

***Meteorological Ensemble
Forecast Processor
(MEFP)
HEFS Release 0.1.1
User's Manual***

Last updated: 04/27/2012

*National Weather Service
Office of Hydrologic Development*

Table of Contents

1	Overview.....	1
1.1	Software Components.....	1
1.2	Terminology	1
1.3	Notation.....	1
1.4	Manual Layout.....	1
2	Science of MEFP	2
3	MEFPPE Reference Manual	3
3.1	Overview	3
3.1.1	Terminology.....	3
3.1.2	Notation	4
3.2	Getting Started.....	5
3.2.1	Input Data Requirements.....	5
3.2.2	Running MEFPPE	5
3.2.3	The Parameter Estimation Procedure.....	6
3.2.4	Core Concepts.....	7
3.2.4.1	The MEFPPE Run Area	8
3.2.4.2	Run-time Information	8
3.2.4.3	Importing From XEFS EPP3.....	8
3.2.4.4	FEWS PI-service Connection.....	9
3.2.4.5	Canonical Events	9
3.2.5	General Graphical User Interface Components.....	9
3.2.5.1	Generic Summary Table.....	10
3.2.5.2	Table Delete/Add and Status Columns.....	10
3.2.5.3	Archive/Reforecast Time Series Diagnostic Display Panel	11
3.2.6	Format of this Reference Manual	12
3.3	MEFPPE Main Panel	13
3.4	Estimation Steps Panel	14
3.4.1	Components	15
3.4.2	Usage	16
3.4.2.1	Performing a Parameter Estimation Step.....	16
3.5	Setup Subpanel.....	18
3.5.1	Export Historical Data Subpanel.....	19
3.5.1.1	Components.....	20
3.5.1.2	Diagnostics	21
3.5.2	Station Mapping Subpanel.....	21
3.5.2.1	Components.....	22
3.5.3	Canonical Events Subpanel.....	23
3.5.3.1	Components.....	23
3.5.4	Usage	24
3.5.4.1	Configuring the FEWS PI-service.....	24
3.5.4.2	Exporting Historical Data Files Manually.....	25
3.5.4.3	Defining a Station Mapping	26
3.5.4.4	Adding a New Canonical Event	26

3.6	Historical Data Subpanel.....	27
3.6.1	Components	28
3.6.2	Diagnostics	28
3.6.3	Usage	29
3.6.3.1	Generating Binary Data Files	29
3.7	RFC Forecasts Subpanel.....	30
3.7.1	Components	31
3.7.2	Diagnostics	32
3.7.3	Usage	34
3.7.3.1	Using IVP to Pair RFC QPF/QTF Forecasts	34
3.7.3.2	Specifying the Archive Database Connection	35
3.7.3.3	Constructing Archive Files Using Archive Database Data	36
3.7.3.4	Importing Files Constructed Externally	37
3.8	GFS Subpanel.....	44
3.8.1	Components	45
3.8.2	Diagnostics	45
3.8.3	Usage	46
3.8.3.1	Downloading GFS Reforecast Files	46
3.9	CFSv2 Subpanel.....	47
3.9.1	Components	48
3.9.2	Diagnostics	48
3.9.3	Usage	51
3.9.3.1	Downloading CFSv2 Reforecast Files	51
3.10	Estimation Subpanel.....	52
3.10.1	Locations Summary Subpanel.....	53
3.10.1.1	Parameter File Backups	53
3.10.1.2	Components	53
3.10.2	Estimation Options Subpanel	54
3.10.2.1	General Options	54
3.10.2.2	EPT Options	55
3.10.2.3	Source Parameters	55
3.10.3	Diagnostics.....	56
3.10.4	Usage.....	58
3.10.4.1	Estimating Parameters	58
3.10.4.2	Loading Parameters and Viewing Diagnostics.....	58
3.10.4.3	Backing-Up Parameters and Restoring Backup Parameters.....	58
3.11	Acceptance Subpanel.....	59
3.11.1	About Parameter Zip Groups and Files	60
3.11.2	Edit Groups Subpanel	60
3.11.2.1	Components	60
3.11.3	Prepare by Location Subpanel	62
3.11.3.1	Components	62
3.11.4	Prepare by Group Subpanel.....	63
3.11.4.1	Components	64
3.11.5	Usage.....	64
3.11.5.1	Defining Parameter Zip Groups	64

3.11.5.2	Generating Group Zip Files	64
3.12	Location Summary Panel	66
3.12.1.1	Components	66
3.12.2	Usage	67
3.12.2.1	Running All Steps for Multiple MEFP Locations	67
3.13	Diagnostic Display Panel	70
3.13.1.1	Components	70
4	MEFP Operational Reference Manual.....	71
4.1	Overview	71
4.1.1	Using CHPS to Import and View GFS and CFSv2 Grid Data	71
4.1.2	Using CHPS to Generate MEFP Ensembles and View Results	71
4.2	MEFP Grid Data Model Adapter.....	71
4.2.1	Description.....	71
4.2.2	Model Parameters	71
4.2.3	Model Time Series.....	71
4.2.4	Notes on Configuration	71
4.3	MEFP Model Adapter	71
4.3.1	Description.....	71
4.3.2	Model Parameters	71
4.3.3	Model Time Series.....	71
4.3.4	Notes on Configuration	71
4.4	Graphics Generator Products.....	71
4.4.1	Required Settings	71

1 Overview

This section is pending transition of HEFS from beta-testing to operational use, and will be supplied at a later date. Once completed, it is anticipated that this section will provide an overview of the user's manual.

- 1.1 **Software Components**
- 1.2 **Terminology**
- 1.3 **Notation**
- 1.4 **Manual Layout**



2 Science of MEFP

This section is pending transition of HEFS from beta-testing to operational use, and will be supplied at a later date. Once completed, it is anticipated that this section will provide an overview of the science behind MEFP.



3 MEFPPE Reference Manual

3.1 Overview

The Meteorological Ensemble Forecast Processor (MEFP) Parameter Estimator (PE) computes parameters used by the MEFP to generate ensembles operationally. Those parameters are zipped and stored in FEWS module data set files, being exported via `exportDataSetActivity` entries in the MEFP module configuration files. The MEFPPE guides the user through a step-by-step estimation process that includes setup, acquiring archive and reforecast data files, estimating parameters, and accepting/zipping those parameters. It runs as a FEWS explorer plug-in, being seamlessly integrated within the CHPS/FEWS interface, and provides diagnostic capabilities to enable the user to more easily quality control forecast source data and the estimated parameters.

This section of the manual describes how to use the MEFPPE software interface to accomplish parameter estimation and provides details about all interface components. It is recommended that users read Section 3.2, Getting Started, prior to using the software, and refer to the other sections as needed while using the software. This manual is available via the MEFPPE help functionality.

3.1.1 Terminology

The following important terms are used throughout this section:

- *active estimation data type*: The current data type for which estimation will be performed; either precipitation or temperature. It is controlled by a choice box in the **Location Summary Panel**.
- *CHPS locationId*: The locationId used in the CHPS configuration files to specify a location.
- *CHPS parameterId*: The parameterId used in the CHPS configuration files to specify a data type. Common parameterIds are as follows:

MAP/FMAT: observed/forecast 6h accumulated precipitation

MAT/FMAT: observed/forecast 6h instantaneous temperature

TFMX/TMAX: observed 24h maximum temperature

TFMN/TMIN: observed 24h minimum temperature

- *forecast data source*: A source of forecasts for which the MEFPPE is to compute parameters and which the MEFP uses as input to generate ensembles operationally. Current forecast sources include HPC/RFC QPF and QTF, NCEP GFS, and NCEP CFSv2 forecasts.
- *MEFP location*: A location for which the MEFP is to be executed and parameters are to be estimated. An MEFP location is defined by a CHPS locationId and parameterId and will sometimes be referred to by its *identifier* within this manual, which is “<locationId> (<parameterId>)”. For example “NFDC1HUF (MAP)”.

- *parameter zip group*: A group of locations for which the MEFP will be executed at one time (via one model adapter execution) and, therefore, for which the estimated parameters must be zipped together.

3.1.2 Notation

The following notation is used:

- Important terms are displayed in *italics* the first time they are used and defined.
- Graphics user interface components are displayed in **Bold**.
- List items, such as available plug-ins or allowed parameter settings, will be in “quotes”.
- Column names in tables will be in ‘single quotes’.
- Parameter names are displayed as normal text.
- Text which is to be entered at a command line or into an ASCII text file (including XML files) is denoted in `this font`.

3.2 Getting Started

The MEFPPE is used to estimate parameters for the MEFP to generate ensembles of precipitation and temperature time series. It guides the users through a step-by-step procedure outlined in Section 3.2.1, providing tools to allow for quality controlling data and analyzing the parameters.

This section provides basic background material pertinent to the understanding of the MEFPPE software in order to get started using the software. It explains (1) how to run MEFPPE, (2) the parameter estimation procedure through which the MEFPPE guides the users and how that procedure connects to the interface components, and (3) general concepts that are core to understanding and using the MEFPPE.

3.2.1 Input Data Requirements

To use the MEFPPE, historical precipitation (MAP) and temperature (MAT) time series must be made available to it. See Section 3.5.1 and 3.5.4 for how to make that data available. Furthermore, archived forecasts or reforecasts must be available for each forecast source for which parameters are to be estimated. The forecast sources and required data are as follows:

- RFC Forecast Source: HPC/RFC QPF/QTF forecasts are required along with corresponding observations. See Section 3.7.3 for information on how to provide that data to MEFPPE: either via the vfypairs table of the archive database or via importing files constructed outside of MEFPPE.
- GFS Forecast Source: GFS reforecasts are required. Those reforecasts are automatically acquired as needed by MEFPPE via SFTP. See Section 3.8.3.1. No preparation by the user is required.
- CFSv2 Forecast Source: CFSv2 reforecasts are required. Those reforecasts are automatically acquired as needed by MEFPPE via SFTP. See Section 3.9.3.1. No preparation by the user is required.
- Climatology (Historical) Forecast Source: The aforementioned historical data is used to estimate parameters for this forecast source.

All other information is acquired from CHPS via PI-XML files that are exported, including location ids, parameter ids, and coordinates.

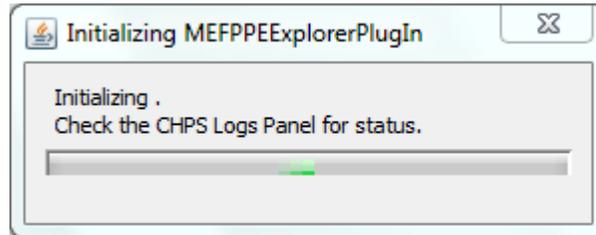
3.2.2 Running MEFPPE

To use MEFPPE, you must install it in a CHPS stand-alone as described in the *HEFS Release Install Notes* and then start the CHPS session. After starting CHPS, the main toolbar will include an **MEFPPE Button**:



Click on that button to run MEFPPE.

Upon starting, MEFPPE reads historical XML/fastInfoSet files in order to identify for which locations parameter estimation will be performed. This may take a while if there are many such files available. A progress dialog will be visible while the information is being read and will disappear upon completion:



Log messages generated while initializing the interface will be displayed in the standard CHPS **Logs Panel**.

3.2.3 The Parameter Estimation Procedure

The MEFP parameter estimation step procedure is provided below. With each step, the sections describing how to use components of the MEFPPE to perform the step are referred to.

1. Setup

Acquire historical MAP/MAT data from the CHPS database and create historical data files for the MEFPPE to use. The time series in those files specify the locations for which the MEFP will be executed. The time series acquired are the same MAP and MAT time series that are used to drive the standard ESP forecasts at an RFC. The historical data files can be constructed manually; see the section on MEFPPE installation in the *HEFS Release Install Notes*.

See: Section 3.5.4 for how to setup for parameter estimation using the **Setup Subpanel** of the **Estimation Steps Panel**.

2. Process historical data and generate binary files

Create faster-access binary files containing historical data, to be stored with the estimated parameters in the module data set .zip file for access during operational ensemble generation. Also, some data processing is performed for the historical temperature data, computing the historical 24h minimum and maximum temperature values. For precipitation, the historical data is used without change.

See: Section 3.6.3.1 for how to create the binary files using the **Historical Data Subpanel** of the **Estimation Steps Panel**.

3. Acquire/Create HPC/RFC QPF and QTF archive forecast data files

Either create RFC archived data files containing past QPF/QTF and corresponding observations based on data in the vfyPairs table of the archive database, or copy RFC

archived data files created by the user. Archives of past QPF/QTF along with corresponding observed values are necessary to estimate MEFP parameters for the RFC forecast data source.

See: Section 3.7.3 for how to create or import RFC archived data files using the **RFC Forecast Subpanel** of the **Estimation Steps Panel**, including creating and using QPF/QTF forecast-observed pairs to construct archived data files and importing files constructed outside of MEFPE if the archive database cannot be used.

4. *Acquire GFS reforecast data files*

Acquire the reforecast data files for the GFS forecast source. Reforecasts (forecasts for past dates) are necessary in order to estimate MEFP parameters.

See: Section 3.8.3.1 for how to acquire GFS reforecast files via SFTP using the **GFS Subpanel** of the **Estimation Steps Panel**.

5. *Acquire CFSv2 reforecast data files*

Acquire the reforecast data files for the CFS version 2 forecast source. Reforecasts (forecasts for past dates) are necessary in order to estimate MEFP parameters.

See: Section 3.9.3.1 for how to acquire CFSv2 reforecast files via SFTP using the **CFSv2 Subpanel** of the **Estimation Steps Panel**.

6. *Estimate parameters*

Specify estimation options and estimate the parameters of the MEFP for whichever forecast sources will be used to generate ensembles operationally. Examine the quality of the estimated parameters to determine their acceptability.

See: Section 3.10.4.1 for how estimate parameters and Section 3.10.4.2 for how to view diagnostics related to estimated parameters, both using the **Estimation Subpanel** of the **Estimation Steps Panel**.

7. *Accept (zip) parameter files*

Create zip files of parameters to be exported during operational ensemble generation. Since the MEFP is typically executed for a group of locations at one time, and only one exportDataSetActivity can be specified in a module configuration file, all parameters for a group must be zipped together.

See: Section 3.11.5.1 for how to define parameter zip groups and Section 3.11.5.2 for how to construct module data set zip files using the **Acceptance Subpanel** of the **Estimation Steps Panel**.

3.2.4 Core Concepts

This section discusses several concepts that are core the operations of the MEFPE.

3.2.4.1 The MEFPPE Run Area

The MEFPPE runs using files stored on the file system within the CHPS region directory:

Models/hefs/mefppeRunArea

Files stored under that directory include run-time information files, historical data files, archive or reforecast data files, and parameter files. The user should never modify anything within the MEFPE run area unless specifically instructed to do so (as in Section 3.2.4.3).

3.2.4.2 Run-time Information

MEFPPE run-time information includes any information necessary for the MEFPPE to execute and that needs to be remembered whenever the MEFPPE is closed so that the user can pick-up where he or she left off upon restarting MEFPPE. That run-time information includes the following:

- MEFPE location information, including mapped location ids and coordinates
- Defined canonical events
- Defined parameter zip groups

All other information, including step status, is determined at run-time based on the contents of the MEFPPE run area.

The run-time information is stored in a file underneath of the system files directory within the MEFPPE run area:

.systemFiles/runTimeInformation.xml

Do not modify this file unless you are told to do so by an OHD developer while debugging an issue. The file is updated once per minute while MEFPPE is running and whenever MEFPPE is closed.

3.2.4.3 Importing From XEFS EPP3

MEFPPE is capable of importing index (location and station mapping) information and canonical events from its predecessor, the eXperimental Ensemble Forecast System (XEFS) Ensemble Pre-Processor 3 (EPP3) software. To do so, before starting MEFPPE, place the files to import under the import directory within the MEFPPE run area.

Models/hefs/mefppeRunArea/import

The following files beneath the import directory will be loaded (description of file contents is provided in parentheses):

control/...

base_events_precip_v2.txt (base canonical events for precipitation)
base_events_temp_cfsv2.txt (base canonical events for temperature)
modulation_events_precip_v2.txt (modulation canonical events for precipitation)
modulation_events_temp_cfsv2.txt (modulation canonical events for temperature)
index/...
map_ts_index.txt (station mapping index information for precipitation locations)
map_area_loc.txt (location coordinate information for precipitation locations)
mat_ts_index.txt (station mapping index information for temperature locations)
stationlocs.txt (location coordinate information for temperature locations)

For older version of EPP3, the names of the files may not be identical to those listed above. Rename the files to be imported as needed. Furthermore, the XEFS EPP3 software used lower case letters to denote EPP3 locations (e.g., “nfdc1huf”), whereas CHPS usually uses all upper case letters (e.g., “NFDC1HUF”). Edit the index files prior to importing so that all EPP3 location ids are upper case to match the CHPS location ids.

3.2.4.4 FEWS PI-service Connection

MEFPPE acquires historical MAP and MAT time series via the FEWS PI-service, and, in order to use the FEWS PI-service, the connection port number must be identified. After the CHPS interface has started, check the **Logs Panel** for lines similar to the following:

```
11-04-2010 11:16:01 INFO - Started FewsPiServiceImpl on localhost : 8101  
11-04-2010 11:16:01 WARN - Failed to start: SocketListener0@0.0.0.0:8100
```

The line that begins with “Started FewsPiServiceImpl...” indicates the port number (as **highlighted** above) of the FEWS PI-service session initialized for the currently running session of CHPS. This is the PI-service to which the MEFPPE should connect. If the port number is not 8100 (the default) or is not the value which was setup during installation, then MEFPPE must be directed to the correct port number. See Section 3.5.1.1 for details on how to change the port number in MEFPPE.

3.2.4.5 Canonical Events

A detailed definition of canonical events is provided in Section 2. To summarize, a canonical event defines an aggregation period for forecast time series. It is defined by a start period (positive integer) and end period (positive integer). For precipitation data, the periods are defined in units of 6 hours, while for temperature it is 24 hours. For example, a canonical event for periods 1 – 2 for precipitation covers the first 12 hours of the forecast time series, while periods 120 – 240 covers the second thirty-day period, generally referred to as month 2. For every day of the year for which they are computed, parameters are estimated for each canonical event.

3.2.5 General Graphical User Interface Components

Some graphical user interface components are used many times within the MEFPPE and are described below.

3.2.5.1 Generic Summary Table

Various panels within the MEFPPPE make use of a **Generic Summary Table**, which provides information about MEFPP locations and the status of steps performed. For example:

Location ID	Param...	Used Lat	Used Lon	Status	Log File?	Backup?
AKYC1HOF	MAP	38.7400017	-120.1600037	!	!	!
APCC1LOF	MAP	38.4599991	-122.3799973	!	!	!
ARCC1LOF	MAP	40.6500015	-123.750	!	!	!
AROC1LOF	MAP	36.9500008	-121.3899994	!	!	!
bprc1hlf	MAP	38.300	-119.300	!	!	!
bprc1huf	MAP	38.200	-119.400	!	!	!
mfac1llf	MAP	39.020	-120.600	!	!	!
mfac1luf	MAP	39.050	-120.450	!	!	!
nfdc1hlf	MAP	39.110	-120.820	!	!	!
nfdc1huf	MAP	39.240	-120.450	!	!	!
tmdc1hlf	MAP	36.500	-118.800	✓	✓	!
tmdc1huf	MAP	36.500	-118.650	!	!	!

Underneath the table is a tool bar containing buttons that are panel specific; the example above is for the **Estimation Subpanel** (Section 3.4). Four buttons, however, are common to all **Generic Summary Tables**:

-  **Select All Button:** Selects all rows of the table.
-  **Unselect All Button:** Unselects all rows, clearing the table selection.
-  **Select Rows That Need Processing Button:** Select all rows for which the status in the primary status column is not a check mark:  or . These are the rows indicating locations for which the associated step needs to be performed or updated.
-  **Refresh Button:** Refresh the table, determining the status of the rows from scratch. Clicking this button is usually not necessary, but may be required if the user changes files in the MEFPPPE run area.

When this table is used within panel, it will be referred to as a **Generic Summary Table** associated with a specific step described in Section 3.2.1 and its panel specific buttons will be described.

3.2.5.2 Table Delete/Add and Status Columns

Many tables used within the MEFPPPE include a leading column that allows for deleting or adding rows, or status columns indicating the status of steps performed. Those columns display icons as follows:

Delete/Add Column:

-  **Delete Icon:** Click to delete the row from the associated table. Sometimes this will cause a dialog popup confirming the delete.
-  **Add Icon:** Click to add a row to the associated table.

Status Column:

-  **Bad Status Icon:** Indicates that a step has not been performed or an error of some kind occurred while performing some other action.
-  **Warning Status Icon:** Indicates that a step has been performed but needs to be updated (performed again).
-   **Good Status Icon:** Indicates that a step has been performed or some other action was successful. The  icon is usually used to indicate success, but sometimes a 

For all status icons, a tool tip will display further information, such as the cause of failures or why a step needs to be updated. To see the message, leave the mouse cursor over the icon without moving it for a few seconds.

If a table within the MEFPPPE uses either a delete/add or status column, it will be stated in the description of that table. All **Generic Summary Tables** use a status column.

3.2.5.3 Archive/Reforecast Time Series Diagnostic Display Panel

For forecast sources that use archived or reforecast time series to estimate parameters (RFC, GFS, and CFSv2), a standard panel is used to display the archive/reforecast time series. Shown in Figure 1, the panel is designed to display one year of time series at a time and has the following components:

- **Time Series Chart:** The chart occupies the left part of the panel and displays the RFC archived forecasts and the GFS/CFSv2 reforecasts, depending on the subpanel of the **Estimation Steps Panel** that was used to create the diagnostic. For RFC forecasts, which provide their own observation time series, an observed time series is also displayed in dark gray.
- **Show All Checkbox:** Click to see all time series in a single plot. It may take a long time to render the chart, so checking this box is generally not recommended.
- **T0 List:** A selectable list of the forecast times, or T0s, for which reforecasts or archived forecasts are available. When one or more items in the list are selected, the time series for those forecast times are “emphasized”; they are highlighted in red on the chart and displayed in front of the other time series. For temperature data, the region between corresponding 24-hour minimum and maximum values is shaded.

