VI.5.3C-MAP   PROGRAM FCST MEAN AREAL PRECIPITATION FUNCTION (MAP)

Purpose

Function MAP is a preprocessor Function that creates 6 hour Mean Areal
Precipitation time series.

MAP time series are used by the Forecast Function (FCEXEC) as input
data for models that need areal estimates of precipitation.

Function MAP computes areal estimates based on three types of data:

  1. precipitation data from stations that are part of the defined
     network (the network is defined using program PPINIT command
     DEFINE STATION - see Section VI.3.3 [Hyperlink])

  2. Manually Digitized Radar (MDR) data (available only on NCCF NAS
     computer system)

  3. precipitation data from so-called 'stranger' stations (i.e.
     stations that are not part of the defined network) - this option
     is not currently available

The form of these data used by Function MAP is:

  1. daily total or precipitation increment since the start of the
     hydrologic day for all stations,

  2. 1, 3 or 6 hour incremental precipitation for the defined network
     stations that report at these intervals (stations that do not
     regularly report incremental precipitation can still be
     designated as less than 24 hour stations; whatever incremental
     reports are available for these stations will be used)

  3. 6 hour summations of hourly reported MDR values

Function MAP will only generate 6 hour MAP time series. All 1 and 3
hour data are converted into 6 hour increments before proceeding with
the computations.

Two basic sets of computations are done by Function MAP:

  1. Daily computations primarily involving station data: Observed
     data for all stations are read from the Preprocessor Data Base
     and all missing values are estimated on a day-by-day basis. For
     each day, the data needed by each MAP area in the run are
     written to a temporary file.

  2. Area computations involving only those areas included in the
     run: For each area, the data for each day are read from the
     temporary files and mean areal 6 hour precipitation values are
     computed.

The areas for which MAP time series are to be generated during a run

of Function MAP are based on the type of run that the user selects.
There are three types of runs to choose from:

1. Carryover Group run: Computations are made for all MAP areas
    within the specified Carryover Group in the order that the areas
    are used (the ordered list of MAP areas is generated by the
    program PPINIT command ORDER using the information in the
    Forecast Component files - see Section VI.3.3 [Hyperlink]),

2. Forecast Group run: Computations are made for all MAP areas
    within the specified Forecast Group (ordered list of areas also
    generated by command ORDER) and

3. area run: The user selects the MAP areas and their order for
    the run (maximum of 10 areas allowed).

These run options allow the user to restrict the portion of the user
area for which MAP computations are made. The options can be used to
avoid unnecessary computations and to avoid changing values in areas
for which satisfactory results have been obtained. For example, in a
portion of the user area with sparse station data, MDR can be used to
estimate MAP without changing MAP values computed from gage data in
other parts of the user area.

A technical description of Function MAP is in Chapter II.6-OFS-MAP.

Setup Input

Prior to making a run with Function MAP all of the needed parametric
data must be defined using program PPINIT (see Section VI.3.3
[Hyperlink]). This includes:

1. defining user parameters using command DEFINE USER (includes MDR
    subset and beginning months of winter and summer seasons)

2. defining the station network using command DEFINE STATION and
    defining area boundaries using command DEFINE BASIN

3. completing the station parameters by running command NETWORK to
    define the inter-station relationships needed to estimate
    missing data and to generate alphabetical order lists of
    stations by states for display purposes

4. defining MAP area parameters using command DEFINE AREA (future
    MAP area parameters must be defined before regular MAP area
    parameters; Function MAP only works with regular MAP areas)

5. determining the computation order of MAP areas using command
    ORDER (Forecast Component parameters must be defined before
    ORDER can be run)

PPINIT is also used to make changes to the station network and area
parameters as needed.

HCL Input

Input to Function MAP is through the Hydrologic Command Language
(HCL).

The input consists of Techniques and their Arguments (see Section
VI.5.3C-MAP-TECH [Hyperlink]).

Sample HCL Input

The following sample HCL input demonstrates a few typical runs that
can be made using Function MAP. In these examples, it is assumed that
no local defaults are defined (i.e., only global defaults exist).

