WESTERN CRATONIC DOMAINS IN URUGUAY: GEOCHRONOLOGY

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The western cratonic domains in Uruguay are divided into three major units: Piedra Alta Terrane, Valentines Block and Pavas Block. Piedra Alta Terrane lacks of evidence of Neoproterozoic orogeneses (deformation, metamorphism or magmatism). Sarandí del Yi - Arroyo Solís Grande shear zone, separates it from Valentines Block. Valentines Block is separated from Pavas Block by Cueva del Tigre shear zone.

Magmatic rocks with different ages, compositions and emplacements occur all over the Piedra Alta Terrane distributed in three metamorphic belts (Arroyo Grande, San José and Montevideo) as well as in the Central Gneissic-Migmatitic Complex (Figure 1).

Samples from the gneissic-migmatitic complex, late tectonic granitoids and basic rocks associated to the metamorphic belts were analyzed using Rb/Sr, U/Pb, K/Ar and Sm/Nd methodologies.

The age ranges obtained for granitoids and gneissic-migmatitic samples using Rb/Sr whole rock (WR) systematics are 1.7 to 2.5 Ga, showing two intervals: 1.9 to 2.05 Ga (intrusion of late granites) and 2.1 to 2.2 Ga (deformation and metamorphism). K/Ar cooling ages present several ranges: 1.3 to 1.35 Ga (probable local heating of the crust), 1.7 to 1.8 Ga (microgabbro magmatism, data confirmed by the Ar/Ar method) and ages between 2.0 to 2.2 Ga.

Rb/Sr (WR) data yielded an isochronic age of 2094 ± 28.3 Ma, Ro = 0.70174 ± 0.00009, MSWD 19.74, interpreted as the time of the metamorphic event recognized for all the Piedra Alta Terrane.

T_{DM} Sm/Nd model ages presented a range from 2065 Ma to 2450 Ma. U/Pb systematics yield ages in migmatitic and gneissic rocks from 2.16 Ga to 2.21 Ga, showing metamorphism and deformation phenomena. While the ages of granitoids associated to the San José Belt are between 2.06 Ga and 2.08 Ga (Isla Mala) to 2.1 Ga (Granito de Cufré). None of them show metamorphic phenomena.

Valentines Block (Preciozzi *et al*., 1979) comprises granulitic gneisses, granitoids and mafic rocks of different compositions.

The geologic complexity of this unit is also illustrated by the existence of extended mylonitic zones, relicts of supracrustal rocks and granitic intrusions with different ages and compositions. Some isochronic ages (Rb/Sr WR) are ca. 650 to 500 Ma, being associated to partial melting processes generated during the Neoproterozoic orogeneses.

The most important and the oldest metamorphic event yields transamazonic ages around 2250 ± 60 Ma in granulitic orthogneisses of Rivera using Rb/Sr (WR) (Cordani and Soliani, 1990). These rocks are intercalated with leucocratic and cataclastic gneisses and with diverse types of mafic rocks (amphibolites, piroxenites and peridotites).

A rapakivi granite dated in 1.75 Ga is located near the town Minas de Corrales. Another one having a Rb/Sr isochronic age of 1760 ± 32 Ma (Bossi and Campal, 1992) is developed to the south and it is called Illescas Batholith (Campal and Schipilov, 1995).

Recent geochronologic ages using Shrimp U/Pb (Hartmann *et al*., 2000) in samples taken from the Valentines Block produced ages around 2.6 Ga for crystallization and around 2.2 Ga for metamorphism.

Pavas Block is composed of an orthogneissic basement and a volcano-sedimentary cover strongly deformed and recristalized, occurring like an allocton tectonic sheet. A K/Ar determination in muscovite gave an age of 584.9 ± 18 Ma and using Rb/Sr (WR) systematics the age obtained was 1252 ± 3 Ma with R_0 = 0.72664. Metasedimentary zircons gave ages of 3.4 Ga, which is interpreted as the age of crystallization,

and of 2.7 Ga, which is interpreted as the age of metamorphism.
Younger ages for this terrane were not observed. In basement rocks of de la China creek Hartmann (2000) obtained an age of 3.41 Ga in addition to events at 3.1 Ga and 2.7 Ga.
Pavas Block does not record events later than 2.7 Ga except for values around 586 Ma using K/Ar method in green muscovites taken from corundum micaceous quartzites.