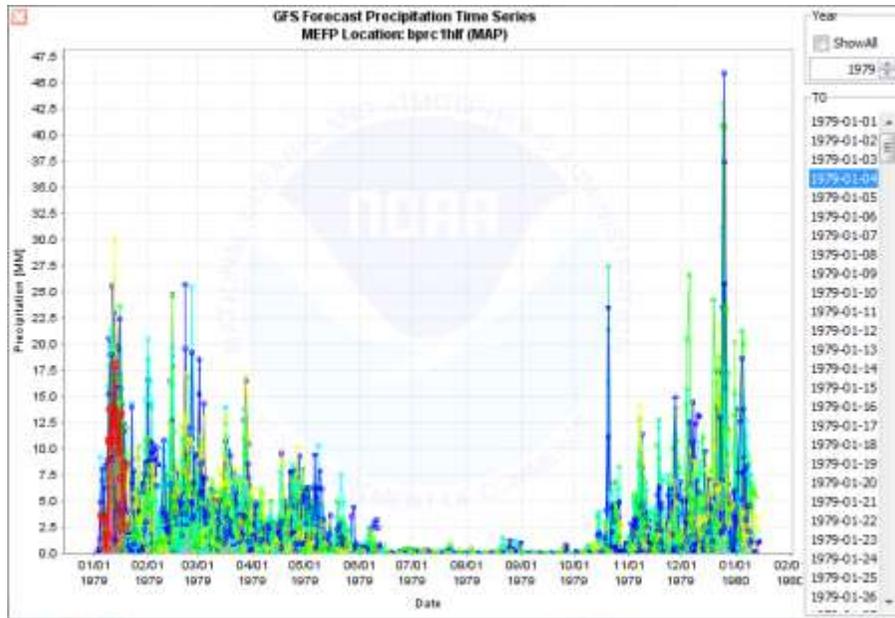


Figure 1: Example diagnostic display panel displaying GFS reforecast time series.

3.2.6 Format of this Reference Manual

The Sections 3.4 – 3.13 are provided as a reference for the MEFPPPE component panels of the MEFPPPE interface. Each section provides the following information:

- A description of the component panel to which the section applies.
- Any special considerations required for the panel.
- A listing of the interface components, including buttons, tables, lists, etc.
- Instructions for how to perform basic tasks using the components.

3.3 MEFPPE Main Panel

Shown in Figure 2-1, the MEFPPE Main Panel is displayed as a plug-in to CHPS after initialization is completed. It includes three components:

- **Estimation Steps Panel:** Guides the user through the steps outlined in Section 3.2.3. A tabbed panel is provided for each of the steps.
- **Location Summary Panel:** Summarizes the status of the steps for each of the MEFP locations. Also provides for the ability to run all steps for selected locations and select the active estimation data type (precipitation or temperature).
- **Diagnostics Display Panel:** Displays diagnostics that assist the user in quality controlling the data, deciding on options to use for estimation, and quality controlling and accepting the estimated parameters.

NOTE: The Select Type of Data for Estimation Choice Box displayed in the Location Summary Panel controls the active estimation data type for the entire interface. This selection affects most of the panels in the Estimation Steps Panel.

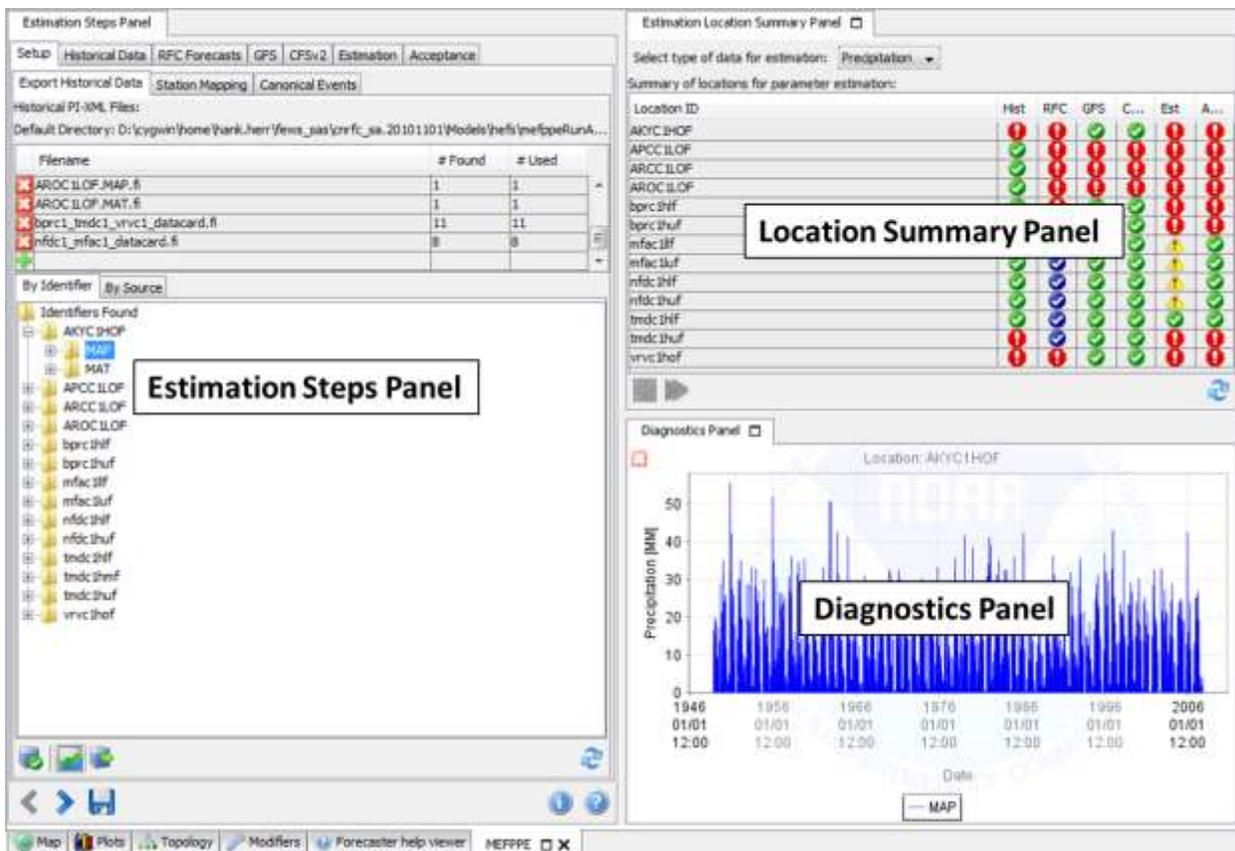


Figure 2: The MEFPPE Main Panel, displayed upon start-up of the MEFPPE.

3.4 Estimation Steps Panel

The **Estimation Steps Panel**, shown in Figure 3, is positioned on the left-hand side of the **MEFPPE Main Panel** and displays tabbed subpanels that correspond to the steps of the MEFP parameter estimation process. All of the tabbed subpanels are described in sections that follow. Also provided are buttons that facilitate navigating the tabbed subpanels, an information button, and a help button.

Estimation Steps Panel

Setup | **Historical Data** | RFC Forecasts | GFS | CFSv2 | Estimation | Acceptance

Summary of Available Historical Data

Location ID	Parameter ID	Used Lat	Used Lon	Status
AKYC1HOF	MAP	38.7400017	-120.1600037	!
APCC1LOF	MAP	38.4599991	-122.3799973	!
ARCC1LOF	MAP	40.6500015	-123.750	!
AROC1LOF	MAP	36.9500008	-121.3899994	!
bprc1hlf	MAP	38.300	-119.300	✓
bprc1huf	MAP	38.200	-119.400	!
mfac1llf	MAP	39.020	-120.600	✓
mfac1luf	MAP	39.050	-120.450	✓
nfdc1hlf	MAP	39.110	-120.820	✓
nfdc1huf	MAP	39.240	-120.450	✓
tmdc1hlf	MAP	36.500	-118.800	✓
tmdc1huf	MAP	36.500	-118.650	!
vrvclhof	MAP	34.470	-119.310	!

Navigation icons: Home, Back, Forward, Save, Refresh, Info, Help

Figure 3: The Estimation Steps Panel.

3.4.1 Components

The following describes the **Estimation Steps Panel** components:

- **Estimation Steps Tabbed Subpanels:** One tabbed subpanel is displayed for each of the estimation steps discussed in Section 3.2.3:



To move between step subpanels, either the tabs can be clicked, or the **Back** and **Next Buttons**, described below, can be used. A subpanel is said to be ‘active’ if its tab is selected and its contents are current viewed. For example, in the image above, the **Historical Data Subpanel** is active.

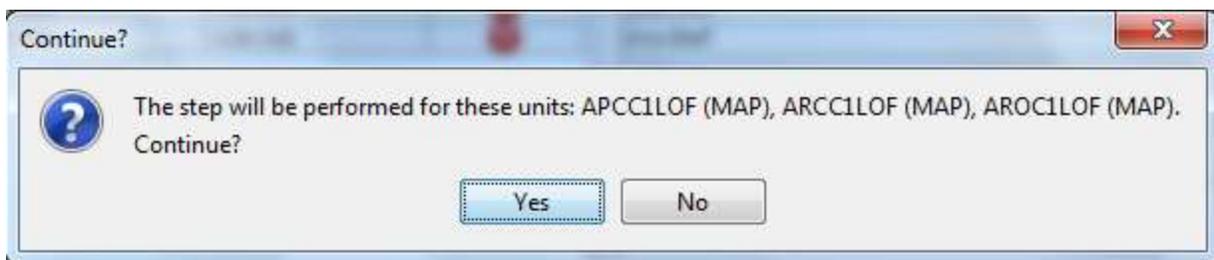
-  **Back/Next Buttons:** Click to navigate to the previous or the next step tabbed subpanel. The buttons are disabled if there is no previous or next subpanel.
-  **Perform Step Button (Run Button):** Click to run the step corresponding to the active tabbed subpanel. If there is no step to perform, as for the **Setup Tabbed Panel**, then this button will not be present. The button is enabled only if one or more MEFP locations for which to perform the step are selected in the tabbed subpanel (see the description for the individual steps subpanels provided in following sections). A description of how to perform a step is presented below in Section 3.4.2.1. This button is not available in the **Setup Subpanel**.
-  **Save Run-Time Information Button:** Click to force an immediate save of the run-time information. MEFPPE saves run-time information to a file that is loaded whenever it starts, enabling it to remember user settings. The file is saved once per minute while MEFPPE is running, when MEFPPE is closed, and when this button is clicked.
-  **About Button:** Click to display a dialog providing version information for the MEFPPE.
-  **Help Button:** Click to active help mode. When in help mode, the interface cannot be interacted with. Rather, the user can click on a component of the interface to receive help information tailored for the clicked component. The information is extracted directly from this manual and is displayed in the system’s default internet browser. The component for which help will be provided is highlighted by a faded red box; for example:

Estimation Location Summary Panel <input type="checkbox"/>						
Select type of data for estimation: Precipitation ▾						
Summary of locations for parameter estimation:						
Location ID	Hist	RFC	GFS	C...	Est	A...
AKYC1HOF	!	!	✓	✓	!	!
APCC1LOF	✓	!	!	!	!	!
ARCC1LOF	✓	!	!	!	!	!
AROC1LOF	✓	!	!	!	!	!
bprc1hlf	✓	!	✓	✓	!	!
bprc1huf	!	!	✓	✓	!	!
mfac1llf	✓	!	✓	✓	!	✓
mfac1luf	✓	!	✓	✓	!	✓
nfdc1hlf	✓	!	✓	✓	!	✓
nfdc1huf	✓	!	✓	✓	!	✓
tmdc1hlf	✓	!	✓	✓	!	✓
tmdc1huf	!	!	✓	✓	!	!
vrvclhof	!	!	✓	✓	!	!

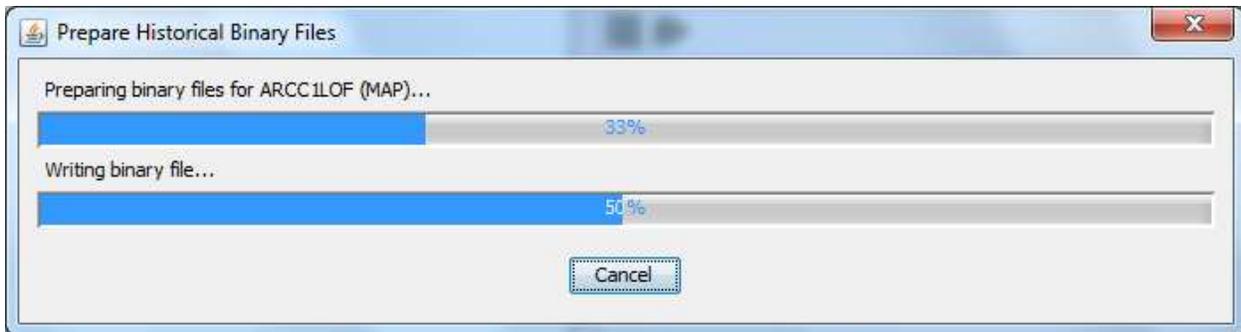
3.4.2 Usage

3.4.2.1 Performing a Parameter Estimation Step

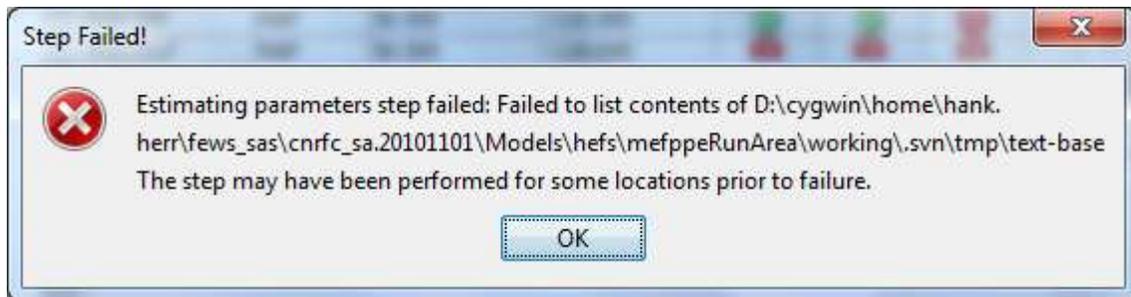
A step is performed by making the corresponding step subpanel active, selecting MEFP locations for which to perform the step, and clicking on the **Perform Step Button**. Upon clicking, a **Continue Dialog** will be displayed allowing the user to confirm or cancel the run; for example:



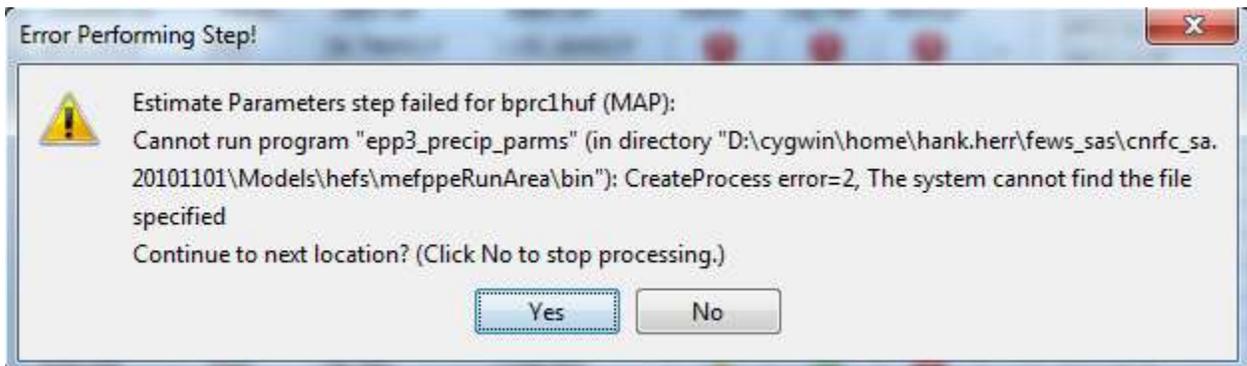
Click on **Yes** to continue or **No** to cancel. If **Yes** is clicked, a **Step Progress Dialog** will be displayed providing the ability to cancel the step via a **Cancel Button**:



If the step fails for any reason, including if it was canceled, an error dialog will be displayed. If the step is only being performed for one MEFP location or it is the last of multiple locations for which the step failed, then a **Step Failed Dialog** will be displayed explaining the cause of the failure:



Otherwise, an **Error Performing Step Dialog** will be displayed, giving the user the option to continue to the next selected MEFP location (click **Yes** to continue, **No** to stop):



If the step is successful, the progress dialog will close with no additional dialog displayed.

If a step is canceled by clicking on the **Cancel Button** in the **Step Progress Dialog**, the MEFPE may not immediately cancel the step. Rather, it will wait until the step can be canceled cleanly without causing any problems. Upon clicking **Cancel**, the button will be disabled until the step can be canceled.

3.5 Setup Subpanel

The **Setup Subpanel** of the **Estimation Steps Panel**, shown in Figure 4, allows the user to setup the MEFP locations for which parameters are to be estimated. There are three items to setup for the MEFPPE:

- **Export required historical data:** The MEFPPE executes from its run area based on files therein. In order to compute parameters for a location, historical data must be present for that location within a FEWS pi-timeseries compliant XML or fastInfoset file in the MEFPPE run area. Those files can be created manually by the user (see Section 3.5.4.2) or by acquiring time series via the FEWS PI-service and creating files from those time series. Exporting and verifying the available historical data is done during the setup phase.
- **Setup station mapping:** In some cases, it may be necessary to use data for one location as a proxy for data for another location. For example, if temperature forecasts are derived from MDL MOS forecasts based on locationIds that do not match CHPS locationIds, a station mapping may be used. The station mapping is defined during the setup phase.
- **Setup canonical events:** The MEFPPE estimates parameters for canonical events, described in Section 3.2.4.5. Those canonical events are defined during the setup phase.

Subpanels within the **Setup Subpanel** are defined for each of these three setup steps and are described below. The usage section explains how to perform each of these steps using the interface components provided.

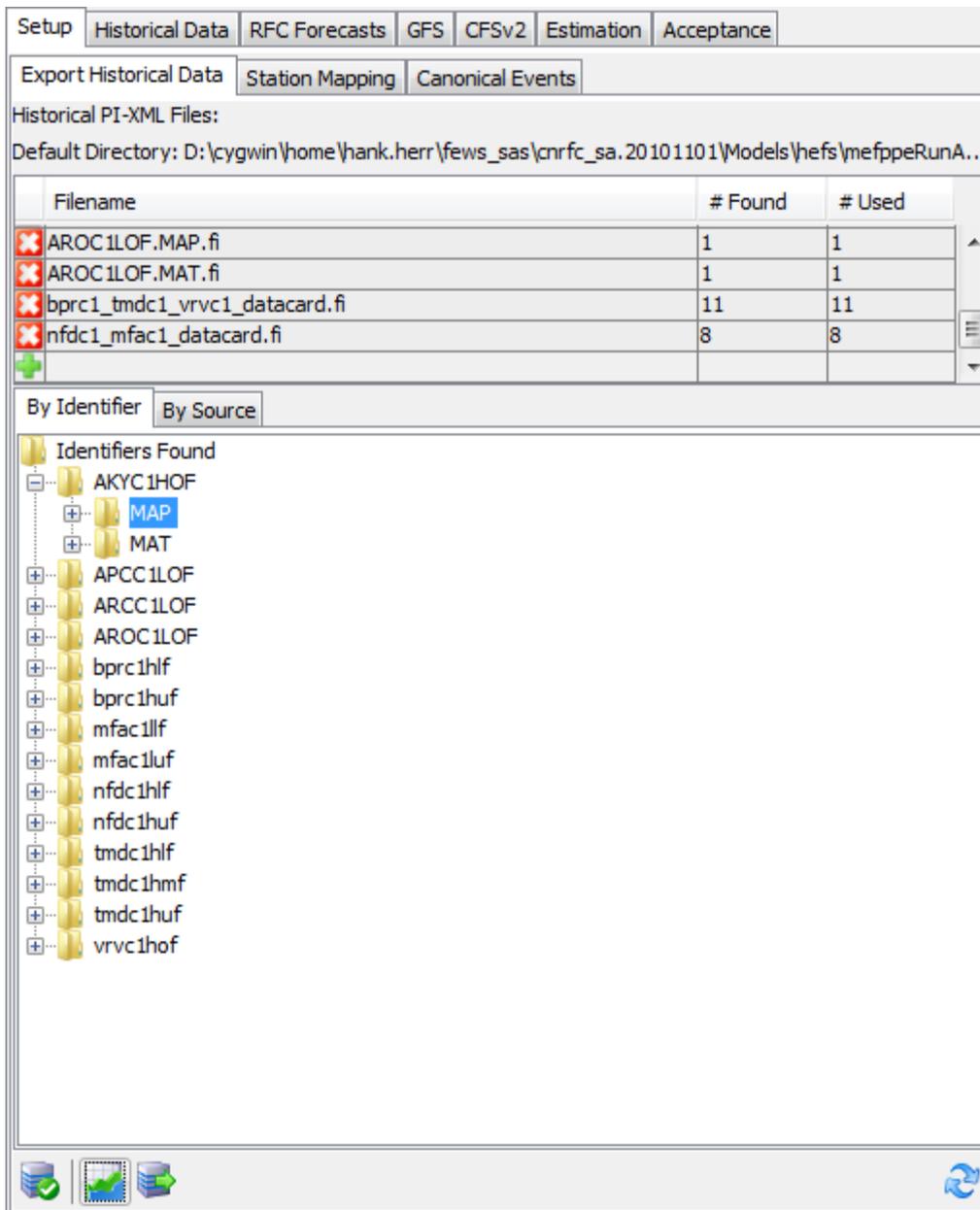


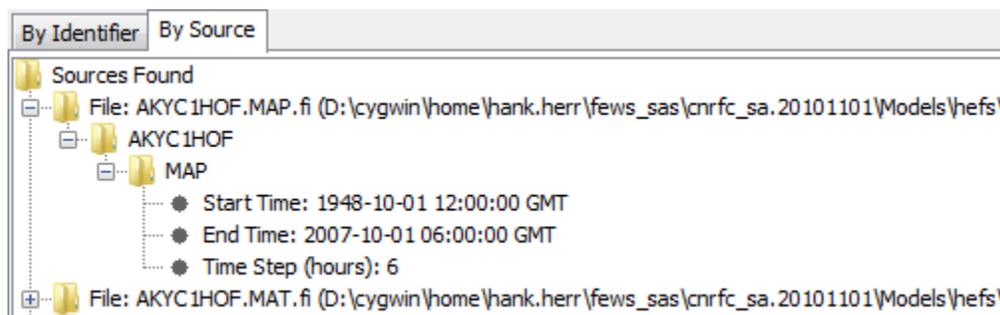
Figure 4: The Setup Subpanel of the Estimation Steps Panel.

