031	0.0001				
		Z	5720721.8220	5720721.8080	-0.0140	0.0005				
		HEIGHT	222.4407	222.4255	-0.0152	0.0005	0.0005	0.5		
		LATITUDE	64 13 19.254883	64 13 19.254860	-0.0007	0.0001	0.0000	89.1	0.0000	89.1
		LONGITUDE	29 55 41.827606	29 55 41.827601	-0.0001	0.0000	0.0001	-0.1	0.0001	
4	GPS4	X	2410183.6629	2410183.6629	0.0000	0.0002				
		Y	1388327.7870	1388327.7895	0.0025	0.0001				
		Z	5720712.9448	5720712.9463	0.0015	0.0005				
		HEIGHT	228.6607	228.6626	0.0019	0.0005	0.0005	0.4		
		LATITUDE	64 13 18.179839	64 13 18.179822	-0.0005	0.0001	0.0000	89.2	0.0000	89.2
		LONGITUDE	29 56 34.977031	29 56 34.977193	0.0022	0.0000	0.0001	0.0	0.0001	
5	GPS5	X	2411065.8443	2411065.8469	0.0026	0.0002				
		Y	1387498.1880	1387498.1881	0.0001	0.0001				
		Z	5720528.0899	5720528.0911	0.0012	0.0005				
		HEIGHT	214.6804	214.6825	0.0021	0.0005	0.0005	0.6		
		LATITUDE	64 13 5.389555	64 13 5.389506	-0.0015	0.0001	0.0000	90.6	0.0000	90.5
		LONGITUDE	29 55 9.024823	29 55 9.024738	-0.0011	0.0000	0.0001	0.0	0.0001	

6	GPS6	X	2411071.3051	2411071.3075	0.0024	0.0002					
		Y	1388657.9331	1388657.9334	0.0003	0.0001					
		Z	5720270.4931	5720270.4946	0.0015	0.0005					
		HEIGHT	236.4912	236.4935	0.0023	0.0005	0.0005	0.5			
		LATITUDE	64 12 44.808990	64 12 44.808947	-0.0013	0.0001	0.0000	89.6	0.0000	89.5	
		LONGITUDE	29 56 23.339861	29 56 23.339793	-0.0009	0.0000	0.0001	-0.1	0.0001		
2	GPS2	X	2409792.7492	2409792.7430	-0.0062	0.0002					
		Y	1387832.0097	1387832.0088	-0.0009	0.0001					
		Z	5720997.1485	5720997.1375	-0.0110	0.0005					
		HEIGHT	229.6879	229.6754	-0.0125	0.0005	0.0005	0.6			
		LATITUDE	64 13 39.216043	64 13 39.216058	0.0004	0.0001	0.0000	89.1	0.0000	89.0	
		LONGITUDE	29 56 17.584812	29 56 17.584979	0.0022	0.0000	0.0001	-0.1	0.0001		
7	GPS7	X	2410852.0692	2410852.0698	0.0006	0.0002					
		Y	1389251.9113	1389251.9119	0.0006	0.0001					
		Z	5720205.3683	5720205.3676	-0.0007	0.0005					
		HEIGHT	224.2017	224.2015	-0.0002	0.0005	0.0005	0.5			
		LATITUDE	64 12 40.796407	64 12 40.796374	-0.0010	0.0001	0.0000	89.4	0.0000	89.3	
		LONGITUDE	29 57 9.606445	29 57 9.606460	0.0002	0.0000	0.0001	-0.1	0.0001		

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SITE-SPECIFIC TROPOSPHERE PARAMETERS: (NOT SAVED)