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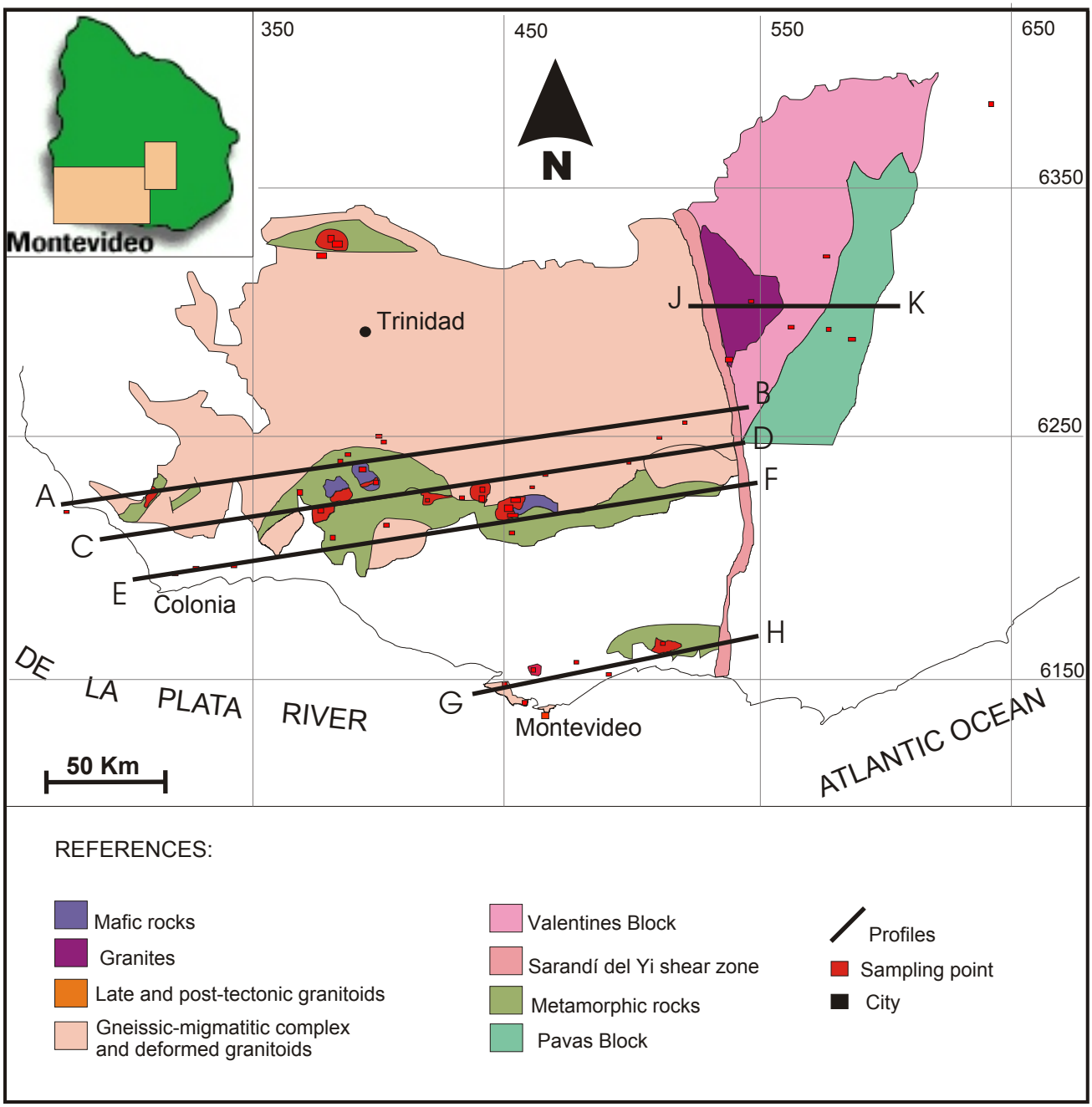