3.5.1 Export Historical Data Subpanel

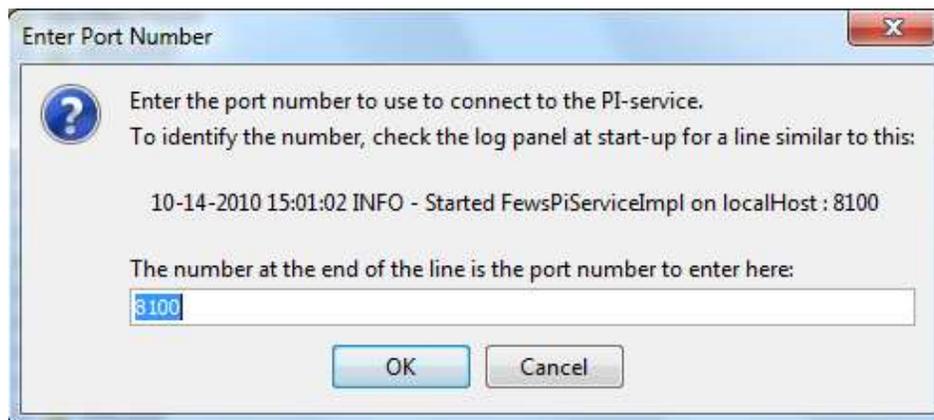
The **Export Historical Data Subpanel**, shown above in Figure 4, facilitates creating time series XML files for use by MEFPPE based on time series acquired via the FEWS PI-service. It also facilitates viewing and quality controlling that data. The time series are gathered by examining files in the directory 'historicalData' within the MEFPPE run area (Section 3.2.4.1). Available data for both precipitation and temperature are displayed.

3.5.1.1 Components

- **Historical PI-XML Files Table:** Displays which files were found specifying historical time series. A delete column is included which, when clicked, removes the clicked row's file from the file system. A confirmation dialog will be shown before the file is deleted.
- **By Identifier Tree/By Source Tree:** The contents of the files found are listed in two trees displayed via a tabbed panel: the **By Identifier Tree** displays the time series first by MEFP location identifier (locationId and parameterId), while the **By Source Tree** displays the time series first by source file found. The information provided in the tree includes locationId, parameterId, source file, and the start time, end time, and time step of the time series found. Both trees are selectable. Expand the tree nodes in order to view this information. For example:



-  **Reconnect to CHPS PI-service Button:** Click to open an **Enter Port Number Dialog** that allows for entering a port number to use for connecting to the PI-service:



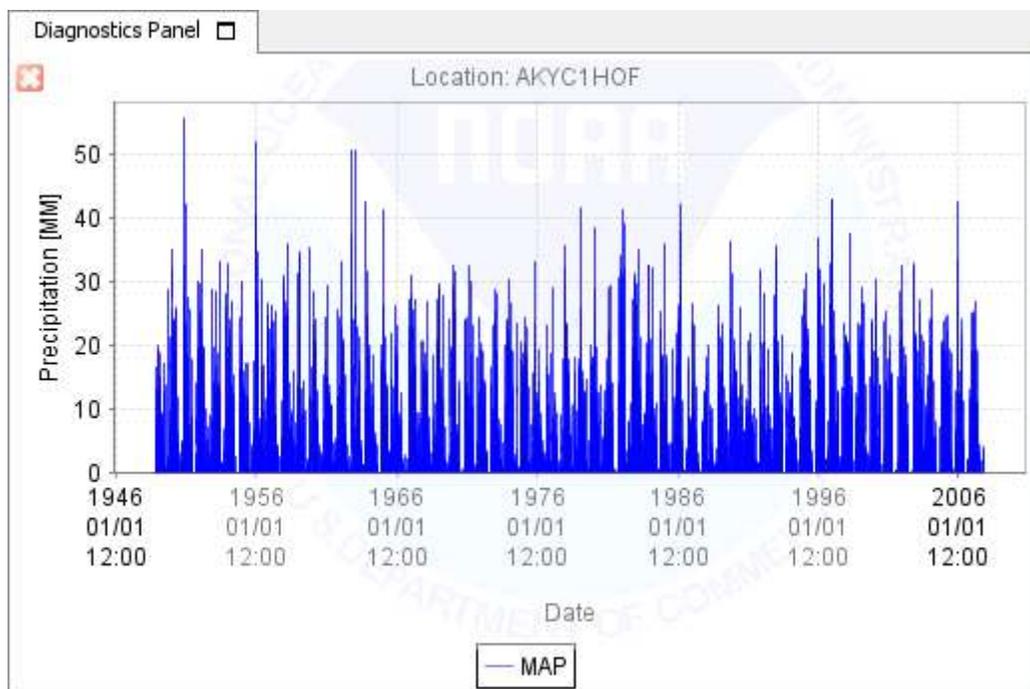
This is useful if the port number used previously (default is 8100) failed to yield a connection or connected to the wrong PI-service. A status icon is included within the larger icon,  indicates a good connections, while  indicates a bad connection. When the connection is bad, the **Export Time Series from CHPS DB Button** will be disabled. Detailed instructions for identifying this port number are provided in Section 3.2.4.4.

NOTE: It is possible for the button to indicate a good connection even though it connected to the wrong PI-service.

-  **View Button:** Click to view time series selected from either the **By Identifier Tree** or **By Source Tree**. To view a time series, all selected nodes or leaves in the tree must be for the same CHPS locationId and the same data type.
-  **Refresh Button:** Reread the files in the historicalData directory of the MEFPPE run area and reconstruct the two trees. This needs to be clicked only if the files in the historicalData are modified manually while running MEFPPE, as in Section 3.5.4.2.

3.5.1.2 Diagnostics

The diagnostics displayed for this subpanel are the time series as provided in the XML or fastInfoSet files. For both precipitation and temperature data, the time series are displayed as blue lines:



3.5.2 Station Mapping Subpanel

The **Station Mapping Subpanel**, shown in Figure 5, allows the user to define station mappings, or MEFP locations for which data for other locations are to be used. This is most useful if an MEFP location is to use RFC QPF/QTF data from an external provider (e.g., MDP MOS forecasts of temperature) and the location for that external provider not identical to the MEFP location, either in locationId or coordinates. In Figure 5, the selected row is a station mapping indicating that for MEFP location bprc1hlf (MAT), data for MOS forecast station BPRSYNLW, with coordinates (38.250, -118.50), will be used. For RFC QPF/QTF, then, the location id 'BPRSYNLW' will be used to find the archive forecast data files. Furthermore, the mapped coordinates will be used to identify which GFS and CFSv2 reforecast files must be acquired. The station mappings for both precipitation and temperature are defined in a single table.

Export Historical Data		Station Mapping		Canonical Events			
Map Location ID To Another Location ID (Synthetic Station ID)							
Locatio...	Param...	Latitude	Longitude	Mappe...	Mappe...	Mappe...	Used?
AKYC1HOF	MAP	38.7400...	-120.16...	-none-	-999.000	-999.000	✓
AKYC1HOF	MAT	38.7400...	-120.16...	-none-	-999.000	-999.000	✓
APCC1LOF	MAP	38.4599...	-122.37...	-none-	-999.000	-999.000	✓
APCC1LOF	MAT	38.4599...	-122.37...	-none-	-999.000	-999.000	✓
ARCC1LOF	MAP	40.6500...	-123.750	-none-	-999.000	-999.000	✓
ARCC1LOF	MAT	40.6500...	-123.750	-none-	-999.000	-999.000	✓
AROC1LOF	MAP	36.9500...	-121.38...	-none-	-999.000	-999.000	✓
AROC1LOF	MAT	36.9500...	-121.38...	-none-	-999.000	-999.000	✓
NFDC1HUF	MAT	39.2400...	-120.44...	-none-	-999.000	-999.000	✓
bprc1hlf	MAP	38.300	-119.300	-none-	-999.000	-999.000	✓
bprc1hlf	MAT	38.300	-119.300	BPRSYNLW	38.250	-118.500	✓
bprc1huf	MAP	38.200	-119.400	-none-	-999.000	-999.000	✓
bprc1huf	MAT	38.200	-119.400	BPRSYNUP	38.250	-118.500	✓
mfac1llf	MAP	39.020	-120.600	-none-	-999.000	-999.000	✓
mfac1llf	MAT	39.020	-120.600	-none-	-999.000	-999.000	✓
mfac1luf	MAP	39.050	-120.450	-none-	-999.000	-999.000	✓
mfac1luf	MAT	39.050	-120.450	-none-	-999.000	-999.000	✓
nfdc1hlf	MAP	39.110	-120.820	-none-	-999.000	-999.000	✓
nfdc1hlf	MAT	39.110	-120.820	-none-	-999.000	-999.000	✓
nfdc1huf	MAP	39.240	-120.450	-none-	-999.000	-999.000	✓
nfdc1huf	MAT	39.240	-120.450	-none-	-999.000	-999.000	✓
tmdc1hlf	MAP	36.500	-118.800	-none-	-999.000	-999.000	✓
tmdc1hlf	MAT	36.500	-118.800	-none-	-999.000	-999.000	✓
tmdc1hmf	MAT	36.500	-118.720	-none-	-999.000	-999.000	✓
tmdc1huf	MAP	36.500	-118.650	-none-	-999.000	-999.000	✓
tmdc1huf	MAT	36.500	-118.650	-none-	-999.000	-999.000	✓
vrvc1hof	MAP	34.470	-119.310	-none-	-999.000	-999.000	✓
vrvc1hof	MAT	34.470	-119.310	-none-	-999.000	-999.000	✓
akyc1hof	MAP	38.7395	-120.1737	-none-	-999.000	-999.000	!
akyc1hof	MAT	0.000	0.000	FOLSYNUP	39.060	-119.600	!
apcc1hof	MAP	38.430	-122.280	-none-	-999.000	-999.000	!

Figure 5: The Station Mapping Subpanel of the Setup Subpanel.

3.5.2.1 Components

- Mapping Table:** Labeled “Map Location ID To Another Location ID (Synthetic Station ID)”, this table allows for defining station mappings. It is a standard **Generic Summary Table** (see Section 3.2.5.1) with a status column titled ‘Used?’ and a delete column (see the **Delete Selected Rows Button** below for which deletions can be made). The ‘Used?’ column displays if the MEFP location for a row has historical data corresponding to it, so that parameters can be estimated (i.e., it is displayed in the **Location Summary Panel**). There are three additional editable columns: ‘Mapped Station Id’, ‘Mapped Lat’, and ‘Mapped Lon’. The first allows for defining a mapped station id. The latter two allow

for specifying the coordinates of the mapped station id and can only be edited if the mapped station id is not “-none-”. If the mapped station id is defined as one that already exists for another MEFP location, the mapped coordinates will be set to the values defined for that other location and the coordinates will always be kept in sync. To clear a station mapping, edit the ‘Mapped Station Id’ column, clear it (delete all characters), and press <Enter>.

NOTE: If a mapped station id is defined, its coordinates must be provided or GFS and CFSv2 reforecast files will not be acquired.

-  **Delete Selected Rows Button:** Removes the selected row from the table. Only rows for which the ‘Used?’ column displays  can be removed. This is generally useful if you imported the station mappings (Section 3.2.4.3) and many mappings were brought in for unused MEFP locations.
-  **Copy the Mapped Location Information:** Copies the mapped station id and coordinates into memory.
-  **Paste the Copied Mapped Location Info to Selected Rows Button:** Applies the copied station id and coordinates to the MEFP locations for the selected rows.

3.5.3 Canonical Events Subpanel

The **Canonical Events Subpanel**, shown in Figure 6, allows the user to modify the base and modulation canonical events, described fully in the scientific documentation accompanying this software and summarized in Section 3.2.4.5. A canonical event is defined by a start period and an end period. Also, specific to the CFSv2 forecast data source, the number of lagged ensembles to use can be specified.

3.5.3.1 Components

- **Base/Modulation Tables:** The **Base Table** and the **Modulation Table**, each in its own tab, display the current canonical events and allow the user add new events or modify existing events. The columns are as follows:
 - ‘Event Number’: The number of the event in sorted (by end period) order, or the row number.
 - ‘Start’: The start period of the event. This column is editable (click and type).
 - ‘End’: The end period of the event. This column is editable (click and type).
 - ‘Length’: The length of the canonical event in periods, with the period unit provided in the column header.
 - ‘Lagged Members’: The number of ;lagged ensemble members to use for the canonical event when estimating parameters for CFSv2. This column is editable (click and type).

Whenever a change is made to any canonical event, the table is resorted and the event numbers reassigned. The table includes an add/delete column for adding new canonical events (click on  at the bottom of the table) or removing existing ones.

Export Historical Data		Station Mapping		Canonical Events	
Base		Modulation			
	Event Number	Start	End	Length (6hrs)	Lagged Members
<input checked="" type="checkbox"/>	1	1	1	1	5
<input checked="" type="checkbox"/>	2	2	2	1	5
<input checked="" type="checkbox"/>	3	3	3	1	5
<input checked="" type="checkbox"/>	4	4	4	1	5
<input checked="" type="checkbox"/>	5	5	5	1	5
<input checked="" type="checkbox"/>	6	6	6	1	5
<input checked="" type="checkbox"/>	7	7	7	1	5
<input checked="" type="checkbox"/>	8	8	8	1	5
<input checked="" type="checkbox"/>	9	9	9	1	5
<input checked="" type="checkbox"/>	10	10	10	1	5
<input checked="" type="checkbox"/>	11	11	11	1	5
<input checked="" type="checkbox"/>	12	12	12	1	5
<input checked="" type="checkbox"/>	13	13	13	1	5
<input checked="" type="checkbox"/>	14	14	14	1	5
<input checked="" type="checkbox"/>	15	15	15	1	5
<input checked="" type="checkbox"/>	16	16	16	1	5
<input checked="" type="checkbox"/>	17	17	17	1	5
<input checked="" type="checkbox"/>	18	18	18	1	5
<input checked="" type="checkbox"/>	19	19	19	1	5
<input checked="" type="checkbox"/>	20	20	20	1	5
<input checked="" type="checkbox"/>	21	21	24	4	5
<input checked="" type="checkbox"/>	22	25	28	4	5
<input checked="" type="checkbox"/>	23	29	32	4	5
<input checked="" type="checkbox"/>	24	33	40	8	5
<input checked="" type="checkbox"/>	25	41	48	8	5
<input checked="" type="checkbox"/>	26	49	56	8	5
<input checked="" type="checkbox"/>	27	57	64	8	5
<input checked="" type="checkbox"/>	28	65	80	16	5
<input checked="" type="checkbox"/>	29	81	96	16	5
<input checked="" type="checkbox"/>	30	97	120	24	10
<input checked="" type="checkbox"/>	31	121	240	120	16
<input checked="" type="checkbox"/>	32	241	360	120	16
<input checked="" type="checkbox"/>	33	361	480	120	16

Figure 6: The Canonical Events Subpanel of the Setup Subpanel.

3.5.4 Usage

3.5.4.1 Configuring the FEWS PI-service

MEFPPE uses the FEWS PI-service to acquire historical time series from the CHPS database. The query performed is defined in the file

Config/PiServiceConfigFiles/MEFPPE.xml

with a query id “All Historical Data”. The query must be configured to return all MAP and MAT time series that will be used as historical data for MEFP parameter estimation. Here is an example:

```

<feWsPiServiceConfig xmlns="http://www.wldelft.nl/feWs" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://www.wldelft.nl/feWs
http://feWs.wldelft.nl/schemas/version1.0/feWsPiServiceConfig.xsd">
  <general>
    <importIdMap>IdImportPiService</importIdMap>
    <exportIdMap>IdExportPiService</exportIdMap>
  </general>

  <timeSeries>
    <id>All Historical Data</id>
    <timeSeriesSet>
      <moduleInstanceId>ImportDataCard</moduleInstanceId>
      <valueType>scalar</valueType>
      <parameterId>MAP</parameterId>
      <locationSetId>Catchments</locationSetId>
      <timeSeriesType>external historical</timeSeriesType>
      <timeStep unit="hour" multiplier="6" timeZone="GMT-6"/>
      <readWriteMode>read only</readWriteMode>
      <synchLevel>1</synchLevel>
    </timeSeriesSet>
    <timeSeriesSet>
      <moduleInstanceId>ImportDataCard</moduleInstanceId>
      <valueType>scalar</valueType>
      <parameterId>MAT</parameterId>
      <locationSetId>Catchments</locationSetId>
      <timeSeriesType>external historical</timeSeriesType>
      <timeStep unit="hour" multiplier="6" timeZone="GMT-6"/>
      <readWriteMode>read only</readWriteMode>
      <synchLevel>1</synchLevel>
    </timeSeriesSet>
  </timeSeries>
</feWsPiServiceConfig>

```

Instructions for configuring this file are provided in the *HEFS Release Install Notes*.

3.5.4.2 Exporting Historical Data Files Manually

The MEFPPE searches the directory 'historicalData' within the MEFPPE run area (Section 3.2.4.1) for XML and fastInfoSet files specifying historical MAP and MAT time series. To specify those files manually, create an FEWS pi-timeseries compliant XML or fastInfoSet file containing those time series and place it within the directory:

Models/hefs/mefppeRunArea/historicalData

The files can be manually copied or exported directly into the directory. Any file in the directory that cannot be read or is not following an appropriate schema will be skipped and a warning message will be displayed in the **CHPS Logs Panel**. If the directory contents are modified while the MEFPPE is running, click on the **Refresh Button** in the **Export Historical Data Subpanel** (see Section 3.5.1.1).

3.5.4.3 Defining a Station Mapping

To define a station mapping for an existing MEFP location, do the following:

1. Make the **Station Mapping Subpanel** active by clicking on the tab.
2. In the **Mapping Table**, find the row for which the ‘Location ID’ and ‘Parameter ID’ match that for the MEFP location. Click on the cell for the ‘Mapped Station ID’ column and type in the mapped station id and press <Enter>. For example, here AKYC1HOF (MAT) has been mapped to location id “STATION”:

Map Location ID To Another Location ID (Synthetic Station ID)								
	Location ID	Parameter ID	Latitude	Longitude	Mapped S...	Mapped Lat	Mapped Lon	Used?
	AKYC1HOF	MAP	38.7400017	-120.1600...	-none-	-999.000	-999.000	
	AKYC1HOF	MAT	38.7400017	-120.1600...	STATION	0.000	0.000	
	APCC1LOF	MAP	38.4599991	-122.3799...	-none-	-999.000	-999.000	
	APCC1LOF	MAT	38.4599991	-122.3799...	-none-	-999.000	-999.000	

Upon pressing <Enter>, the ‘Mapped Station ID’ cell value will change to the typed in value, the ‘Mapped Lat’ and ‘Mapped Lon’ cell values for the row will be set to 0.000, and the next row in the table will be selected. If the ‘Mapped Station ID’ matches that for another row in the table, its coordinate cell values will be set to the values for that other matching row.

3. Edit the ‘Mapped Lat’ and ‘Mapped Lon’ cell values appropriately (click and type).

To clear the defined station mapping, clear the ‘Mapped Station ID’ cell value and press <Enter>. Upon pressing <Enter> the cell values for the row will indicate no mapped station:

Map Location ID To Another Location ID (Synthetic Station ID)								
	Location ID	Parameter ID	Latitude	Longitude	Mapped S...	Mapped Lat	Mapped Lon	Used?
	AKYC1HOF	MAP	38.7400017	-120.1600...	-none-	-999.000	-999.000	
	AKYC1HOF	MAT	38.7400017	-120.1600...	-none-	-999.000	-999.000	
	APCC1LOF	MAP	38.4599991	-122.3799...	-none-	-999.000	-999.000	
	APCC1LOF	MAT	38.4599991	-122.3799...	-none-	-999.000	-999.000	

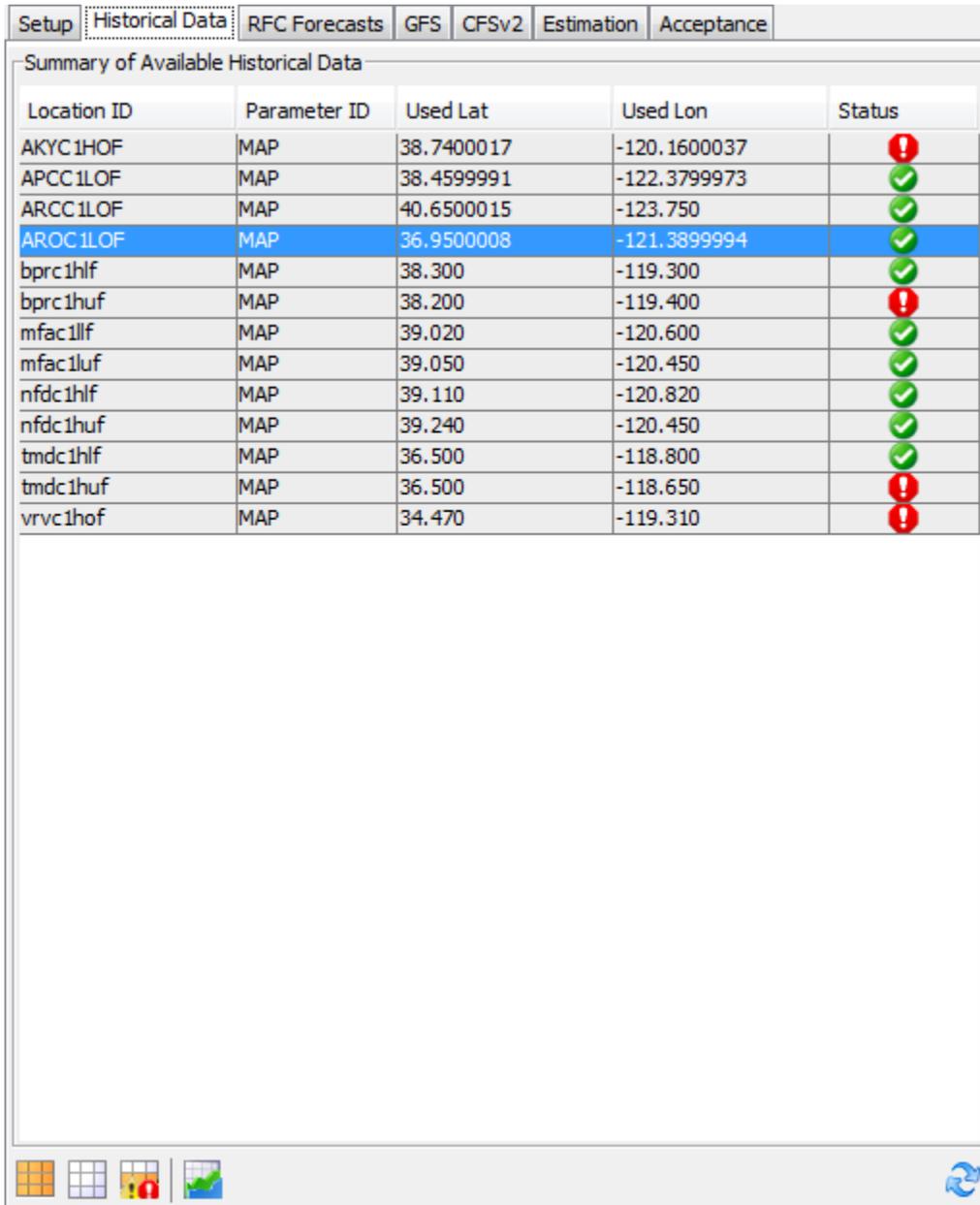
3.5.4.4 Adding a New Canonical Event

To define a new canonical event, do the following

1. Click on at the bottom of the table in the add/delete column. You may need to scroll down. A new row will be added to the table with a ‘Start’ cell value of -1 and an ‘End’ cell value equal to one larger than the largest ‘End’ cell value in the table, so that the new row sorts to the bottom of the table.
2. Edit the ‘Start’, ‘End’, and ‘Lagged Members’ columns appropriately. For each, click on the cell, type the new value, and press <Enter>. Upon pressing <Enter> for the ‘End’ cell value, the table will resort and the row will move appropriately and will remain selected.

