VIII.4.1 INTRODUCTION TO ADDING A FORECAST COMPONENT OPERATION

Background

Operations are the basic building blocks of the Forecast Component. Operations are computer algorithms that perform computations to display or transform time series data. Operations can be:

1. Hydrologic or hydraulic models of basic processes such as snow accumulation and ablation, soil moisture accounting, temporal distribution of runoff, channel routing, river mechanics and reservoir regulation.

2. Procedures for updating the state variables or the output of models based on observations.

3. Procedures for displaying time series data in plotted or tabular form.

4. Algorithms that perform basic arithmetic computations such as adding, subtracting, clearing and weighting time series.

Operations can be combined in various user specified sequences to produce river forecasts or provide answers to other hydrologic problems.

The purpose of the Forecast Component is to provide a means of combining Operations to produce river forecasts at hundreds of forecast points in a logical and efficient manner. To do this the Operations are first combined into groups called Segments.

A Segment is defined as a group of Operations for which computations are performed as a unit.

The list of Operations performed within a Segment in the order in which they are performed is referred to as the Operations Table. A Segment will usually include the Operations that are needed to produce a forecast at a single forecast point but a Segment may compute forecasts at several forecast points or may not compute any forecasts. Thus, the function of the Forecast Component becomes the determination of the list of Segments that need to be executed to produce forecasts for all or part of a user's area and the efficient management of the parametric, carryover and time series data needed by these Segments.

Within a Segment time series with a fixed time interval are used to pass information from one Operation to another. The time series data needed by an Operation can be read from the processed data files (containing data generated by the preprocessors and by upstream Segments) or can be obtained from a previous Operation in the Operations Table. The Operations can be executed in any sequence, as long as the time series data needed by each Operation are available.

When used operationally to produce a forecast the Operations Table is usually executed for a period of one or more days with observed data and several days into the future. The state variables of the various

Operations, more commonly referred to as carryover, can be saved for various dates usually during the period when observed data are available. Subsequent runs can only begin at dates when carryover is saved (dates when the state variables are known).

The Forecast Component Initialization Program (FCINIT) is used to define Segments and computational order information. During the definition process, the Operations Table for each Segment is defined, parametric data for each Operation is read, initial carryover values are assigned and the order in which Segments are to be executed is specified. All of this information is stored in the Forecast Component Data Base that is read when the Forecast Component is executed. Carryover values are updated as has been described. In some cases parameters can be temporarily changed by using temporary MODs in the Operational Forecast Program (FCST). Permanent changes to parameters can be by redefining the Segment using program FCINIT or by using permanent MODs in the program FCST.

Steps to Follow When Adding an Operation

This section describes the steps to follow when adding an Operation to the Forecast Component.

1. Develop a design of the Operation including function and data requirements.

2. Select the 8-character Operation identifier and get an Operation number.

3. Code the Operation and test in a stand-alone mode. For most Operations it should be relatively easy to write a driver program that will set common block values, read in or generate some test time series data, call the subroutines associated with the Operation and print the quantities needed to check the results.

4. Write the user and system documentation.

5. When coding and testing of the Operation in a stand-alone mode is finished have the Operation added to the NWSRFS programs. Final testing of the Operation can be done when this is completed.

6. When testing is finished all documentation will be added to the NWSRFS User's Manual.

Examples

Existing Operations can be used as examples when coding and documenting new Operations. User documentation for existing Operations is in Section V.3.3 and program documentation is in Section VIII.3.3.