Example 1. Carryover group run with no MDR

The following example will compute MAP for carryover group TULSARFC.
The run is for the latest hydrologic day with observed data. Observed
daily totals for all stations will be displayed along with
distributions for stations that report 6 hour summations of
precipitation.

```
    @SETOPTIONS
     CGROUP TULSARFC
     STARTRUN *-01
     LSTCMPDY *
     PRTPP24
     PRTPP6
    @COMPUTE MAP
    @STOP
```

Example 2. Carryover group run with MDR

The following example will again compute MAP for carryover group
TULSARFC. The run is for the last two hydrologic days (presumably to
incorporate late precipitation reports from the previous day). The
station data are displayed as in Example 1 except that now estimated
as well as observed daily totals are printed and also plotted using
AFOS graphics. MDR data and MDR derived precipitation are displayed
and used to fill in zero daily totals and 6-hourly distributions for
stations with missing data that can use MDR. The Tulsa procedure is
used to estimate missing daily values that are non-zero. All
estimated daily values are stored on the PPDB for display or utility
purposes. Printer displays are on unit 8 and only the last day is
printed.

```
    @SETOPTIONS
     CGROUP TULSARFC
     STARTRUN *-02
     LSTCMPDY *
     ESTTULSA
     PRTPP24(2)
     PRTPP6
     PLOTPP24(2)
```

```
        MDREST24
        MDREST6
        PRTMDR
        WTEST24
        PRLASTDY
        PPPRINT(8)
    @COMPUTE MAP
    @STOP
```

Example 3. Carryover group run-convection option

The following example is also for the TULSARFC carryover group. The
run starts at the beginning of the hydrologic day and goes through 0Z
of the same day (i.e., it is a partial day run for an evening
forecast). The convective option is used with a convective radius of
25 miles. Observed daily totals and 6 hour distributions are
displayed.

```
    @SETOPTIONS
        CGROUP TULSARFC
        STARTRUN *
        LSTCMPDY *00Z
        CONVEC 25.
        PRTPP24
        PRTPP6
    @COMPUTE MAP
    @STOP
```

Example 4. Forecast group run using MDR

The following example computes MAP for the latest hydrologic day for
the J.RED.IF forecast group. MDR is used to estimate missing daily
values up to 0.5 inches. The Tulsa method is used to estimate missing
amounts above 0.5 inches from surrounding stations. The distribution
of the daily MAP amounts into 6 hour values is completely based on MDR
data. Observed daily totals, 6 hour distributions, MDR values and
MDR/gage comparisons are displayed. As in any run of Function MAP,
missing station data are estimated for the entire user area, however,
in this run MAP values are only computed for the specified Forecast
Group.

```
    @SETOPTIONS
        FGROUP J.RED.IF
        STARTRUN *-01
        LSTCMPDY *
        ESTTULSA
        MDREST24(2) 0.5
        MDRDIST
        PRTPP24
        PRTPP6
        PRTMDR(2)
        PRTMDR6
    @COMPUTE MAP
    @STOP
```

Example 5. Area run using only MDR

The following example computes MAP for the latest hydrologic day for
areas CTHM7, WCOM7, JOPM7 and QUAO2. The MAP values for the three
areas CTHM7 through JOPM7 are based completely on MDR values. The MAP
for QUA02 is based on station data where zeros have been filled in
from MDR, other missing values were estimated using the Tulsa method.
Only MDR data are displayed.

```
   @SETOPTIONS
    AREA CTHM7 WCOM7 JOPM7 QUA02
    STARTRUN *-01
    LSTCMPDY *
    ESTTULSA
    MDREST24
    MDRONLY (A CTHM7-JOPM7)
    PRTMDR
   @COMPUTE MAP
   @STOP
```


Output

There are three types of output from Function MAP. The first is
printer output. The second output is MAP time series data written to
the Processed Data Base. The third output is a punch stream
containing daily precipitation plots for display on AFOS controlled by
Technique PLOTPP24.

Error Messages

Error and warning messages generated by Function MAP are described in
Section VI.5.3C-MAP-ERROR [Hyperlink].