3.6 Historical Data Subpanel

The **Historical Data Subpanel** of the **Estimation Steps Panel**, shown in Figure 7 is used to perform Step 2 of the parameter estimation procedure in Section 3.2.3: processing historical data and generating binary files for fast access during operational ensemble generation.



Location ID	Parameter ID	Used Lat	Used Lon	Status
AKYC1HOF	MAP	38.7400017	-120.1600037	!
APCC1LOF	MAP	38.4599991	-122.3799973	✓
ARCC1LOF	MAP	40.6500015	-123.750	✓
AROC1LOF	MAP	36.9500008	-121.3899994	✓
bprc1hlf	MAP	38.300	-119.300	✓
bprc1huf	MAP	38.200	-119.400	!
mfac1llf	MAP	39.020	-120.600	✓
mfac1luf	MAP	39.050	-120.450	✓
nfdc1hlf	MAP	39.110	-120.820	✓
nfdc1huf	MAP	39.240	-120.450	✓
tmdc1hlf	MAP	36.500	-118.800	✓
tmdc1huf	MAP	36.500	-118.650	!
vrvclhof	MAP	34.470	-119.310	!

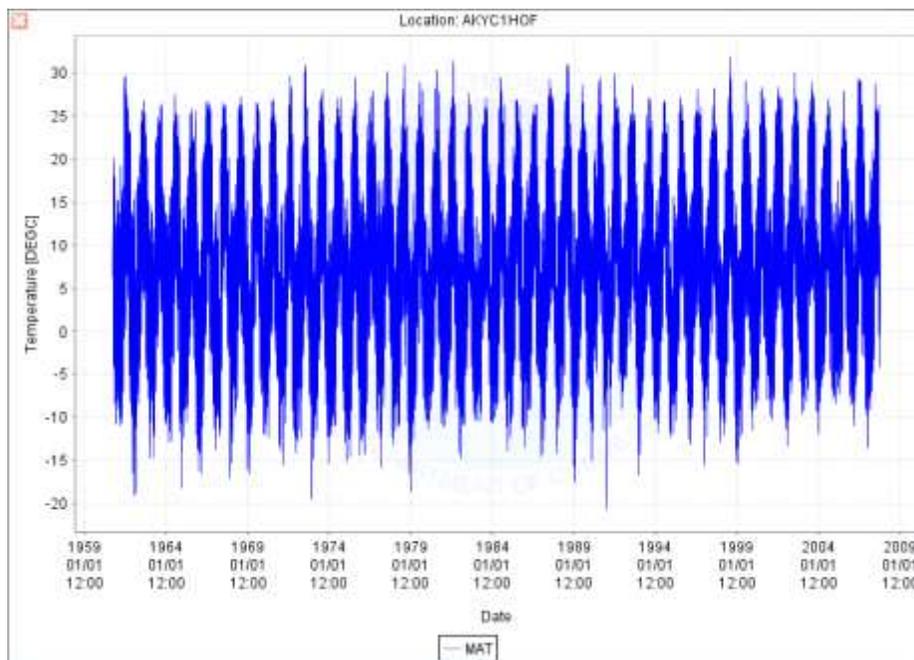
Figure 7: The **Historical Data Subpanel** of the **Estimation Steps Panel**.

3.6.1 Components

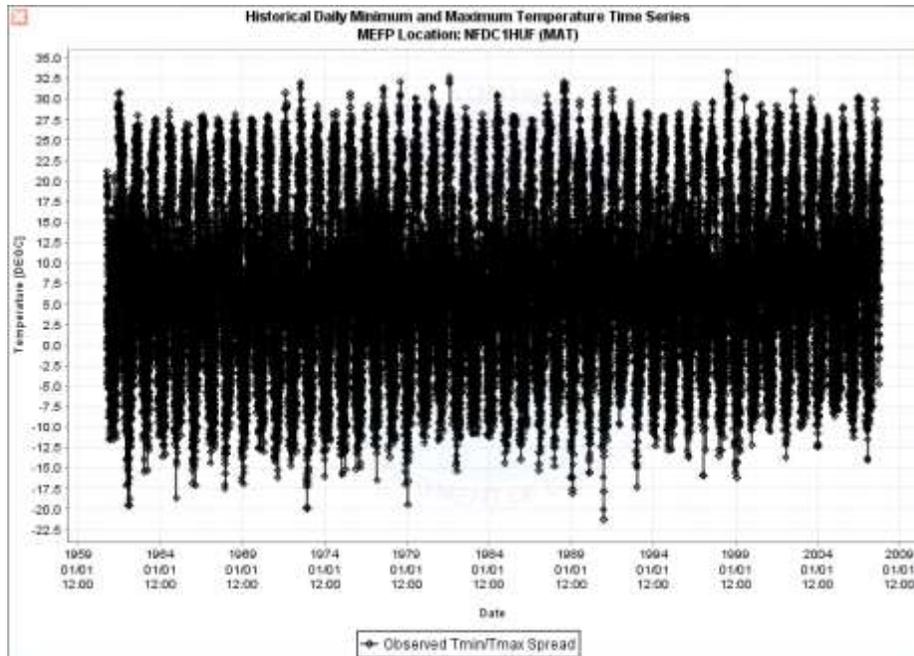
- **Summary of Available Historical Data Table:** Allows the user to select MEFP locations for which to perform the step and view for which locations the step has been performed. It is a **Generic Summary Table** (Section 3.2.5.1) and includes all the standard buttons.
-  **View Button:** Displays diagnostics for a single MEFP location selected in the **Summary of Available Historical Data Table**.

3.6.2 Diagnostics

For precipitation, the diagnostic displayed when the **View Button** is clicked are the raw precipitation time series, and should be identical to those displayed for the **Export Historical Data Subpanel** (Section 3.5.1.2):



For temperature, the diagnostic displayed will show the 24-hour maximum and minimum temperatures computed from the historical temperature data defined in the **Export Historical Data Subpanel**. For example:



3.6.3 Usage

3.6.3.1 Generating Binary Data Files

To create binary data files to be kept with the MEFP parameters and used operationally when generating ensemble, select one or more locations from the **Summary of Available Historical Data Table** and click on the **Perform Step Button**. See Section 3.4.2.1 for details on how to perform a step using the **Perform Step Button** of the **Estimation Steps Panel**.

3.7 RFC Forecasts Subpanel

The **RFC Forecasts Subpanel** of the **Estimation Steps Panel**, shown in Figure 8, is used to perform Step 3 of the parameter estimation procedure in Section 3.2.3: acquire or create HPS/RFC QPF/QTF archive forecast files. The RFC archive forecast files are put in place by the MEFPPE in one of two ways: (1) importing (copying) files constructed by RFC users; (2) constructing the files based on data extracted from the vfy pairs table of the archive database. See the Usage section below for more details.

Location ID	Para...	Used Lat	Used Lon	Status	ADB Location...	SHEF Code
AKYC1HOF	MAP	38.7400017	-120.1600037	!	AKYC1HOF	PPQ__ZZ
APCC1LOF	MAP	38.4599991	-122.3799973	!	APCC1LOF	PPQ__ZZ
ARCC1LOF	MAP	40.6500015	-123.750	!	ARCC1LOF	PPQ__ZZ
AROC1LOF	MAP	36.9500008	-121.3899994	!	AROC1LOF	PPQ__ZZ
bprc1hlf	MAP	38.300	-119.300	!	bprc1hlf	PPQ__ZZ
bprc1huf	MAP	38.200	-119.400	!	bprc1huf	PPQ__ZZ
mfac1llf	MAP	39.020	-120.600	✓	mfac1llf	PPQ__ZZ
mfac1luf	MAP	39.050	-120.450	✓	mfac1luf	PPQ__ZZ
nfdc1hlf	MAP	39.110	-120.820	✓	nfdc1hlf	PPQ__ZZ
nfdc1huf	MAP	39.240	-120.450	✓	nfdc1huf	PPQ__ZZ
tmdc1hlf	MAP	36.500	-118.800	✓	nfdc1huf	PPQFAZZ
tmdc1huf	MAP	36.500	-118.650	✓	tmdc1huf	PPQ__ZZ
vrvc1hof	MAP	34.470	-119.310	!	vrvc1hof	PPQ__ZZ

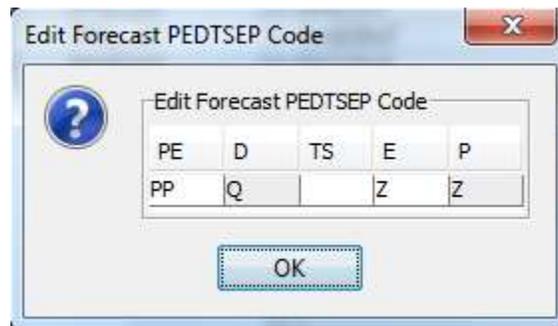
Figure 8: The RFC Forecasts Subpanel of the Estimation Steps Panel.

3.7.1 Components

- Summary of Available RFC Forecast Data Table:** Allows the user to select MEFP locations for which to perform the step and view for which locations the step has been performed. It is a **Generic Summary Table** (Section 3.2.5.1) and includes all the standard columns and buttons. Note that, for the ‘Status’ column, a  indicates that the archived data files were imported, whereas  indicates that the archived data files were constructed by MEFPPE using archive database data. The following additional editable columns are included: the ‘ADB Location ID’ and one (precipitation) or two (temperature) ‘SHEF Code’ columns. For temperature, the names of the SHEF code columns are ‘TMIN SHEF Code’ and ‘TMAX SHEF Code’. The extra columns identify the rows of the vfympairs table within the archive database that will be extracted and used to create the archive forecast file. Cell values for the additional columns can be edited directly (click and type). The SHEF code columns can also be edited via the **Edit Forecast PEDTSEP Code Dialog** (see below).
- Edit Forecast PEDTSEP Code Dialog:** Allows the user to specify a SHEF code column value for cell. It is accessed by clicking on a cell to edit and selecting the “Open Editor” menu item:

bprc1nur	MAP	38.200	-119.400		bprc1nur	PPQ_ZZ
mfac1llf	MAP	39.020	-120.600		mfac1llf	PPQ_ZZ
mfac1luf	MAP	39.050	-120.450		mfac1luf	Open Editor
nfdc1hlf	MAP	39.110	-120.820		nfdc1hlf	Copy to All

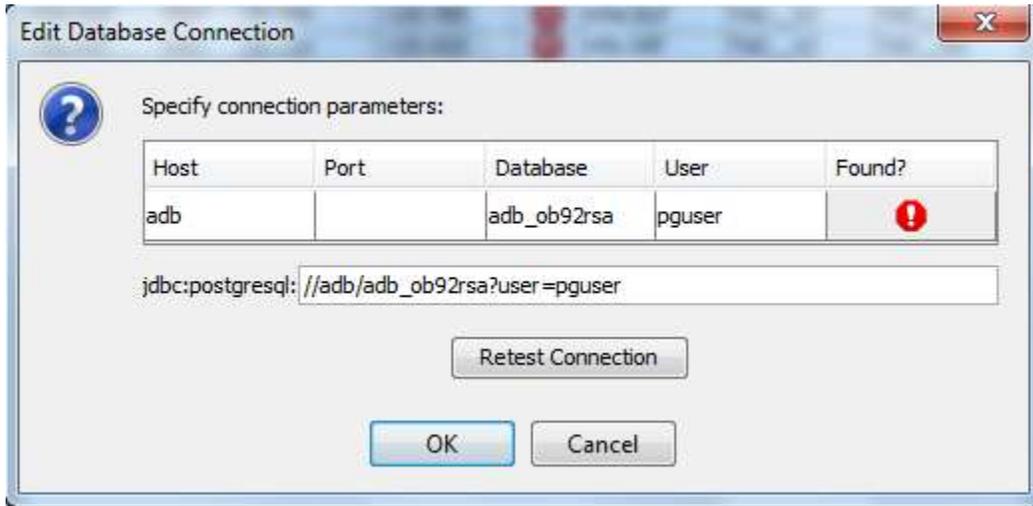
The dialog appears as follows:



The ‘SHEF Code’ cell value is edited by editing the contents of the table provided in the dialog (click in a cell and type the entry). The ‘D’uration and ‘P’obability cell values cannot be edited. The duration must always be Q (6-hourly) for precipitation data and D (daily) for temperature data, while the probability must always be Z. See Section 3.7.3.3 for more details.

-  **Edit Archive Database Connection Button:** Allows the user to edit the connection used for the archive database. A status icon is included within the larger button icon:  indicates a successful connection, while  indicates a bad connection. The archive database cannot be accessed in order to construct archive forecast files unless the

connection is successful. Clicking on the button opens up an **Edit Database Connection Dialog** to edit the connection parameters:



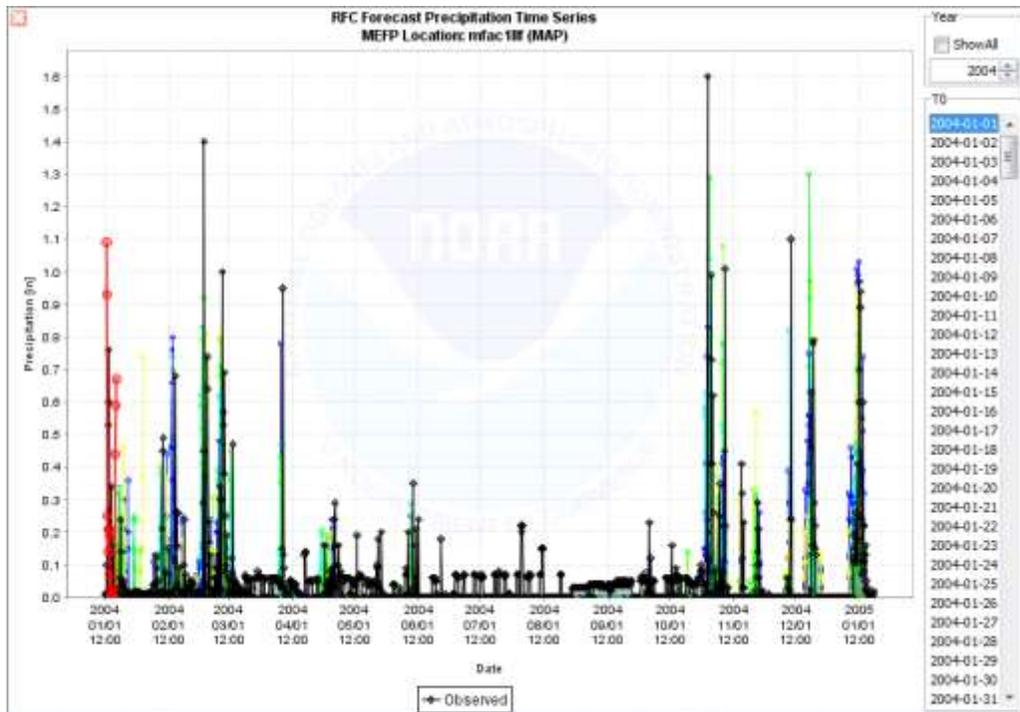
By default, all cells of the **Specify Connection Parameters Table** will be empty, except for the 'Database' cell which will be filled with a default value of "DATABASENAME". For more details on how to connect to the archive database, see Section 3.7.3.1.

-  **View Button:** Displays diagnostics for a single MEFP location selected in the **Summary of Available RFC Forecast Data Table**.
-  **Import Prepared RFC Forecast Files Button:** Click to import externally constructed RFC archive forecast files. When clicked, a **Choose Directory Dialog** will be opened. Navigate to the directory to import and click **Import Directory**. For more details, see Section 3.7.3.4.

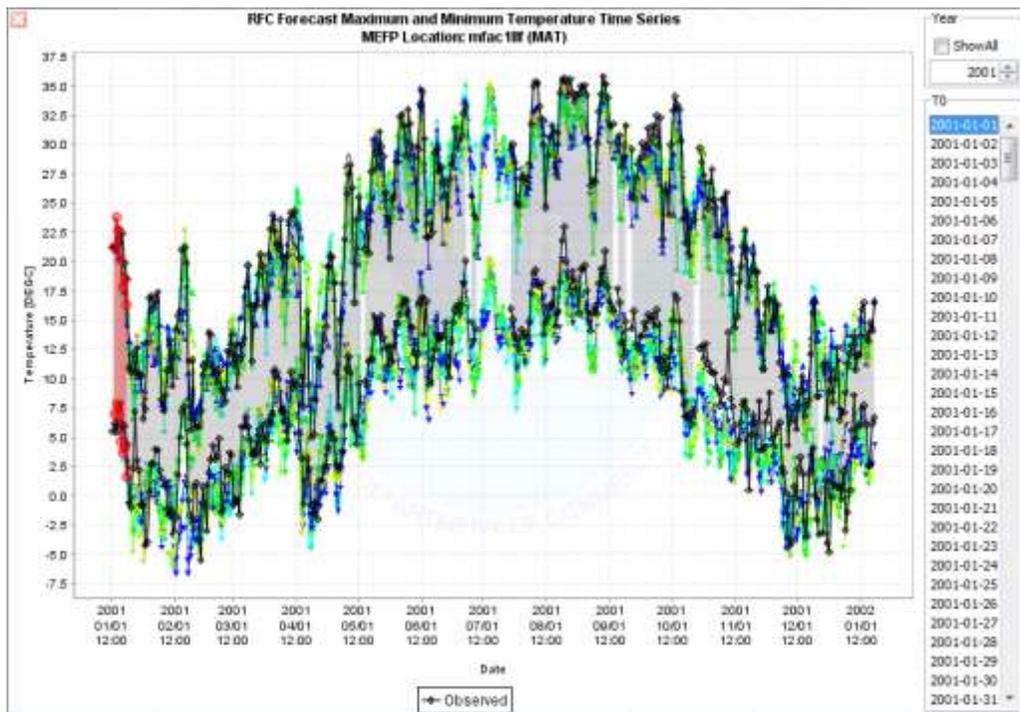
3.7.2 Diagnostics

The current diagnostic displays provided when the **View Button** is clicked for the RFC archived data are designed primarily for data quality control. Both display the archived forecast time series along with archived observed time series, all provided in the RFC archived data files. The chart is displayed within a standard **Archive/Reforecast Time Series Diagnostic Display Panel** (Section 3.2.5.3).

For precipitation, the displayed forecast and observed time series are 6-hour accumulated precipitation time series. For example:



For temperature, the displayed forecast and observed time series are 24-hour minimum and maximum temperatures. The area between corresponding minimum and maximum values is shaded for the observed data (dark gray), as well as selected (i.e., emphasized) time series. For example:



3.7.3 Usage

3.7.3.1 Using IVP to Pair RFC QPF/QTF Forecasts

The MEFPPE acquires archived forecast and observed values, including precipitation and minimum and maximum temperatures, from the vfypairs table of the archive database. The vfypairs table is populated by the Interactive Verification Program, delivered with AWIPS. Documentation is made available on the NWS website:

http://www.nws.noaa.gov/oh/hrl/verification/verification_doc_ob82.php

The general steps to be following to populate the vfypairs table of the archive database so that MEFPPE can find the required archived forecast is as follows:

1. Identify the archive database connection information. This is best done by determining the values of apps-defaults tokens as follows:

Host machine: identify the value of the apps-defaults token rax_pghost; typically “ax”.

Database name: identify the value of the apps-defaults token adb_name; typically “adb_ob” followed by text identifying the AWIPS release and three-letter RFC code. For example, adb_ob7rsa.

User name: typically “pguser”.

2. Import all necessary archive database into the archive database. This should be done via the standard SHEF importing tools. The data required is as follows:

Precipitation: 6-hour accumulated precipitation amounts, both forecast and observed. The SHEF code must include a duration code of “Q” and a probability code of “Z”. The physical element will likely be “PP” while the extremum will be “Z”. The type sources will vary between forecast and observed.

Temperature: 24-hour minimum and maximum temperature values, both forecast and observed. The SHEF code must include a duration code of “D” and a probability code of “Z”. The physical element will likely be “” while the extremum will be “N” for minimum and “X” for maximum temperatures. The type sources will vary between forecast and observed.

Note the SHEF codes used for both the forecast and observed data, as they are needed in order to configure IVP to populate the vfypairs table.

