

TESTING AND DOCUMENTATION OF PROGRAMS USED TO TRANSFORM
CLIMATOLOGICAL PRECIPITATION DATA TO A GEOGRAPHICALLY GRIDDED FORMAT

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A procedure was developed for converting climatological hourly precipitation data into a form suitable for input to regional atmospheric transport and removal models. The procedure involves a rearrangement of the original data by date rather than by station, followed by the use of a spatial averaging scheme to interpolate data from randomly spaced stations to a regularly spaced grid. The procedure has been tested and documented for general use.

It has been shown that the use of actual time-varying fields of precipitation, rather than climatologically averaged fields, in atmospheric transport and removal models can produce important differences in results (Wendell and Powell 1976). A procedure was developed to produce fields of hourly precipitation on a regularly spaced regional grid (Wendell and Hane 1976). Such a procedure requires time-concurrent data from many stations over a wide region. However, climatological precipitation data is arranged in month- or year-long series for each reporting station. A sequence of computer program steps has been created to rearrange climatological precipitation data in this way (Fox and Wendell 1977). This sequence has been incorporated with the original procedure into a system of CDC^(a)-7600 FORTRAN computer programs for producing fields of gridded hourly precipitation data. The system has been tested, documented and is ready for general use.

The system consists of a main three-step sequence of computer programs and five auxiliary programs, which perform utility functions on the data. The system's eight program elements are organized by their major functions in Table 2.2.

The main conversion sequence (shown in Figure 2.21) transforms the original climatological data through two intermediate forms into the gridded output data. The original input data^(b) is binary-coded-decimal (BCD) card climatological hourly precipitation data from the National Climatic Center (NCC), Ashville, North Carolina. These data are arranged by station, a year's worth of data for each station.^(c) This type of arrangement is called station-file or STA-FILE.

TABLE 2.2. Eight Program Elements Procedure Arranged by Major Function.

Main Sequence Conversion Steps	Auxiliary Programs	
	Printing	Extraction/ Combination
PAK	CHEK	EXT
SRT	RGR	COMP
GRI		SPL

The first conversion program (PAK) converts this BCD data to a packed binary format to reduce space and access-time requirements. The result of PAK is packed binary data in the STA-FILE arrangement.

The need of atmospheric models for spatially distributed, time-concurrent data requires that the data be sorted with respect to time. The combination of programs called SRT sorts the packed STA-FILE data according to date and produces packed binary data arranged so that data for all stations are collected together for each day. This arrangement is called synoptic file^(d) or SYN-FILE, because it emulates the more typical arrangement of weather data compiled for synoptic analysis.

The packed SYN-FILE data becomes input to GRI, the precipitation gridding program. GRI uses all precipitation reports for a given hour to produce a regular grid of average precipitation estimates. It does this for each hour for a specified period of time. The output is a file of hourly gridded precipitation "maps."

(a) Control Data Corporation.

(b) "Original" only in terms of entry to this system. An initial conversion of the NCC data may be needed to make it compatible with the user's hardware and software facilities.

(c) Arrangements may be made with NCC to obtain recent monthly STA-FILE data.

(d) This is not strictly a synoptic file arrangement in that all data for a given hour are not grouped together. This hourly grouping takes place within GRI, when the time zone data are included.

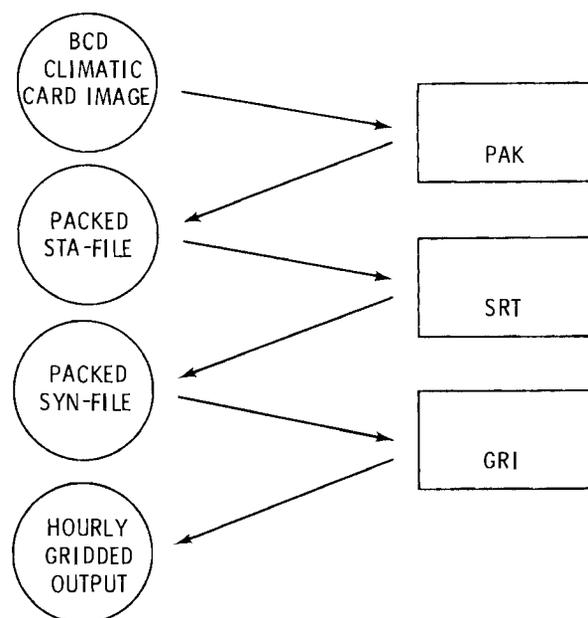


FIGURE 2.21. System Data Flow

The five auxiliary programs may be used to inspect or manipulate aggregates of data in the packed SYN-FILE or gridded formats. CHEK prints out specified days' data for all stations from a file in the packed SYN-FILE format. EXT extracts a specified subset of the packed SYN-FILE data and may also be used to splice two data sets covering different but overlapping time periods to form a chronologically continuous set. CMB combines packed SYN-FILE data sets of the same time period but from different sets of states. RGR prints out

gridded data for a portion of the grid at specified hours. Finally, SPL is used to splice gridded data sets from overlapping time periods to form a chronologically continuous set. CMB combines packed SYN-FILE data sets of the same time period but from different sets of states. RGR prints out gridded data for a portion of the grid at specified hours. Finally, SPL is used to splice gridded data sets from overlapping time periods to form a single chronological continuous data set.

THE EFFECT OF USING TIME-AVERAGED PRECIPITATION FOR THE ESTIMATION OF WET DEPOSITION IN A REGIONAL SCALE MODEL

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A study has been performed to determine why the use of average precipitation causes an increase in wet deposition over the wet deposition caused by the use of hourly precipitation. Results of this study are presented along with additional results from a study using the average precipitation turned on and off for set periods to calculate wet deposition.