REQU.	STATION NAME	CORRECTIONS (M)			RMS ERRORS (M)			ZENITH VECTOR (")				ERROR ELLIPSE (M)		
		NORTH	EAST	ZENITH	NORTH	EAST	ZENITH	ANGLE	RMS	RATIO	AZI	MAX RMS	MIN RMS	AZI
1	GPS3			0.00000			0.00000							
2	GPS3			0.00000			0.00000							
3	GPS3			0.01691			0.00050							
4	GPS3			0.00533			0.00036							
5	GPS3			0.00890			0.00032							
6	GPS3			0.00747			0.00036							
7	GPS3			0.00882			0.00047							
8	GPS3			0.00567			0.00033							
9	GPS3			0.00799			0.00033							
10	GPS3			0.00820			0.00034							
11	GPS3			0.01046			0.00034							
12	GPS3			0.00706			0.00034							
13	GPS3			0.00890			0.00032							
14	GPS3			0.00780			0.00032							
15	GPS3			0.00898			0.00031							
16	GPS3			0.00776			0.00039							

17	GPS3	-0.00298	0.00249
18	GPS4	0.00000	0.00000
19	GPS4	0.00000	0.00000
20	GPS4	-0.00886	0.00425
21	GPS4	-0.00102	0.00039
22	GPS4	-0.00195	0.00032
23	GPS4	-0.00121	0.00036
24	GPS4	-0.00163	0.00047
25	GPS4	-0.00144	0.00033
26	GPS4	-0.00246	0.00033
27	GPS4	-0.00201	0.00034
28	GPS4	-0.00150	0.00034
29	GPS4	-0.00188	0.00034
30	GPS4	-0.00226	0.00031
31	GPS4	-0.00196	0.00032
32	GPS4	-0.00146	0.00031
33	GPS4	-0.00195	0.00038
34	GPS4	-0.00026	0.00156
35	GPS5	0.00918	0.01123
36	GPS5	0.00050	0.00043
37	GPS5	0.00145	0.00031
38	GPS5	-0.00068	0.00033
39	GPS5	0.00206	0.00032
40	GPS5	-0.00115	0.00035
41	GPS5	0.00270	0.00047
42	GPS5	-0.00124	0.00033
43	GPS5	0.00152	0.00032
44	GPS5	0.00017	0.00034
45	GPS5	0.00229	0.00034
46	GPS5	0.00042	0.00033
47	GPS5	-0.00094	0.00031
48	GPS5	0.00059	0.00032
49	GPS5	0.00042	0.00032
50	GPS5	0.00013	0.00048
51	GPS5	0.00000	0.00000
52	GPS6	0.00000	0.00000
53	GPS6	-0.01924	0.00274
54	GPS6	-0.00006	0.00035
55	GPS6	0.00198	0.00034
56	GPS6	-0.00189	0.00032
57	GPS6	-0.00114	0.00036
58	GPS6	0.00032	0.00047
59	GPS6	0.00067	0.00032
60	GPS6	-0.00363	0.00032
61	GPS6	0.00437	0.00034
62	GPS6	-0.00262	0.00034
63	GPS6	0.00002	0.00033
64	GPS6	-0.00063	0.00031
65	GPS6	-0.00082	0.00032
66	GPS6	-0.00152	0.00031
67	GPS6	0.00192	0.00037
68	GPS6	-0.00616	0.00093
69	GPS2	0.00000	0.00000

70	GPS2	0.00000	0.00000
71	GPS2	0.00871	0.00053
72	GPS2	0.00510	0.00036
73	GPS2	0.01215	0.00033
74	GPS2	0.00699	0.00036
75	GPS2	0.00651	0.00048
76	GPS2	0.01055	0.00033
77	GPS2	0.00767	0.00033
78	GPS2	0.00873	0.00034
79	GPS2	0.01311	0.00035
80	GPS2	0.01120	0.00034
81	GPS2	0.01095	0.00032
82	GPS2	0.00501	0.00032
83	GPS2	0.01809	0.00031
84	GPS2	-0.00170	0.00041
85	GPS2	0.04112	0.00747
86	GPS7	0.00000	0.00000
87	GPS7	0.81142	0.25571
88	GPS7	0.00036	0.00041
89	GPS7	0.00033	0.00035
90	GPS7	-0.00002	0.00032
91	GPS7	0.00162	0.00036
92	GPS7	-0.00011	0.00047
93	GPS7	-0.00002	0.00033
94	GPS7	-0.00002	0.00032
95	GPS7	-0.00020	0.00034
96	GPS7	0.00027	0.00034
97	GPS7	-0.00042	0.00033
98	GPS7	-0.00071	0.00031
99	GPS7	0.00034	0.00032
100	GPS7	-0.00088	0.00031
101	GPS7	0.00002	0.00038
102	GPS7	-0.00051	0.00117