3. Log onto the archive database host machine.
4. Use the Vfyrinfo Editor and add verification locations in order to build pairs of forecasts and observations. For instructions on using the Vfyrinfo Editor, check Section 7 of the user’s manual:

<http://www.nws.noaa.gov/oh/hrl/verification/ob8/VfyrinfoEditorGUI.pdf>

5. Construct a pairing batch file for the IVP Batch Program. The following is an example that will construct all pairs for locations AAAAA, BBBB, and CCCCC and physical elements PP and TA where the type source of the 6-hour accumulated precipitation forecasts and 24-hour minimum and maximum temperatures is FF:

```
# Define the pairing parameters for a run for 12 years, turning
# persistence off as it is not needed for MEFPPE.
START_TIME = "2000-01-01 00:00:00"
END_TIME = "2011-12-31 00:00:00"
PERSISTENCE = OFF

# Specify locations for pairing and execute the pairing for
# precipitation.
LOCATION = "AAAAA, BBBB, CCCCC"
FCST_TS = "FF"
PE = "PP"
DUR = "Q"
EXTREMUM = "Z"
BUILD_PAIRS = true

# Specify locations for pairing and execute the pairing for
# temperature.
LOCATION = "AAAAA, BBBB, CCCCC"
FCST_TS = "FF"
PE = "TA"
DUR = "Q"
EXTREMUM = "N,X"
BUILD_PAIRS = true
```

6. Execute the IVP Batch Program to build the pairs. For more information, check the manual:

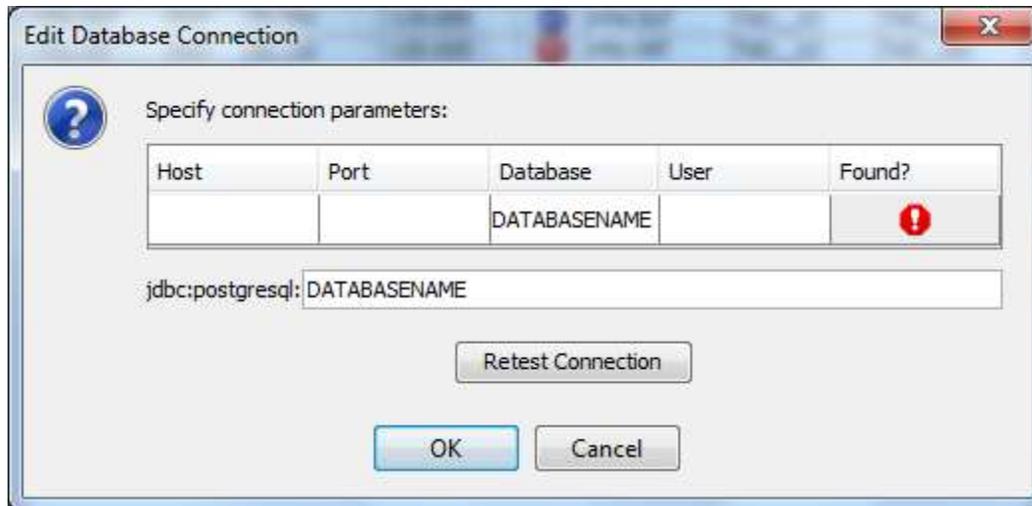
<http://www.nws.noaa.gov/oh/hrl/verification/ob8/PairingBatch.pdf>

Upon completion of Step 6, the vfpairs table should be adequately populated for use by MEFPPE in constructing RFC archived forecast data files.

3.7.3.2 Specifying the Archive Database Connection

To specify the archive database connection so that the MEFPPE can acquire the needed data from the archived database, do the following:

1. Click on the **Edit Archive Database Connection Button**. The **Edit Database Connection Dialog** with open with either empty connection settings or settings that were defined previously:



2. Enter (click, type, and press <Enter>) the archive database (or RAX) host machine name in the 'Host' cell. Typically this should be set to "ax".
3. Leave the 'Port' cell empty.
4. Enter the archive database name in the 'Database' cell. Typically this should be set to something similar to "adb_ob####".
5. Enter a valid database user into the 'User' cell. Typically this should be set to pguser. Upon pressing <Enter> after entering the user, MEFPPE will attempt to make a connection. If successful, the 'Found?' cell image will display . If unsuccessful, it will display .
6. Click **OK** to accept the database connection settings.

To retest the connection at any time, click the **Retest Connection Button**.

3.7.3.3 Constructing Archive Files Using Archive Database Data

In order for MEFPPE to build RFC archived data files, QPF/QTF forecast-observed pairs must be available in the archive (RAX) database vfypairs table (see Section 3.7.3.1). If that is the case, then identify the lid and SHEF code used to store the data in the archive database. Then do the following in order to make MEFPPE generate the files:

1. In the **Summary of Available RFC Forecast Data Table**, select the row for the location for which RFC archived files will be generated.
2. Click on the cell for 'ADB Location ID', and enter the lid used in the archive database vfypairs table for the data to use. Press <Enter> when done.
3. Click on the cell for 'SHEF Code' and edit it to be the SHEF code used in the archive database vfypairs table for the data to use. The cell can be modified by editing it directly (type in the code and press <Enter>) or via the **Edit Forecast PEDTSEP Code Dialog** (see Section 3.7.1). For precipitation, one 'SHEF Code' cell must be modified. For temperature, two 'SHEF Code' cell must be modified: one for 24-hour minimum temperature (TMIN), and one for 24-hour maximum temperature (TMAX).
4. Ensure that the archive database connection properly specified (Section 3.7.3.2).
5. Click on the **Perform Step Button** of the **Estimation Steps Panel**. See Section 3.4.2.1 for details.

3.7.3.4 Importing Files Constructed Externally

In order to import RFC archived files, properly formatted files must be constructed and placed in an acceptable directory structure. The process begins by choosing a directory to be the <import directory> and creating this directory structure:

```
<import directory>/...  
  rfc_pfcst06  
  rfc_pobs06  
  rfc_tfctst  
  rfc_tobs
```

Note that this directory structure may already exist for those who have previously used the eXperimental Ensemble Forecast System (XEFS) Ensemble Pre-Processor 3 (EPP3) software upon which MEFP is based. The first two directories store forecast and observed 6-hour accumulated precipitation amount files, respectively, one file in each directory per location. The latter two directories store forecast and observed 24-hour minimum and maximum temperature files, respectively, two files for each location per directory. All of the needed files must be ASCII and must follow a specific format described below. The names of the files must also follow a specific pattern described below.

After importing, for RFC archive data files to be considered available or ready by MEFPPE for an MEFP location, *all* files must be present for that MEFP location's CHPS location id and parameter id. For precipitation locations, a forecast file under rfc_pfcst06 and an observed file under rfc_pobs06 must be present. For temperature, minimum and maximum forecast files under rfc_tfctst and minimum and maximum observed files under rfc_tobs must be present.

The pages that follow described required file formats for the different file types.

6-hour Accumulated Precipitation Forecast Files:

Directory: <import directory>/rfc_pfcst06

File Naming Convention: <MEFP locationId>.pfcst06

Example: NFDC1HUF.pfcst06

Header:

The header of the file is optional and specifies properties of the data. The properties are provided in lines of this format:

```
<key> = <value>
```

If the header exists, it must be closed with an end line:

```
end
```

The following properties are valid (default values used if the property is not provided are specified in parentheses):

- **units:** The units of the measurements, either “in” or “mm”. (default: “in”; data is converted to mm when read in prior to estimating parameters).
- **nfcstdays:** The number of days of forecast values. A positive integer not greater than 5. There is no default: the parameter is required!
- **iy:** The initial year of data available, a four digit year. (default: determined from the data in the file)
- **ly:** The last year of data available, a four digit year. (default: determined from the data in the file)

Example:

```
units = (in/mm)
nfcstdays = 5
end
```

Data:

Every line of the file following the header must specify a single forecast time series (<> are used to separate the fields; do not include them in the text):

```
<T0: YYYYMMDD><####.##><####.##><####.##>...<####.##>
```

The first field is the T0 forecast day (YYYYMMDD format) and it is followed by one space. Starting at the 10th character, forecast values are provided that are 7 characters wide allowing for two decimal places. There must be a number of forecast values equal to nfcstdays multiplied by 4. The forecast time, or basis time, of each forecast time series must be 12Z, with the first value of the line having a valid time of 18Z. Time steps between values must be 6 hours, so that the valid times of following values are 0Z, 6Z, 12Z, etc.

Example:

```

19991231  -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -
99.99 -99.99 -99.99 -99.99  0.00  0.00  0.00  0.00  0.00  0.00
0.00  0.00
20000101   0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
0.00  0.00  0.00  0.00  0.00  0.07  0.07  0.00  0.00  0.00
0.00  0.00
...

```

Full File Example:

```

units = in
nfcstdays = 5
end
19991231  -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -99.99 -
99.99 -99.99 -99.99  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
0.00  0.00  0.00  0.00  0.07  0.07  0.00  0.00  0.00  0.00  0.00
20000102   0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.18
0.09  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
20000103   0.00  0.00  0.00  0.00  0.00  0.18  0.09  0.00  0.00  0.00
0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
...

```

6-hour Accumulated Precipitation Observed Files:

Directory: <import directory>/rfc_pobs06

File Naming Convention: <MEFP locationId>.pobs06

Example: NFDC1HUF.pobs06

Header:

The header of the file is optional and specifies properties of the data. The properties are provided in lines of this format:

```
<key> = <value>
```

If the header exists, it must be closed with an end line:

```
end
```

The following properties are valid (default values used if the property is not provided are specified in parentheses):

- units: The units of the measurements, either “in” or “mm”. (default: “in”).
- iyr: The initial year of data available, a four digit year. (default: determined from the data in the file)
- oyr: The last year of data available, a four digit year. (default: determined from the data in the file)

Example:

```
units = in  
end
```

Data :

Every line of the file must specify one day of observed data:

```
<T0: YYYYMMDD> <####.##><####.##><####.##><####.##>
```

The first field is the observation day (YYYYMMDD format) of the last value of the line (or the end of the 24-hour period). It is followed by one space. Then, starting at the 10th character, four observed values are provided that are 7 characters wide allowing for two decimal places. The observation times of the four values must be 18Z (of the day preceding the observation day shown in field 1), 0Z, 6Z, and 12Z.

In the last line of the example below, the value 0.08 in was observed at 18Z on 1/3/2000, while 0.06 in was observed on 12Z of 1/4/2000.

Example:

```
20000101  -99.99 -99.99 -99.99 -99.99  
20000102  -99.99 -99.99 -99.99 -99.99  
20000103  -99.99 -99.99 -99.99 -99.99  
20000104   0.08  0.03  0.00  0.06
```

Full File Example:

```
units = in
end
20000101  -99.99 -99.99 -99.99 -99.99
20000102  -99.99 -99.99 -99.99 -99.99
20000103  -99.99 -99.99 -99.99 -99.99
20000104   0.08  0.03  0.00  0.06
...
```

24-hour Minimum and Maximum Temperature Forecast Files:

Directory: <import directory>/rfc_tfcst

File Naming Convention: <MEFP locationId>.rfctmncfst (minimum temperature)
<MEFP locationId>.rfctmxfcst (maximum temperature)

Examples: NFDC1HUF.rfctmncfst, NFDC1HUF.rfctmxfcst

Header:

Each file includes a two line header that must obey strict column widths:

Header Line 1:

Columns 1 – 8: location identifier (ex: APCSYN)

9 – 10: spaces

11 – 15: number of RFC forecast days (ex: “ 7”).

16 – 24: longitude (4 decimal places and do not include a negative sign; ex: “122.4700”).

25 – 33: latitude (4 decimal places; ex: “ 38.5000”).

34 – 39: elevation (missing is allowed; ex: “-9999”).

40 – 41: spaces

42 – 61: location descriptive name (ex: “NAPA SYN TEMP”).

Header Line 2:

1 – 8: Begin date of data (YYYYMMDD; ex: “20010101”)

9 – 10: spaces

11 – 18: End date of data (YYYYMMDD; ex: “20100222”)

Example:

```
APCSYN          7 122.4700  38.5000 -9999  NAPA SYN TEMP
20010101  20100222
```

Data:

Every line of the file must specify a single forecast time series (<> are used to separate the fields; do not include them in the text):

```
<T0: YYYYMMDD><#####.><#####.><#####.>...<#####.>
```

The first field is the T0 forecast day (YYYYMMDD format). Then, starting at the 9th character, forecast values are provided that are 6 characters wide allowing for one decimal place. Each line must specify a number of values equal to the number of RFC forecast days specified in the header. The values listed are 24-hour minimum or maximum values, where a day is defined as 12Z – 12Z.

Example:

```
20010101 -12.0  -9.3 -11.2  -9.3  -9.1  -9.8  -9.6
20010102 -10.5 -10.8 -10.2  -8.0  -7.7  -6.7  -8.5
```

Full File Example:

```
APCSYN          7 122.4700  38.5000 -9999  NAPA SYN TEMP
20010101  20100222
20010101 -12.0  -9.3 -11.2  -9.3  -9.1  -9.8  -9.6
20010102 -10.5 -10.8 -10.2  -8.0  -7.7  -6.7  -8.5
...
```

24-hour Minimum and Maximum Temperature Observed Files:

Directory: <import directory>/rfc_tobs

File Naming Convention: <MEFP locationId>.rfctmnobs (minimum temperature)
<MEFP locationId>.rfctmxobs(maximum temperature)

Examples: NFDC1HUF.rfctmnobs, NFDC1HUF.rfctmxobs

Header:

Each file includes a two line header that must obey strict column widths:

Header Line 1:

Columns 1 – 8: location identifier (ex: APCSYN)

9 – 10: spaces

11 – 19: longitude (4 decimal places and do not include a negative sign; ex: “122.4700”).

20 – 28: latitude (4 decimal places; ex: “ 38.5000”).

29 – 34: elevation (missing is allowed; ex: “-9999”).

35 – 36: spaces

37 – 56: location descriptive name (ex: “NAPA SYN TEMP ”).

Header Line 2:

1 – 8: Begin date of data (YYYYMMDD; ex: “20010101”)

9 – 10: spaces

11 – 18: End date of data (YYYYMMDD; ex: “20100222”)

Example:

```
APCSYN      122.4700  38.5000 -9999  NAPA SYN TEMP
20010101    20100222
```

Data:

Every line of the file must specify a single forecast time series (<> are used to separate the fields; do not include them in the text):

```
<T0: YYYYMMDD><####.#>
```

The first field is the observation day (YYYYMMDD format), which is the day marking the end of the observed 12Z – 12Z period. Then, starting at the 9th character, one observed value is provided that is 6 characters wide allowing for one decimal place.

Example:

```
20010101 -13.8
20010102 -13.2
20010103 -14.9
```

Full File Example:

```
APCSYN      122.4700  38.5000 -9999  NAPA SYN TEMP
20010101    20100222
20010101 -13.8
20010102 -13.2
20010103 -14.9
...
```

3.8 GFS Subpanel

The **GFS Subpanel** of the **Estimation Steps Panel**, shown in Figure 9, is used to perform Step 4 of the parameter estimation procedure in Section 3.2.3: acquire GFS reforecast data files. For precipitation, the GFS reforecast files specify the ensemble mean of the 24-hour (12Z – 12Z) accumulated precipitation time series for 14-day forecasts. For temperature, the GFS reforecast files specify the ensemble mean of the 24-hour (12Z – 12Z) minimum and maximum temperature time series for 14-day forecasts.

Location ID	Parameter ID	Used Lat	Used Lon	Status
AKYC1HOF	MAP	38.7400017	-120.1600037	✓
APCC1LOF	MAP	38.4599991	-122.3799973	!
ARCC1LOF	MAP	40.6500015	-123.750	!
AROC1LOF	MAP	36.9500008	-121.3899994	!
bprc1hlf	MAP	38.250	-119.500	✓
bprc1huf	MAP	38.250	-119.500	✓
mfac1llf	MAP	39.0468	-120.5727	✓
mfac1luf	MAP	39.0468	-120.5727	✓
nfdc1hlf	MAP	39.1785	-120.7214	✓
nfdc1huf	MAP	39.1785	-120.7214	✓
tmdc1hlf	MAP	36.500	-118.800	✓
tmdc1huf	MAP	36.500	-118.650	✓
vrvclhof	MAP	34.470	-119.310	✓

Figure 9: The GFS Subpanel of the Estimation Steps Panel.

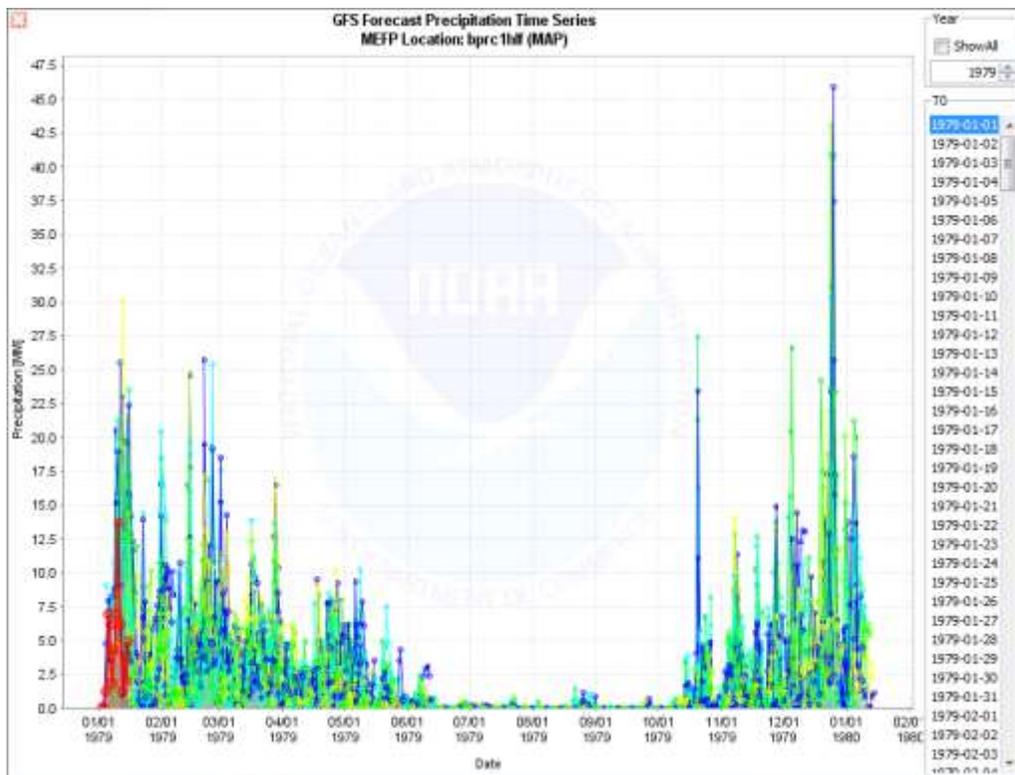
3.8.1 Components

- **Summary of Available GFS Forecast Data Table:** Allows the user to select MEFP locations for which to perform the step and view for which locations the step has been performed. It is a **Generic Summary Table** (Section 3.2.5.1) and includes all the standard buttons.
-  **View Button:** Displays diagnostics for a single MEFP location selected in the **Summary of Available GFS Forecast Data Table**.

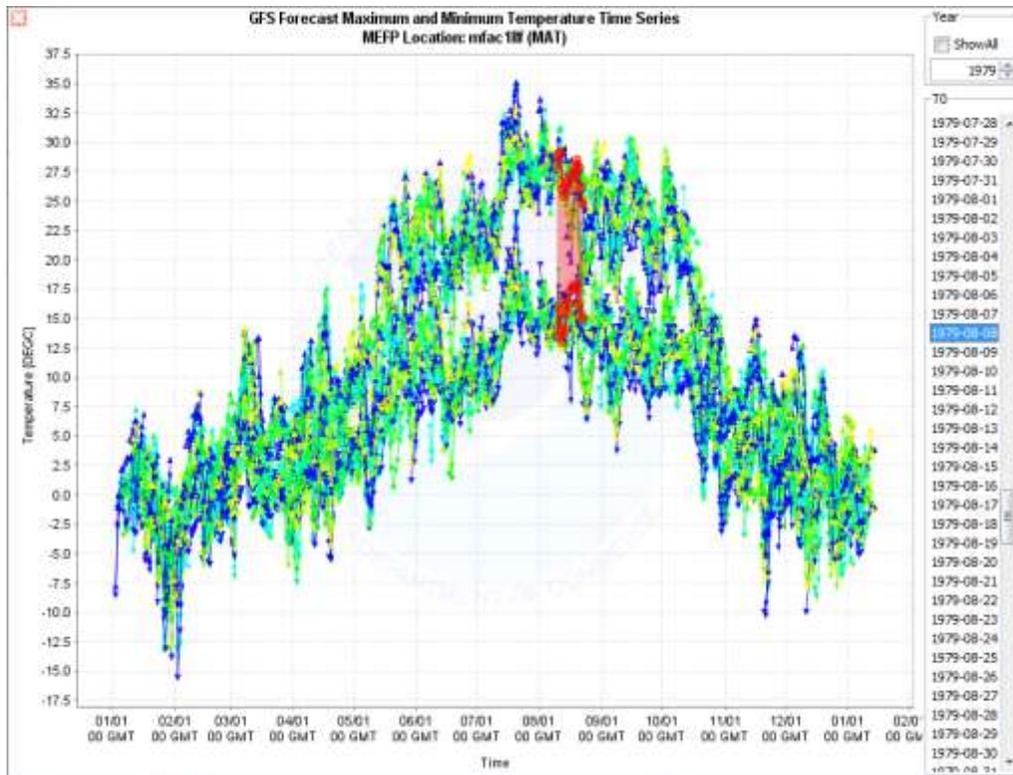
3.8.2 Diagnostics

The current diagnostic displays provided when the **View Button** is clicked for the GFS reforecast data are designed primarily for data quality control. Both diagnostics display the reforecast time series only (no observations are included). The charts are displayed within a standard **Archive/Reforecast Time Series Diagnostic Display Panel** (Section 3.2.5.3).

For precipitation, the displayed forecast and observed time series are 6-hour accumulated precipitation time series. For example:



For temperature, the displayed forecast and observed time series are 24-hour minimum and maximum temperatures. The area between corresponding minimum and maximum values is shaded only for selected (i.e., emphasized) time series. For example:



3.8.3 Usage

3.8.3.1 Downloading GFS Reforecast Files

GFS reforecast data is acquired via SFTP; see Section **Error! Reference source not found.** To download files, select one or more locations from the **Summary of Available GFS Forecast Data Table** and click on the **Perform Step Button**. See Section 3.4.2.1 for details on how to perform a step using the **Perform Step Button** of the **Estimation Steps Panel**.

3.9 CFSv2 Subpanel

The **CFSv2 Subpanel** of the **Estimation Steps Panel**, shown in Figure 10, is used to perform Step 5 of the parameter estimation procedure in Section 3.2.3: acquire CFSv2 reforecast data files. There are two types of reforecast files: submonthly files specifying 60 days of 6-hour single-valued forecasts, and monthly files specifying 30-day accumulated values for the entire lagged ensemble used for each reforecast time. For precipitation, the CFSv2 reforecast files specify the time series of accumulated precipitation amounts (6-hourly for submonthly files, 30-days for monthly files). For temperature, the CFSv2 reforecast files specify the time series of minimum and maximum temperatures (6-hourly for submonthly files, 30-day for monthly files).