Figure 1. Location map and geologic scheme

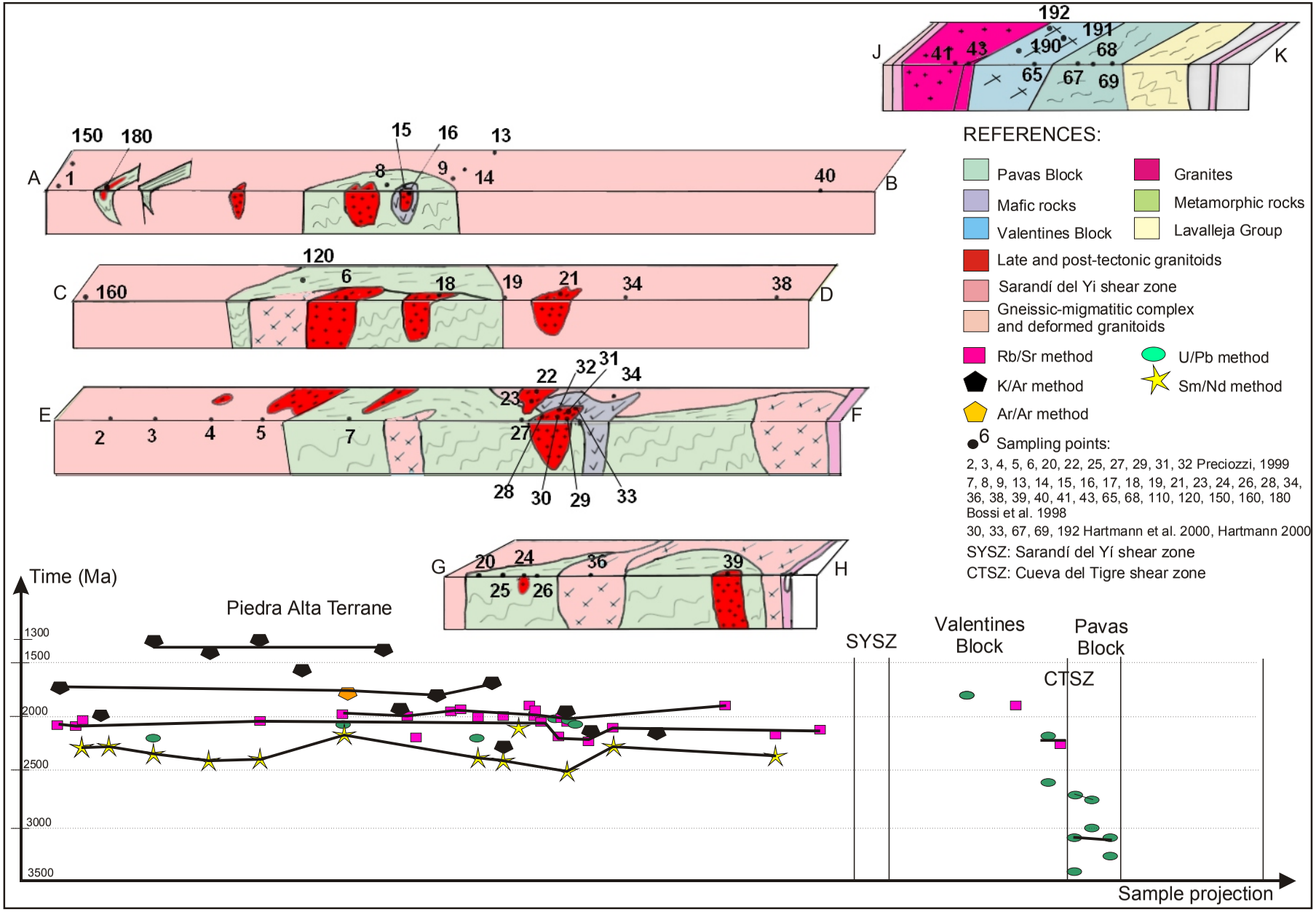

Figure 2. Geologic and radimetric profiles.