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RMS ERRORS OF ELLIP. COORDINATES AND COORDINATE DIFFER. IN MM (PART 1):  
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NUM		1	3	4	5	6	2	7
1	B	0.0	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.0	0.5	0.5	0.5	0.5	0.5	0.5
3	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.5	0.5	0.5	0.5	0.5	0.6	0.5

4	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.5	0.5	0.5	0.5	0.5	0.6	0.5
5	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.5	0.5	0.5	0.5	0.5	0.6	0.5
6	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.5	0.5	0.5	0.5	0.5	0.5	0.5
2	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.5	0.6	0.6	0.6	0.5	0.5	0.5
7	B	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	L	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	H	0.5	0.5	0.5	0.5	0.5	0.5	0.5

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SLOPE DISTANCES AND RMS ERRORS IN M (PART 1):

NUM		3 N	4 N	5 N	6 N	2 N	7 N
1	O	541.2039	731.8961	614.7339	678.1954	1176.4150	1222.3877
	N	541.2038	731.8974	614.7347	678.1959	1176.4162	1222.3884
	RMS	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
3	O		717.5064	616.5345	1204.8026	783.9746	1679.2999
	N		717.5088	616.5356	1204.8030	783.9770	1679.3003
	RMS		0.0000	0.0001	0.0001	0.0001	0.0001
4	O			1225.0101	1045.3079	692.3730	1248.3616
	N			1225.0136	1045.3092	692.3739	1248.3613
	RMS			0.0000	0.0001	0.0001	0.0001
5	O				1188.0213	1397.2201	1795.9383
	N				1188.0214	1397.2237	1795.9393
	RMS				0.0001	0.0001	0.0001
6	O					1686.6780	636.4870
	N					1686.6797	636.4881
	RMS					0.0001	0.0000

| 2 | O |  
| N | N |  
| RMS |

1940.4111 |  
1940.4117 |  
0.0001 |

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**Appendix X. Horizontal angles and distances and high differences from tacheometer measurement between control markers (A, B) and the concrete pillars (O).**