Location ID	Parameter ID	Used Lat	Used Lon	Status
AKYC1HOF	MAP	38.7400017	-120.1600037	✓
APCC1LOF	MAP	38.4599991	-122.3799973	!
ARCC1LOF	MAP	40.6500015	-123.750	!
AROC1LOF	MAP	36.9500008	-121.3899994	!
bprc1hlf	MAP	38.250	-119.500	✓
bprc1huf	MAP	38.250	-119.500	✓
mfac1llf	MAP	39.0468	38.250 -120.5727	✓
mfac1luf	MAP	39.0468	-120.5727	✓
nfdc1hlf	MAP	39.1785	-120.7214	✓
nfdc1huf	MAP	39.1785	-120.7214	✓
tmdc1hlf	MAP	36.500	-118.800	✓
tmdc1huf	MAP	36.500	-118.650	✓
vrvclhof	MAP	34.470	-119.310	✓

Figure 10: The CFSv2 Subpanel of the Estimation Steps Panel.

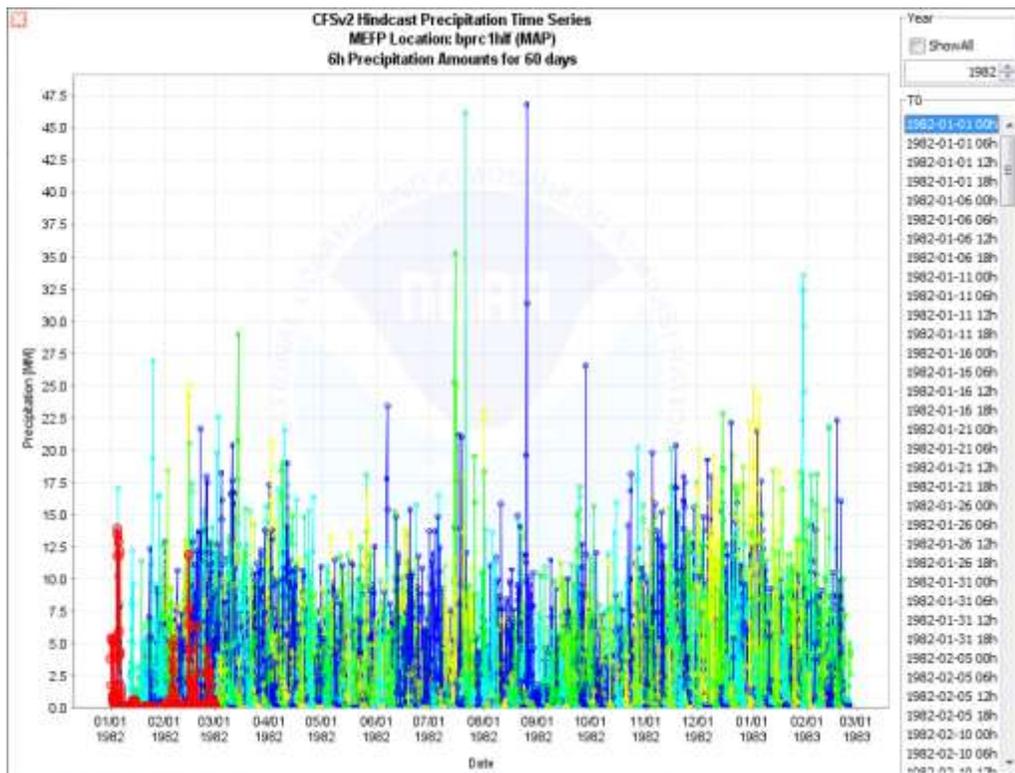
3.9.1 Components

- **Summary of Available CFSv2 Forecast Data Table:** Allows the user to select MEFP locations for which to perform the step and view for which locations the step has been performed. It is a **Generic Summary Table** (Section 3.2.5.1) and includes all the standard buttons.
-  **View Submonthly Button:** Displays submonthly diagnostics for a single MEFP location selected in the **Summary of Available CFSv2 Forecast Data Table**.
-  **View Monthly Button:** Displays monthly diagnostics for a single MEFP location selected in the **Summary of Available GFS Forecast Data Table**.

3.9.2 Diagnostics

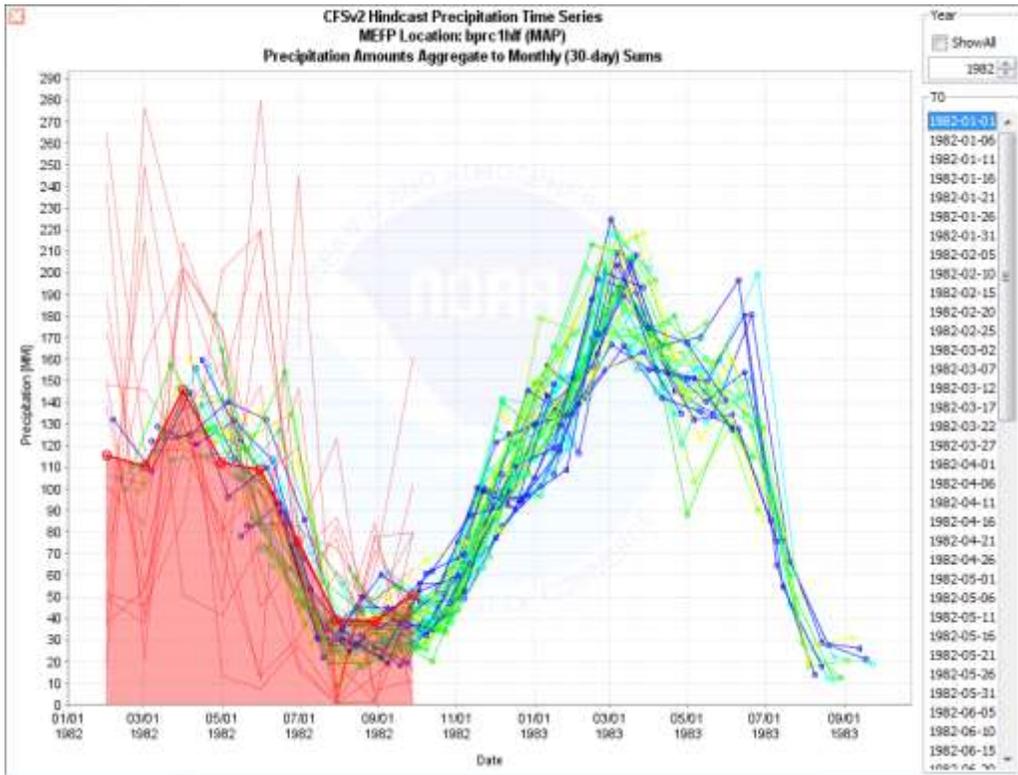
The current diagnostic displays provided when the **View Button** is clicked for the CFSv2 reforecast data are designed primarily for data quality control. All diagnostics display the reforecast time series only (no observations are included). The diagnostic charts are displayed within a standard **Archive/Reforecast Time Series Diagnostic Display Panel** (Section 3.2.5.3).

For precipitation submonthly diagnostics, the displayed forecast time series are 6-hour accumulated precipitation time series. For example:

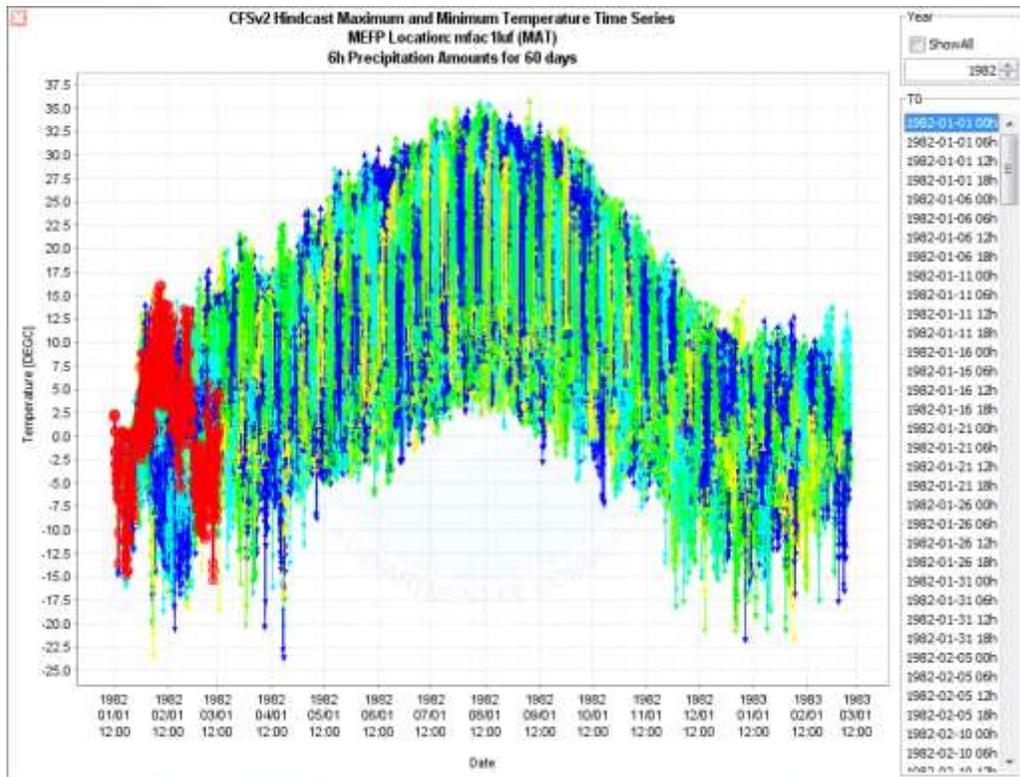


For monthly diagnostics, the displayed forecast time series are 30-day accumulated precipitation time series. For a selected (i.e., emphasized) reforecast TO, the entire lagged ensemble is shown

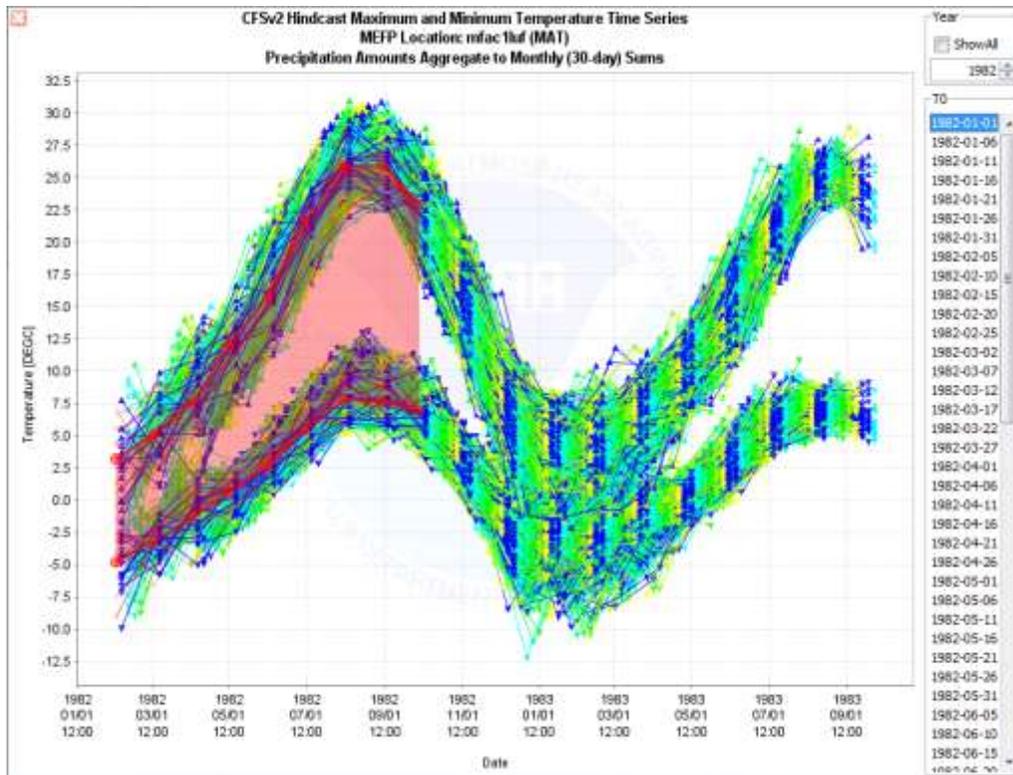
as thin red lines and the ensemble mean is shown as a thick red line with a shaded region. For example:



For temperature, the displayed forecast time series are 6-hour minimum and maximum temperature time series. The area between corresponding minimum and maximum values is shaded only for selected (i.e., emphasized) time series. For example:



For monthly diagnostics, the displayed forecast time series are 30-day accumulated minimum and maximum temperature time series. For a selected (i.e., emphasized) reforecast TO, the entire lagged ensembles for both minimum and maximum are shown as thin red lines and the ensemble means are shown as a thick red lines with a shaded region between corresponding minimum and maximum ensemble mean values. For example:



3.9.3 Usage

3.9.3.1 Downloading CFSv2 Reforecast Files

CFSv2 reforecast data is acquired via SFTP; see Section **Error! Reference source not found..** To download files, select one or more locations from the **Summary of Available CFSv2 Forecast Data Table** and click on the **Perform Step Button**. See Section 3.4.2.1 for details on how to perform a step using the **Perform Step Button** of the **Estimation Steps Panel**.

3.10 Estimation Subpanel

The **Estimation Subpanel** of the **Estimation Steps Panel**, shown in Figure 11, is used to perform Step 6 of the parameter estimation procedure in Section 3.2.3: estimate parameters. The panel includes two subpanels: the **Locations Summary Subpanel** and **Estimation Options Subpanel**. Each subpanel and components are described below.

The screenshot displays the 'Estimation' tab of a software interface. It features two subpanels: 'Locations Summary' and 'Estimation Options'.

Locations Summary Subpanel: Titled 'Summary of Estimated Parameters Availability', it contains a table with the following data:

Location ID	Param...	Used Lat	Used Lon	Status	Log File?	Backup?
AKYC1HOF	MAP	38.7400017	-120.1600037	!	!	!
APCC1LOF	MAP	38.4599991	-122.3799973	!	!	!
ARCC1LOF	MAP	40.6500015	-123.750	!	!	!
AROC1LOF	MAP	36.9500008	-121.3899994	!	!	!
bprc1hlf	MAP	38.250	-119.500	!	!	!
bprc1huf	MAP	38.250	-119.500	!	!	!
mfac1lhf	MAP	39.0468	-120.5727	!	!	!
mfac1luf	MAP	39.0468	-120.5727	!	!	!
nfdc1hlf	MAP	39.1785	-120.7214	!	!	!
nfdc1huf	MAP	39.1785	-120.7214	!	!	!
tmdc1hlf	MAP	36.500	-118.800	!	✓	!
tmdc1huf	MAP	36.500	-118.650	!	!	!

Estimation Options Subpanel: Titled 'Parameter Summary Information for mfac1lhf (MAP)', it includes a 'Select Forecast Source' dropdown set to 'RFC QPF/QTF Forecasts' and a table with the following data:

Parameter Type	# Days	# Ev...	Minimum	Maximum
MAP Average of Observations	365	34	0.4948	2.3737
MAP Average of Forecasts	365	34	0.1053	2.1197
MAP Zero Threshold for Observations	365	34	0.2699	1.524
MAP Probability of Precipitation for Observ...	365	34	0.1761	0.5994
MAP Average of Observations Above Zero ...	365	34	1.0004	8.9544
MAP Coeff. of Variation of Observations A...	365	34	0.9128	1.3844
MAP Zero Threshold for Forecasts	365	34	0.0088	0.755
MAP Probability of Precipitation for Forecasts	365	34	0.1621	0.5106
MAP Average of Forecasts Above Zero Thr...	365	34	0.9483	9.5546
MAP Coeff. of Variation of Forecasts Abov...	365	34	0.8003	1.2264
MAP Correlation (Rho) Between Forecasts ...	365	34	0.5174	0.9565
MAP Number of Observations	365	34	297	364

At the bottom of the subpanel, a text box displays: 'MAP Correlation (Rho) Between Forecasts and Observations'.

Figure 11: The Estimation Subpanel of the Estimation Steps Panel.

3.10.1 Locations Summary Subpanel

The **Locations Summary Subpanel**, shown in Figure 11, summarizes the status of estimation for all locations for the active estimation data type and allows the user view log files, delete parameters, backup parameters, restore parameters, and select diagnostics to display.

3.10.1.1 Parameter File Backups

The MEFPPE allows for *one* set of backup parameters per location. Whenever estimation is performed for selected MEFP locations, if parameters have already been estimated for those locations, they will be backed-up, while any parameters that were backed-up will be discarded. Those newly backed-up parameters can later be restored if the new active parameters just estimated prove to be less desirable.

3.10.1.2 Components

- **Summary of Estimated Parameters Availability Table:** Allows the user to select MEFP locations for which to perform the step and view for which locations the step has been performed. It is a **Generic Summary Table** (Section 3.2.5.1) and includes all the standard buttons. Furthermore, it includes two additional columns: the ‘Log File?’ column indicates if a log file is present for the current estimated parameters; the ‘Backup?’ column indicates if backup parameters exist for the selected location.
-  **View Log File Button:** Allows the user to view the contents of the log file for the estimated parameters. It opens up an **Estimation Log File Dialog** displaying the contents.

NOTE: For Development Release 1, do not view log files for estimated parameters for temperature. This is due to memory limitations and the vast amount of information in the log files. Instead, the log files can be viewed directly under Models/hefs/mefppeRunArea/parameters/logFiles.

-  **Load Parameters Button:** Click to load parameters for one selected location from the **Summary of Estimated Parameters Availability Table**. Upon loading, the **Parameters Summary Information Table** (below) will be updated to reflect the loaded parameters.
-  **Restore Parameters Button:** Click to restore backup parameters for selected MEFP locations. For the selected locations, the active and backed-up parameters will be swapped, making the backup parameters active and vice-versa. A **Continue? Dialog** will be opened allowing the user to confirm the restore.
-  **Remove Parameters Button:** Click to remove the active parameters. A **Backup Parameters? Dialog** will open asking if the user wants to make the parameters backup parameters. If **Yes** is clicked, the parameters are backed-up. If **No** is clicked, the parameters are discarded. If **Cancel** is clicked, the remove is not performed.

- **Select Forecast Source Choice Box:** Allows the user to select the forecast source for which to view parameter summary information within the **Parameter Summary Information Table** (below).
- **Parameter Summary Information Table:** Displays the parameters loaded from the parameter files. The table allows for multiple selections. The following columns are provided:
 - ‘Parameter Type’: A descriptive name of the parameter.
 - ‘# Days’: The number of days of the year for which parameters were found.
 - ‘# Events’: The number of canonical events for which parameters were found.
 - ‘Minimum’: The smallest overall value found for all days of the year and canonical events for the corresponding parameter.
 - ‘Maximum’: The largest overall value found for all days of the year and canonical events for the corresponding parameter.
-  **View Button:** Click to view the parameters for selected rows from the **Parameter Summary Information Table**.

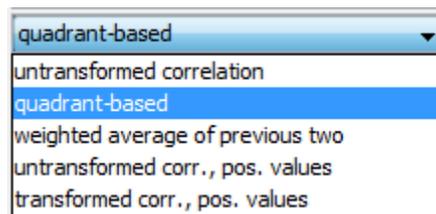
3.10.2 Estimation Options Subpanel

The **Estimation Options Subpanel** allows for users to specify options for the parameter estimation algorithm. There are three groups of parameters: (1) general options used to estimate parameters for the implicit precipitation treatment algorithm; (2) parameters specific to the explicit precipitation treatment (EPT) algorithm; and (3) source-specific parameters. Each is described below, providing a screenshot of the associated components.

All numerical parameters are edited using text fields with spinners; for example:



The number can be edited by clicking and typing or by clicking on the up or down arrows. All choice-based parameters are edited via choice boxes; for example:



3.10.2.1 General Options

The general options for the MEFP parameter estimation algorithm used to estimate the parameters of the implicit precipitation treatment algorithm are shown in Figure 12. All options are considered advanced, meaning that it is recommended users change the options only after gaining significant experience with the software. Advanced options are described in Section 2.

Minimum Required Observations for Param. Est. (minobs):	0
Minimum Width of Data Window in Days (minwin):	61
Maximum Width of Data Window in Days (maxwin):	61
Correlation computation choice (rho_option):	quadrant-based
Correlation weight (cor_weight):	1
Minimum Required Pos. Obs. for Param. Est. (minposobs):	50
Minimum Required Pos. Fcst for Param. Est. (minPosFcst):	50
Specify the PoP fraction (pop_fraction):	0.97
Specify the max. mean precip. ens. value (pmaxvalue):	254
Specify the max. cond. mean precip. ens. value (cavnmax):	50.8
Interval between days for param. computation (par_interval):	5

Figure 12: General options of the MEFP parameter estimation algorithm for estimating the parameters of the implicit precipitation treatment algorithm.

3.10.2.2 EPT Options

The options of the MEFP parameter estimation algorithm used to estimate parameters of the explicit precipitation treatment algorithm are shown in Figure 13. Parameters are estimated only if the **Estimate EPT Parameter Checkbox** is checked. All options are considered advanced, meaning that it is recommended users change the options only after gaining significant experience with the software. Advanced options are described in Section 2.

<input checked="" type="checkbox"/> Estimate EPT Parameters	
EPT Distribution Type (idtype_epp2):	Pearson Type-III
EPT Objective Function Option (objfun_epp2):	Mean CRPS
Specify the Probability to Use For Percentile Option (prob_epp2):	0.6
Specify the Resid Error Factor (errfactor_epp2):	1
EPT Threshold Type Selection (ithreshopt_epp2):	Fixed
Specify the Fixed Precipitation Zero Threshold (pthresh_epp2):	0.25
Specify Optimization Weight-1 (weight1_epp2):	0
Specify Optimization Weight-2 (weight2_epp2):	0
Specify Optimization Weight-3 (weight3_epp2):	1
EPT Residual Error Use Option (terrstd_epp2):	Sample StdDev

Figure 13: Options of the MEFP parameter estimation algorithm for estimating the parameters of the explicit precipitation treatment (EPT) algorithm.

3.10.2.3 Source Parameters

All forecast sources have source-specific options that are used in the estimation of parameters for both the implicit precipitation treatment algorithm and explicit precipitation treatment algorithm. For example, the components to edit the source specific options for GFS are shown in Figure 14. Distribution parameters, used for all forecast sources, are considered advanced, meaning that it is

recommended users change the options only after gaining significant experience with the software. Advanced options are described in Section 2.

The first three options are not advanced and are common to all forecast sources, though the exact names may differ slightly:

- Number of <Source> Days: The number of forecast lead days for which to estimate parameters. This number must not exceed the number of forecast lead days available:
 - RFC QPF/QTF: 5 days for QPF, 7 days for QTF
 - GFS: 14 days
 - CFSv2: 270 days

- Initial Year of Parameter Estimation: The first year of data included in parameter estimation. The data available for the forecast sources is as follows:
 - RFC QPF/QTF: Varies by RFC
 - GFS: 1979 - 2006
 - CFSv2: 1982 - 2010

- Last Year of Parameter Estimation: The last year of data included in parameter estimation.

The screenshot shows a configuration window for the MEFP parameter estimation algorithm. At the top, there is a checked checkbox labeled "Use GFS Data?". Below this, there are five rows of settings, each with a label and a corresponding input field:

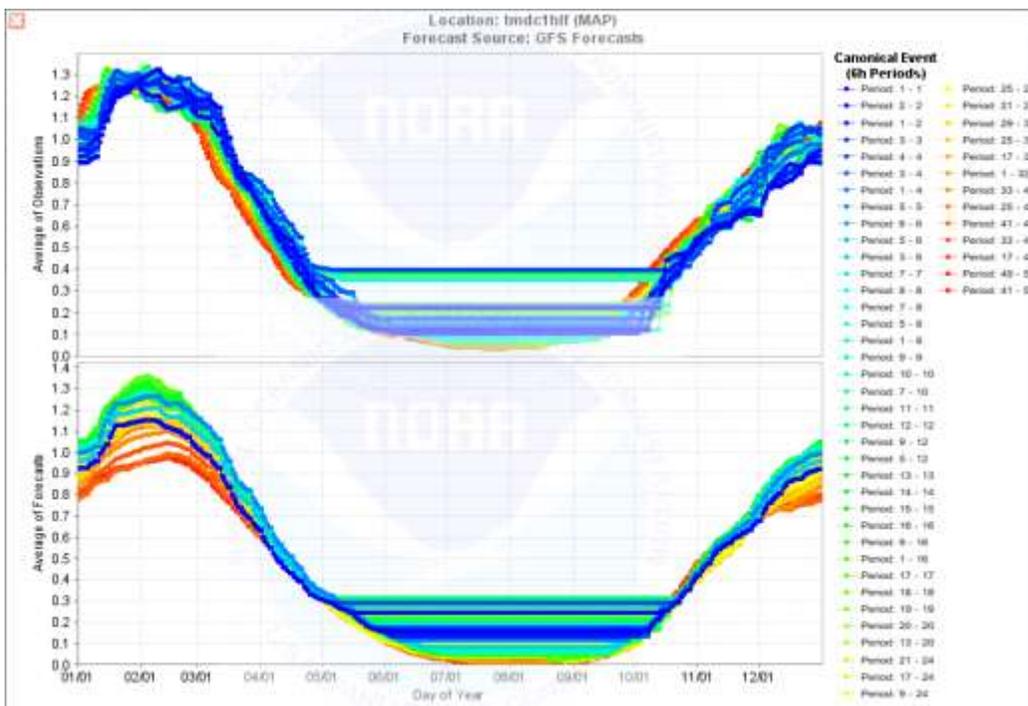
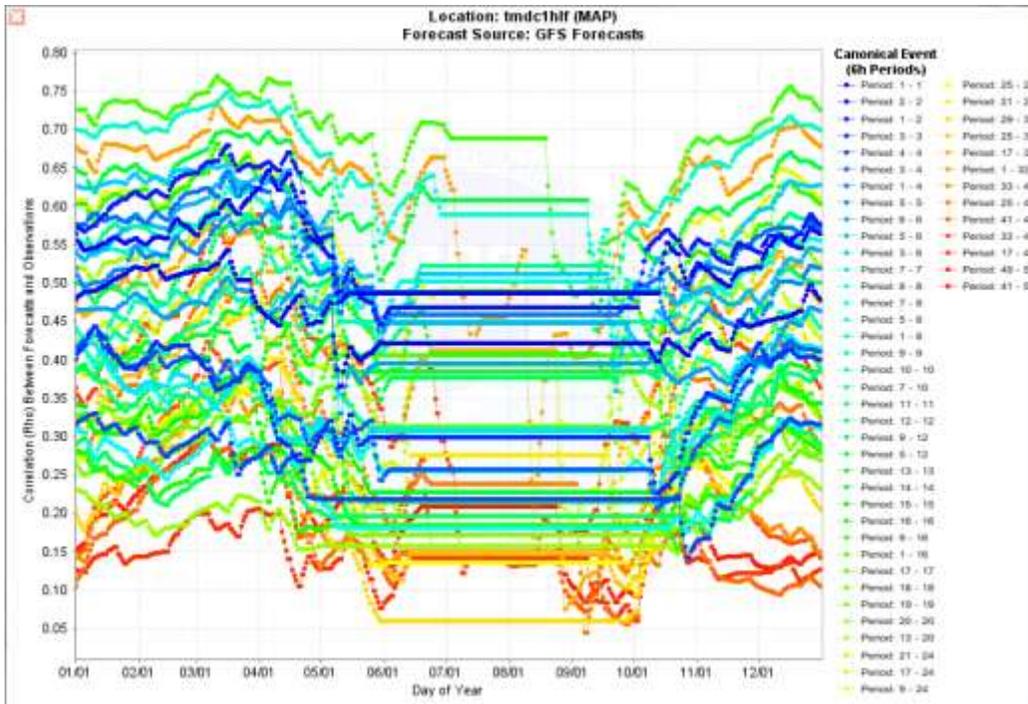
Number of GFS Days (ngfsdays):	14
Initial Year of Parameter Estimation (lyr_gfs_calib):	1979
Last Year of Parameter Estimation (lyr_gfs_calib):	2010
Distribution of Positive Observations (obstran_gfs):	WEIBULL
Distribution of Positive Forecasts (fcsttran_gfs):	WEIBULL

Figure 14: Source specific options of the MEFP parameter estimation algorithm.

3.10.3 Diagnostics

The current diagnostic display provided when the **View Button** is clicked for the estimated parameters are designed primarily for data viewing and quality control. The diagnostic displays parameters selected within the **Parameter Summary Information Table**. The parameter values are displayed against the day of the year (1 – 365) and a series is include for each applicable canonical events. Because the legend can become large, it is recommended that the **Diagnostics Display Panel** be undocked and expanded prior to viewing.

Provided below are two examples of diagnostic displays. The first is for a single parameter (the correlation coefficient between the forecasts and observations) while the second is for multiple parameters (the average of the observations and forecasts).



The diagnostics should be viewed relative to user experience with the locations involved. The following are basic tips for checking parameter diagnostics:

1. Are parameter values computed for observations in line with what is expected for the location involved.
2. Does the seasonal pattern for the observed parameter values appear reasonable?

3. Does the seasonal pattern for the forecast parameter values follow that of the observed?
4. Does the curve pattern for the correlation coefficients look right for the forecast areas?
For example, for test basins in MARFC, the correlation between the observed and the forecast values were higher during winter than summer.

3.10.4 Usage

3.10.4.1 Estimating Parameters

To estimate parameters, select one or more MEFP locations from the **Summary of Estimated Parameters Availability Table** and click on the **Perform Step Button**. See Section 3.4.2.1 for details on how to perform a step using the **Perform Step Button** of the **Estimation Steps Panel**.

3.10.4.2 Loading Parameters and Viewing Diagnostics

To load parameters and view the diagnostics, do the following:

1. Select one MEFP location (row) from the **Summary of Estimated Parameters Availability Table** of the **Locations Summary Subpanel**.
2. Click on the  **Load Parameters Button**. A progress dialog will be displayed indicating that parameters are being loaded. This may take a minute or two. After completion, the **Parameter Summary Information Table** will update displaying the parameters loaded.
3. Select the forecast source for which you want to view parameters from the **Select Forecast Source Choice Box**. If the table is empty, then no parameters were loaded.
4. Select the estimated parameters (rows) that you wish to view from the **Parameter Summary Information Table**.
5. Click on the  **View Button**.

3.10.4.3 Backing-Up Parameters and Restoring Backup Parameters

To backup parameters, select one or more MEFP locations from the **Summary of Estimated Parameters Availability Table** and click on the  **Remove Parameters Button**. When the **Backup Parameters? Dialog** opens, click on **Yes**. Upon completion, the 'Status' column of the **Summary of Estimated Parameters Availability Table** will display a  indicating that no active parameters are available, while the 'Backup?' column will display a  indicating that backup parameters are available.

To restore backup parameters, select one or more MEFP locations from the **Summary of Estimated Parameters Availability Table** and click on the  **Restore Parameters Button**. When the **Continue? Dialog** opens, click on **Yes**. Upon completion, the 'Status' column of the **Summary of Estimated Parameters Availability Table** will display a  or  indicating that parameters are available, while the 'Backup?' column will display either a  if there were active parameters when the button was clicked or  if there were no active parameters.

3.11 Acceptance Subpanel

The **Acceptance Subpanel** of the **Estimation Steps Panel**, shown in Figure 15, is used to perform Step 7 of the parameter estimation procedure in Section 3.2.3: accept (zip) parameter files. The panel includes three subpanels: the **Edit Groups Subpanel**, the **Prepare By Location Subpanel**, and the **Prepare By Group Subpanel**. Each subpanel and components are described below.

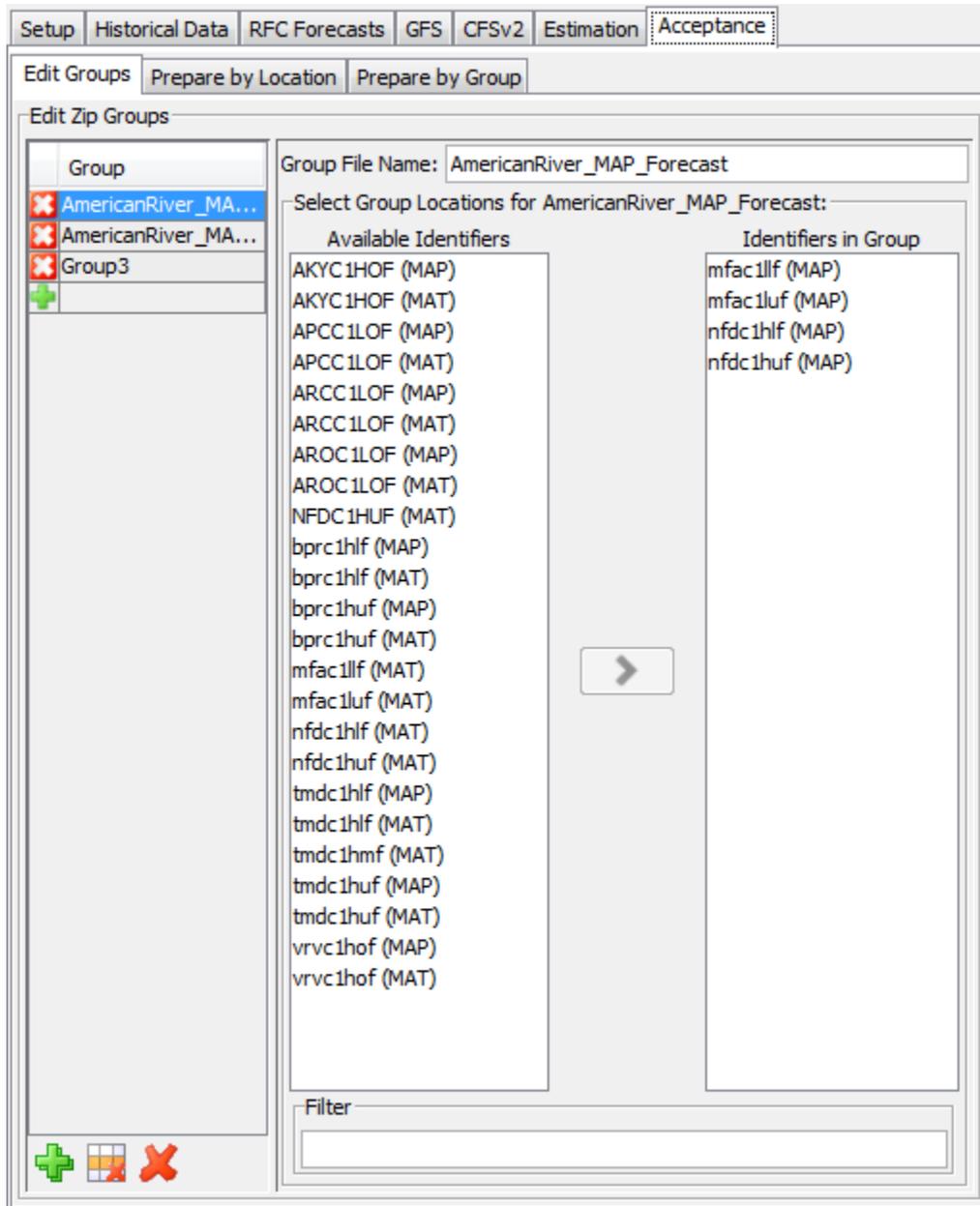


Figure 15: The Acceptance Subpanel of the Estimation Steps Panel.

3.11.1 About Parameter Zip Groups and Files

As defined in Section 3.1.1, parameter zip groups are groups of MEFP locations for which parameters are to be zipped together. The need for these groups is driven by CHPS and FEWS. Operationally, MEFP can (and should) be executed for multiple locations at one time via a single model adapter execution, as defined in a single module configuration file. The parameters of such a run are exported for use by the model adapter via an `exportDataSetActivity`; for example:

```
<exportDataSetActivity>
  <moduleId>MEFP_AmericanRiver_MAP_Forecast</moduleId>
</exportDataSetActivity>
```

There can be only a single `exportDataSetActivity` within a module configuration file. Hence, the data set to which it refers must contain all parameter files necessary for executing the MEFP at all desired MEFP locations. Thus, parameter zip groups are required.

Furthermore, the `moduleId` referred to in the `exportDataSetActivity` must be a valid module instance id (i.e., defined in the `ModuleInstanceDescriptors.xml` file) and typically should match the id of the module in which the `exportDataSetActivity` is included. For example, the above `exportDataSetActivity` would be referred to in a module configuration file with the name `MEFP_AmericanRiver_MAP_Forecast.xml`. Thus the following rule of thumb is recommended:

Parameter zip groups should be named based on the id of the module configuration file that will be exporting it.

The zip file for a parameter zip group will be placed in the directory

Config/ModuleDataSetFiles/hefs

and its file name will match the group name with “.zip” added as a file extension.

3.11.2 Edit Groups Subpanel

The **Edit Groups Subpanel** of the **Acceptance Subpanel**, shown in Figure 15, allows for editing parameter zip groups, specifying the names of the groups and MEFP locations included in them. The subpanel operates independently of the active estimation data type, allowing for groups to contain parameters for both precipitation and temperature.

3.11.2.1 Components

- **Group List:** Provides a list of the already defined parameter zip groups by name. The list includes an add/delete column (Section 3.2.5.2) allowing for groups to be added or removed. When a group is added by clicking , it will be given a default name of “Group#”, where # is the smallest number (starting at 1) for which no group by that name exists (two groups may not have the same name). The **Group List** is selectable and, when a single group is selected, the **Group File Name Text Field**, **Available Identifiers List**, and **Identifiers in Group List** will be updated to match the selected group.

-  **Create One Group for Each Location Button:** Click to add one group for each MEFP location. When clicked, a **Group Name Prefix Dialog** will open in which a name prefix to use for all created groups can be provided. The groups created with have the name “<prefix><MEFP locationId>_<MEFP parameterId>”.
-  **Remove Selected Groups Button:** Click to remove all groups selected in the **Group List**.
-  **Remove All Groups Button:** Click to remove all groups in the **Group List**.
- **Group File Name Text Field:** Displays the name of the selected group in the **Group List**. The field can be modified in order to rename the group.
- **Available Identifiers List:** Displays the list of all MEFP locations by identifier that have not yet been added to the group selected in the **Group List**. This list allows for multiple selections.
- **Identifiers in Group List:** Displays a list of all MEFP locations by identifier that are included in the group selected in the **Group List**. This list allows for multiple selections.
-   **Add/Remove Button:** Click to add or remove MEFP locations to or from the group selected in the **Group List**. If selections are made in the **Available Identifiers List**, when the button is clicked, those MEFP locations will be added to the group, being removed from the **Available Identifiers List** and added to the **Identifiers in Group List**. If selections are made in the **Identifiers in Group List**, when the button is clicked, those MEFP locations will be removed from the group, being removed from the **Identifiers in Group List** and added to the **Available Identifiers List**.
- **Filter Text Field:** Type in a value in order to sort the **Available Identifiers List** and the **Identifiers in Group List**. When text is typed into the field, the two lists will be sorted so that all MEFP location identifiers in the lists that include the filter text will be sorted to the top. Those MEFP location identifiers that do not include the filter text will be grayed-out (but are still selectable). For example:

Group File Name: AmericanRiver_MAP_Forecast

Select Group Locations for AmericanRiver_MAP_Forecast:

Available Identifiers	Identifiers in Group
tmdc1hlf (MAP)	mfac1lhf (MAP)
tmdc1hlf (MAT)	mfac1luf (MAP)
tmdc1hmf (MAT)	nfdc1hlf (MAP)
tmdc1huf (MAP)	nfdc1huf (MAP)
tmdc1huf (MAT)	
AKYC1HOF (MAP)	
AKYC1HOF (MAT)	
APCC1LOF (MAP)	
APCC1LOF (MAT)	
ARCC1LOF (MAP)	
ARCC1LOF (MAT)	
AROC1LOF (MAP)	

Filter: mdc1

3.11.3 Prepare by Location Subpanel

The **Prepare by Location Subpanel** of the **Acceptance Subpanel**, shown in Figure 16, allows for preparing estimation parameter zip files by MEFP location. Whenever a parameter zip file is updated for an MEFP location, the entire file will be updated. The subpanel only displays MEFP locations for the active estimation data type.

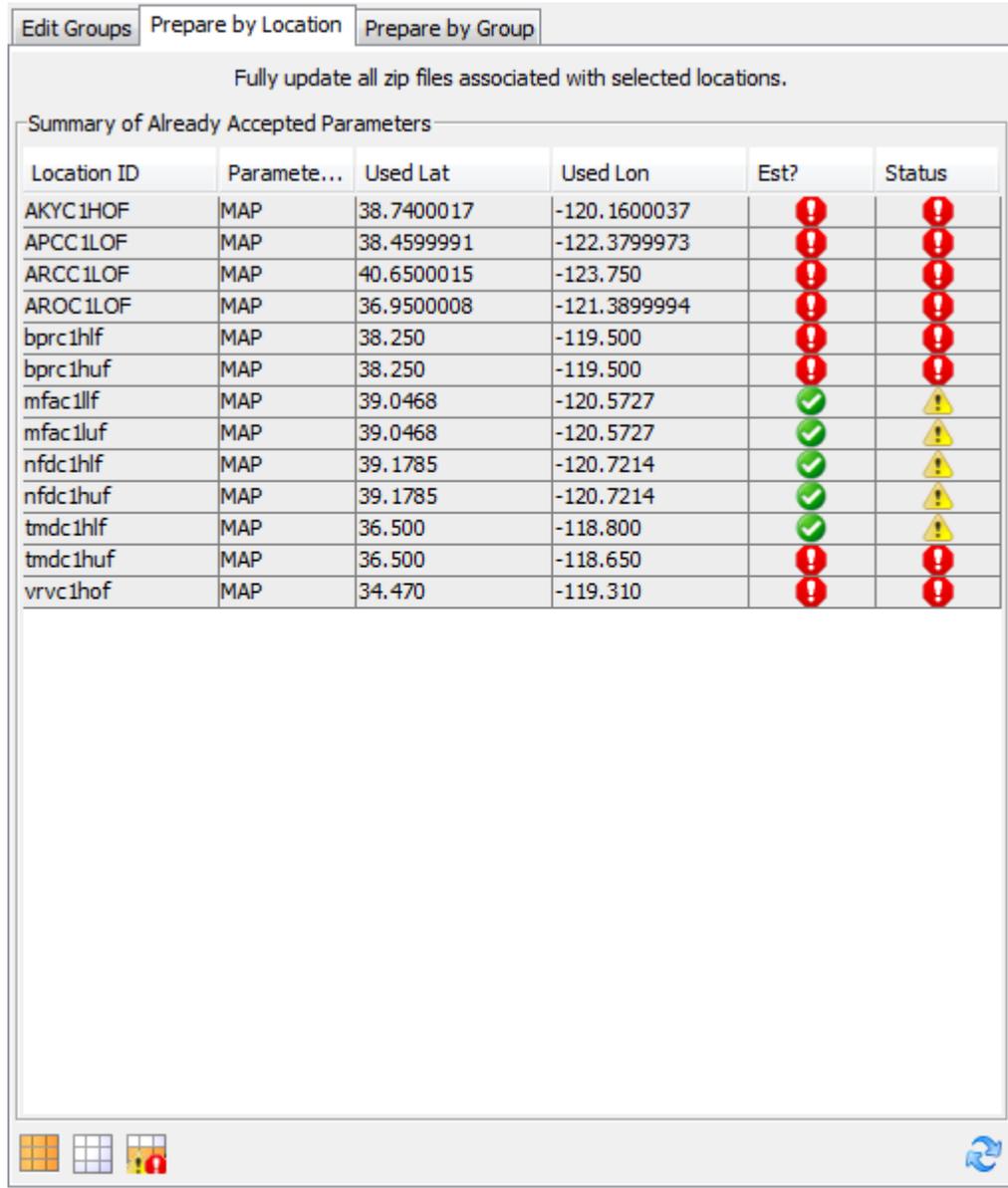


Figure 16: The Prepare by Location Subpanel of the Acceptance Subpanel.

3.11.3.1 Components

- Summary of Already Accepted Parameters Table:** Allows the user to select MEFP locations for which to perform the step (generate zip files) and view for which locations the step has been performed. It is a **Generic Summary Table** (Section 3.2.5.1) and

includes all the standard buttons. The ‘Status’ column displays the status of the MEFP location relative to all group zip files that should contain the location’s parameter files. An additional column is included before the ‘Status’ column called ‘Est?’. That column indicates for which MEFP locations parameters have been estimated.

*NOTE: When the **Perform Step Button** is clicked, for each selected MEFP location, zip files associated with all parameter zip groups that the location is a part of will be fully updated.*

3.11.4 Prepare by Group Subpanel

The **Prepare by Group Subpanel** of the **Acceptance Subpanel**, shown in Figure 17, allows for preparing estimation parameter zip files by parameter zip group.