	Horizontal angles (gon)			Horizontal distances (m)			Height differences (m)		
	B-A-O	O-B-A	A-O-B	AB	AO	BO	AB	AO	BO
<b>GPS1</b>									
2001	53.4844	45.6793	100.8363	15.6687	10.3035	11.6700	0.3066	2.3927	2.0860
2004	53.4827	45.6747	100.8427	15.6665	10.3012	11.6680	0.3061	2.3911	2.0850
2007	53.4813	45.6803	100.8384	15.6677	10.3030	11.6687	0.3066	2.3915	2.0850
<b>GPS2</b>									
2001	33.4122	43.4959	123.0919	13.6919	9.2453	7.3391	0.0419	2.3929	2.3511
2004	33.4167	43.4951	123.0882	13.6921	9.2451	7.3389	0.0418	2.3938	2.3519
2007	33.4131	43.4945	123.0924	13.6930	9.2458	7.3389	0.0421	2.3943	2.3521
<b>GPS3</b>									
	O-A-B	A-B-O	B-O-A	AB	AO	BO	AB	AO	BO
2001	50.9262	48.0784	100.9954	11.3571	7.7856	8.1476	0.0742	2.5303	2.4561
2004	50.9335	48.0838	100.9827	11.3573	7.7864	8.1487	0.0741	2.5309	2.4568
2007	50.9344	48.0805	100.9850	11.3587	7.7870	8.1498	0.0744	2.5304	2.4561
<b>GPS4</b>									
	O-A-B	A-B-O	B-O-A	AB	AO	BO	AB	AO	BO
2001	56.3290	50.2602	93.4108	16.0043	11.4241	12.4507	0.0532	2.5565	2.5033
2004	56.3336	50.2596	93.4068	16.0035	11.4234	12.4509	0.0532	2.5543	2.5011
<b>GPS5</b>									
	B-A-O	O-B-A	A-O-B	AB	AO	BO	AB	AO	BO
2001	56.9263	41.3195	101.7542	9.3593	5.6591	7.3002	0.3628	2.4143	2.0516
2004	56.9277	41.3187	101.7536	9.3592	5.6590	7.3003	0.3622	2.4149	2.0527
2007	56.9316	41.3207	101.7477	9.3592	5.6592	7.3007	0.3613	2.4129	2.0516
<b>GPS6</b>									
	O-A-B	A-B-O	B-O-A	AB	AO	BO	AB	AO	BO
2001	51.1871	67.1139	81.6990	8.7256	7.9117	6.5528	-0.1988	2.2850	2.4838
2004	51.1906	67.1054	81.7040	8.7263	7.9116	6.5535	-0.1981	2.2852	2.4833
2007	51.1860	67.1066	81.7074	8.7269	7.9120	6.5534	-0.1987	2.2849	2.4836
<b>GPS7</b>									
	B-A-O	O-B-A	A-O-B	AB	AO	BO	AB	AO	BO
2001	48.5237	45.4266	106.0498	12.2981	8.0859	8.5306	0.0778	2.3305	2.2527
2004	48.5254	45.4286	106.0460	12.2990	8.0868	8.5314	0.0776	2.3309	2.2533
2007	48.5292	45.4246	106.0462	12.2993	8.0864	8.5321	0.0763	2.3290	2.2527
<b>GPS8</b>									
	B-A-O	O-B-A	A-O-B	AB	AO	BO	AB	AO	BO
2001	73.1242	56.6369	70.2389	5.1466	4.4787	5.2590	0.4228	2.4488	2.0260
2004	73.1372	56.6356	70.2273	5.1468	4.4792	5.2602	0.4237	2.4497	2.0260
2007	73.1293	56.6348	70.2359	5.1472	4.4792	5.2600	0.4234	2.4487	2.0253



<b>GPS9</b>	O-A-B	A-B-O	B-O-A	AB	AO	BO	AB	AO	BO
2001	46.5295	52.7909	100.6796	13.7468	10.1377	9.1769	-0.5238	2.5693	3.0931
2004	46.5290	52.7967	100.6743	13.7472	10.1388	9.1771	-0.5241	2.5702	3.0943
2007	46.5302	52.7946	100.6752	13.7477	10.1389	9.1776	-0.5237	2.5695	3.0932
<b>GPS11</b>	B-A-O	O-B-A	A-O-B	AB	AO	BO	AB	AO	BO
2004	44.3346	52.0592	103.6062	9.4356	6.8953	6.0623	-0.2113	1.4094	1.6207
2007	44.3334	52.0689	103.5977	9.4365	6.8969	6.0627	-0.2120	1.4088	1.6208
<b>GPS13</b>	O-A-B	A-B-O	B-O-A	AB	AO	BO	AB	AO	BO
2004	59.5102	48.7897	91.7000	12.1333	8.4869	9.8445	-0.3243	1.2715	1.5958
2007	59.5068	48.7933	91.6999	12.1340	8.4879	9.8446	-0.3239	1.2705	1.5944
<b>GPS15</b>	O-A-B	A-B-O	B-O-A	AB	AO	BO	AB	AO	BO
2007	50.5948	53.9914	95.4138	10.6066	7.9759	7.5894	-0.5210	1.1806	1.7016