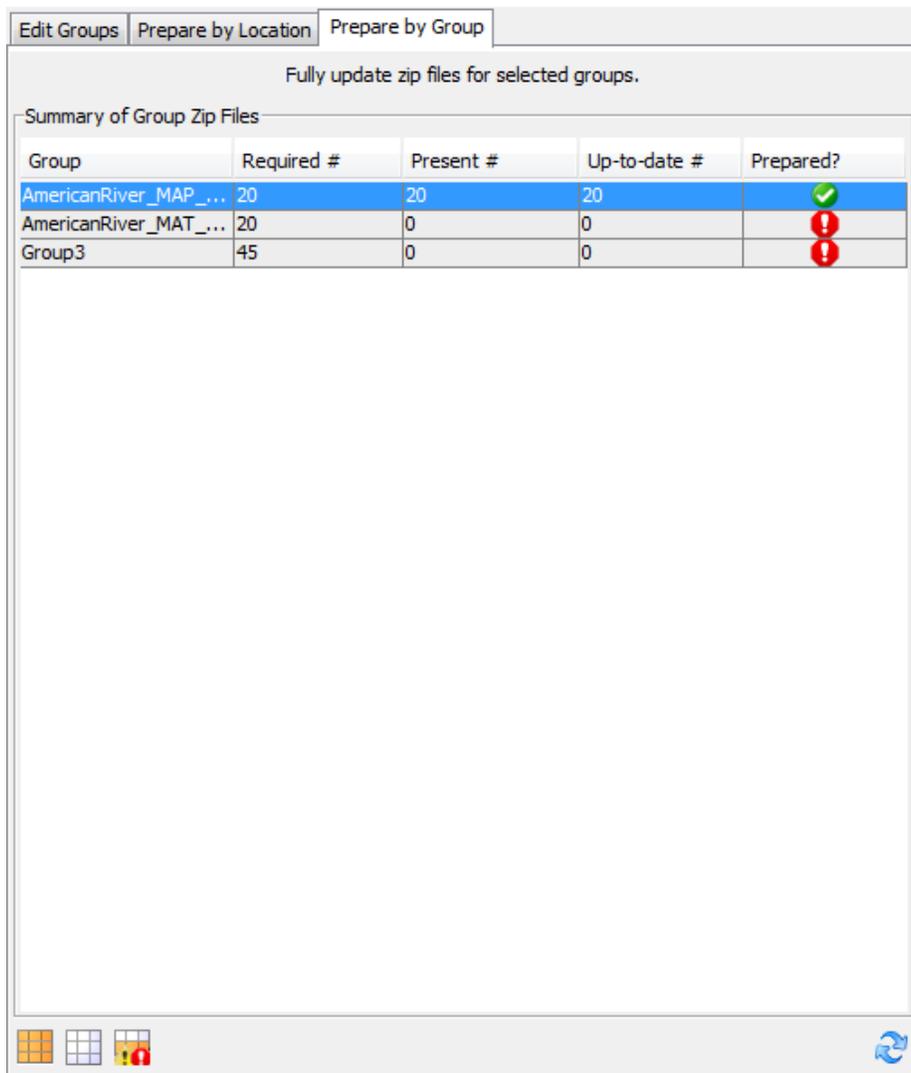


Figure 17: The Prepare by Group Subpanel of the Acceptance Subpanel.

3.11.4.1 Components

- **Summary of Group Zip Files Table:** Allows the user to select parameter zip groups for which to perform the step (generate zip files) and view for which groups the step has been performed. It is a **Generic Summary Table** (Section 3.2.5.1) and includes all the standard buttons, but different columns. The columns are as follows:
 - ‘Group’: The name of the group.
 - ‘Required #’: The number of parameter files that must be in the zip group for the zip file to be complete.
 - ‘Present #’: The number of parameter files found in the zip file.
 - ‘Up-to-date #’: The number of parameter files found in the zip file that are up-to-date relative to the estimated parameter files in the MEFP run area. A file is up to date if it is not older than the corresponding file in the MEFP run area.
 - ‘Prepared?’: A status column indicating if the zip file is present and up-to-date relative to all the parameter files to be contained within it.

*NOTE: When the **Perform Step Button** is clicked, for each selected parameter zip group, the zip file will be fully updated.*

3.11.5 Usage

3.11.5.1 Defining Parameter Zip Groups

To define a parameter zip group, make sure the **Edit Groups Subpanel** is active by clicking on its tab and do the following:

1. In the **Group List**, click on the  icon to add a group.
2. In the **Group File Name Text Field**, modify the name as desired. The name of the group should match the name of the module in which the created module data set zip file will be exported. See Section 3.11.1.
3. Using the <ctrl> and <shift> keys, select rows in the **Available Identifiers List** for MEFP locations to add to the group. If needed, use the **Filter Text Field** to more easily find desired MEFP locations in the list.
4. Click on the **Add Button** to add the MEFP locations to the group. The selected MEFP location identifiers will move to the **Identifiers in Group List**.
5. Repeat Steps 3 and 4 until all desired MEFP locations are in the group.

3.11.5.2 Generating Group Zip Files

Group zip files can be created and updated by either MEFP location or parameter zip group. Which method to use depends on how many MEFP locations parameters must be zipped for and how many group zip files must be updated. For example, if the parameters for one MEFP location have been modified and that location is in multiple parameter zip groups all of which must be updated, then do the following:

1. Click on the **Prepare by Location Subpanel** tab.
2. Select the MEFP location from the **Summary of Already Accepted Parameters Table**.
3. Click on the **Perform Step Button**.

If the parameters for one or more MEFP locations have been modified and those locations are all in a one group, then do the following:

1. Click on the **Prepare by Group Subpanel** tab.
2. Select the group from the **Summary of Group Zip files Table**.
3. Click on the **Perform Step Button**.

In either case, see Section 3.4.2.1 for details on how to perform a step using the **Perform Step Button** of the **Estimation Steps Panel**.

3.12 Location Summary Panel

The **Location Summary Panel**, shown in Figure 18, summarizes the status of all steps to perform described in Section 3.2.3 for all MEFP locations. The panel also includes a **Select Type of Data for Estimation Choice Box** for selecting the active estimation data type, a **Goto Step Panel Button** to facilitate quickly navigating the **Estimation Steps Panel**, and a **Run All Steps Button** to allow for performing all steps for multiple selected locations.

Location ID	Hist	RFC	GFS	C...	Est	A...
AKYC1HOF	!	!	✓	✓	!	!
APCC1LOF	✓	!	!	!	!	!
ARCC1LOF	✓	!	!	!	!	!
AROC1LOF	✓	!	!	!	!	!
bprc1hlf	✓	!	✓	✓	!	!
bprc1huf	!	!	✓	✓	!	!
mfac1llf	✓	✓	✓	✓	!	✓
mfac1luf	✓	✓	✓	✓	!	✓
nfdc1hlf	✓	✓	✓	✓	!	✓
nfdc1huf	✓	✓	✓	✓	!	✓
tmdc1hlf	✓	✓	✓	✓	!	!
tmdc1huf	!	✓	✓	✓	!	!
vrvc1hof	!	!	✓	✓	!	!

Figure 18: The Location Summary Panel.

3.12.1.1 Components

- **Select Type of Data for Estimation Choice Box**: Allows for selecting the active estimate data type, either “Precipitation” or “Temperature”. When a change is made to the choice, many of the tables in the MEFPPPE, including the **Summary of Locations for Parameter Estimation Table**, will update to reflect the change.
- **Summary of Locations for Parameter Estimation Table**: Summarizes the status of all steps to perform (except the setup step) for all MEFP locations for the active estimation data type. The columns are as follows:
 - ‘Location ID’: The location id of the MEFP location.
 - ‘Hist’: Displays the status of Step 2: process historical data and generate binary files.
 - ‘RFC’: Displays the status of Step 3: create RFC archive forecast data files.
 - ‘GFS’: Displays the status of Step 4: acquire GFS reforecast files.
 - ‘CFSv2’: Displays the status of Step 5: acquire CFSv2 reforecast files.
 - ‘Est’: Displays the status of Step 6: estimate parameters.
 - ‘Accept’: Displays the status of Step 7: accept (zip) parameter files.

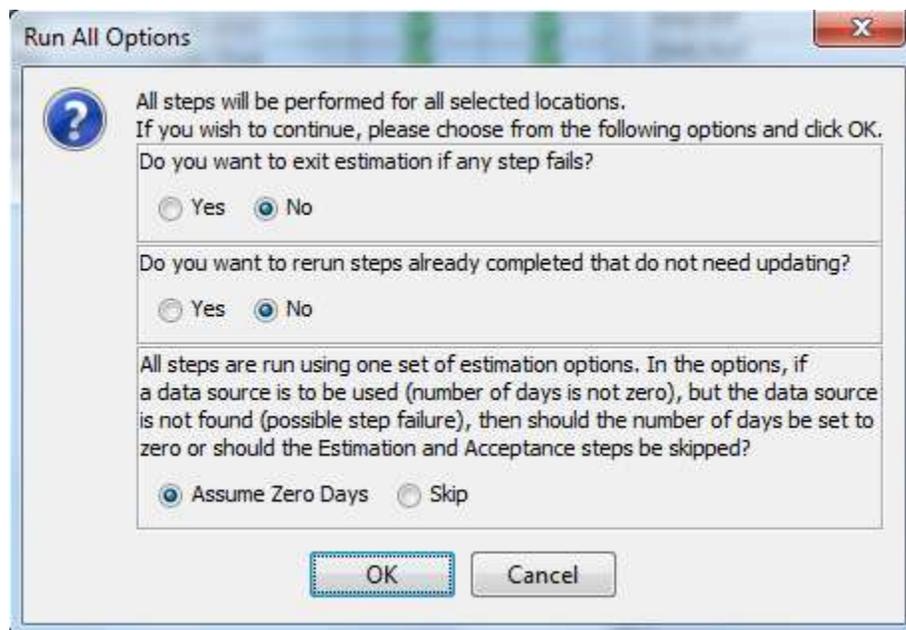
-  **Goto Step Panel Button:** Click to make the step subpanel corresponding to the selected column of the **Summary of Locations for Parameter Estimation Table** active within the **Estimation Steps Panel**. Also, if appropriate, it selects rows of the **Generic Summary Table** for that subpanel for the MEFP locations selected within the **Summary of Locations for Parameter Estimation Table**. After clicking this button, the user should be able to click on the **Perform Step Button** to perform the step for all selected locations.
-  **Run All Steps Button:** Click to run all of the steps for the selected MEFP locations. Upon clicking a **Run All Options Dialog** will be displayed. Click on **OK** to continue with the run all or **Cancel** to cancel it. See Section 3.12.2.1 for more details.
-  **Refresh Button:** Click to refresh the status columns of the **Summary of Locations for Parameter Estimation Table**. This will also trigger a refresh of status columns in all subpanels of the **Estimation Steps Panel**.

3.12.2 Usage

3.12.2.1 Running All Steps for Multiple MEFP Locations

To perform all steps for desired MEFP locations, do the following:

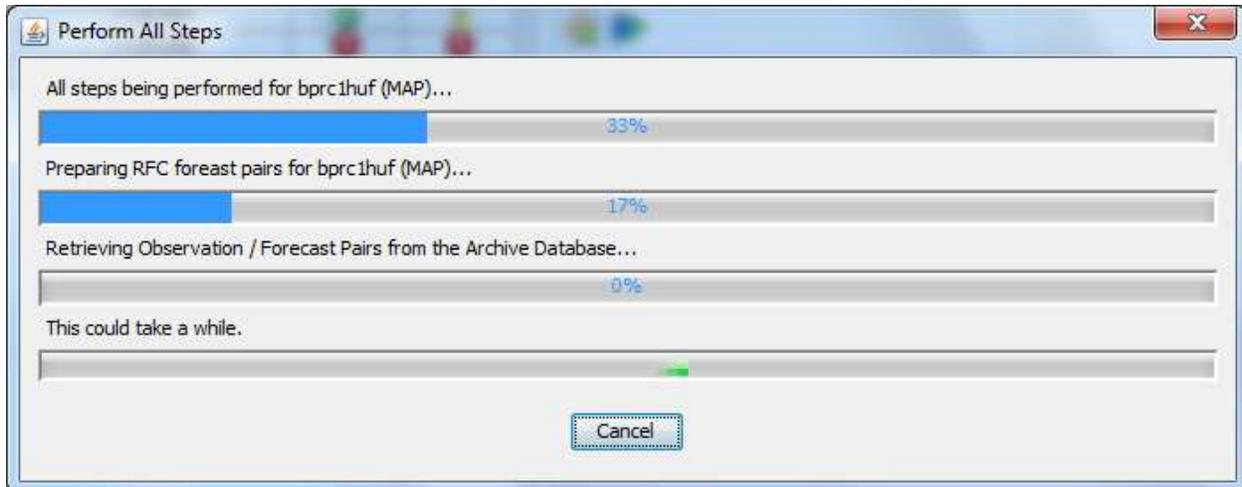
1. Select the rows for the desired MEFP locations from the **Summary of Locations for Parameter Estimation Table**.
2. Click on the **Run All Steps Button**. A **Run All Options Dialog** will open:



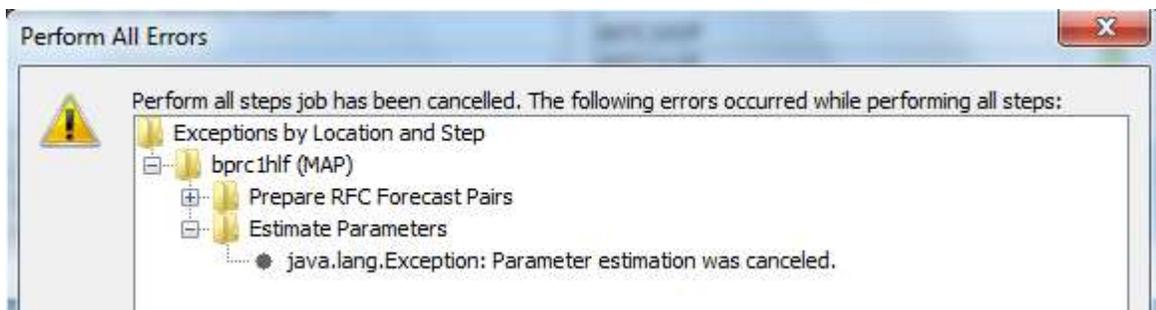
There are three options that the user can set:

- Specify if the run all is to exit as soon as any step fails for any reason.

- Specify if the run all should re-run already completed steps.
 - Specify the behavior of MEFPPE if a source forecast is not available for a MEFP location but it is to be used (i.e., the number of days for the forecast source is not 0). The options are to set the number of days to be 0 so that the parameters are not estimated for that forecast source, or skip parameter estimation for that MEFP location.
 -
3. Set the options as desired and click **OK** (click **Cancel** to stop the run all). A progress dialog will open:



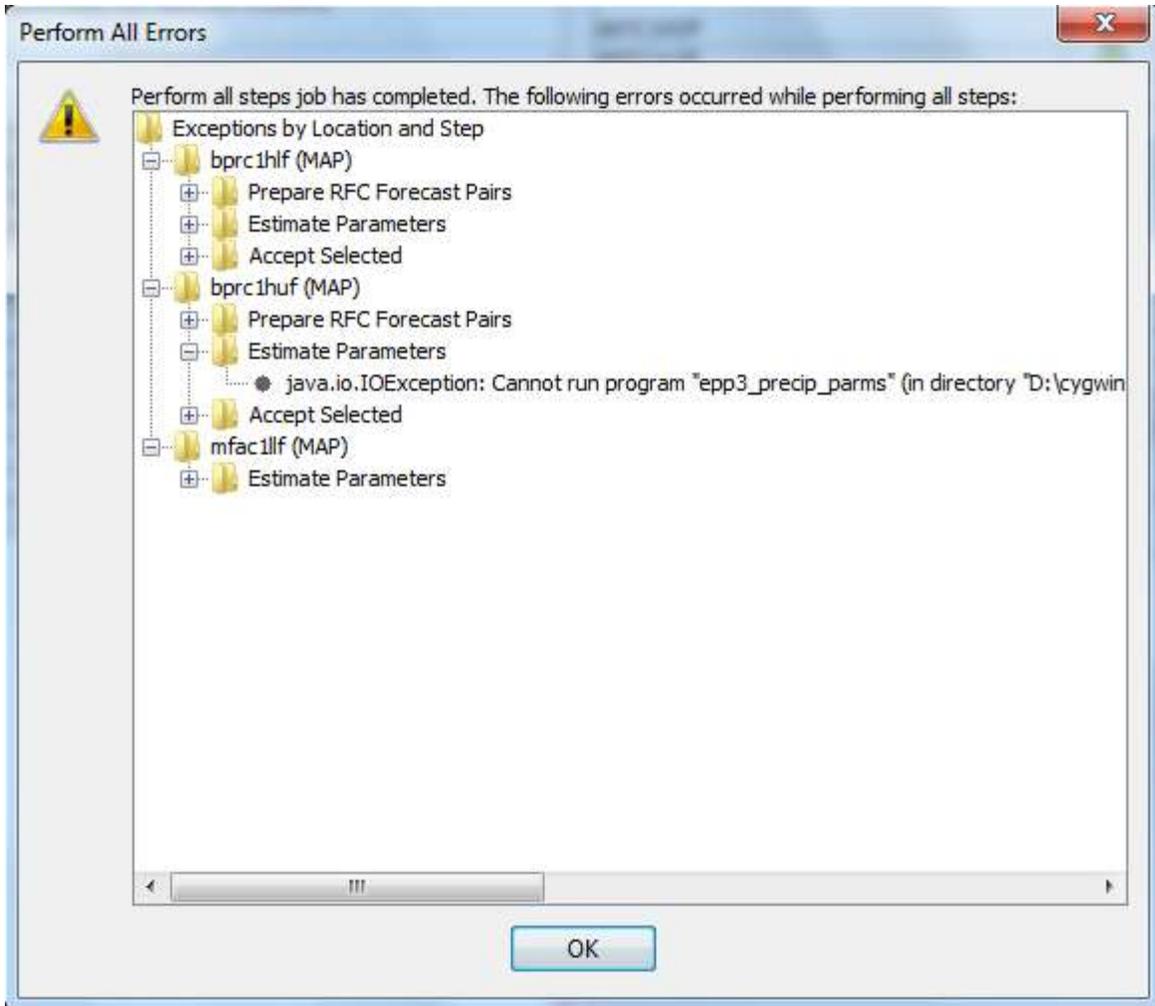
The run all can be canceled at any time by clicking on the **Cancel Button**. The run all will stop at the next opportunity and a **Perform All Errors Dialog** will be displayed where the last leaf will indicate that the user canceled the run:



Click **OK** to close the dialog.

NOTE: When a run all is canceled, the steps performed prior to the cancelation will not be undone.

4. When the run all is completed, a **Perform All Errors Dialog** will be displayed indicating any errors that occurred during the run:



Expand the tree nodes in order to identify the errors that occurred. If no errors occurred, a message will be displayed indicating that no errors occurred.

5. Click **OK** to close the dialog.

3.13 Diagnostic Display Panel

The **Diagnostic Display Panel**, an example of which is shown in Figure 19, displays diagnostics as selected by the user via subpanels of the **Estimation Steps Panel**. The diagnostics that can be displayed are described with the subpanels. Also, a general diagnostic display panel framework is described in Section 3.2.5.3.

Some diagnostics can require a significant amount of time draw. Furthermore, it will need to be redrawn whenever the **Diagnostic Display Panel** is resized. To prevent a slowdown in the software resulting from spending too much time rendering displays, a  **Dispose Button** is included in the upper left corner of the panel for all diagnostics to display. Click on the button to clear the panel.

NOTE: The chart displayed in the **Diagnostic Display Panel** will not change until another diagnostic is selected to be displayed or the  **Dispose Button** is clicked.

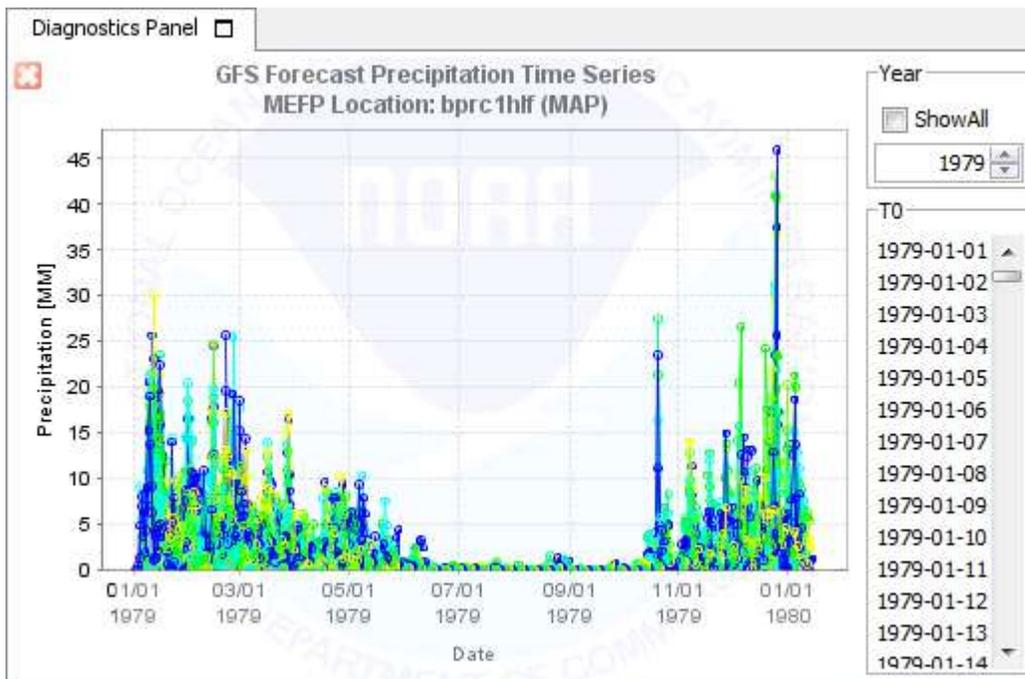


Figure 19: The Diagnostics Display Panel.

3.13.1.1 Components

-  **Dispose Button**: Click on this button to dispose of the current diagnostics. The button is only visible if a diagnostic is currently displayed.

4 MEFP Operational Reference Manual

This section is pending transition of HEFS from beta-testing to operational use, and will be supplied at a later date. Once completed, it is anticipated that this section will serve as a reference for configuring the MEFP model adapters for execution within a CHPS workflow.

4.1 Overview

4.1.1 Using CHPS to Import and View GFS and CFSv2 Grid Data

4.1.2 Using CHPS to Generate MEFP Ensembles and View Results

4.2 MEFP Grid Data Model Adapter

4.2.1 Description

4.2.2 Model Parameters

4.2.3 Model Time Series

4.2.4 Notes on Configuration

4.3 MEFP Model Adapter

4.3.1 Description

4.3.2 Model Parameters

4.3.3 Model Time Series

4.3.4 Notes on Configuration

4.4 Graphics Generator Products

4.4.1 Required Settings

