MEFPPE Configuration Guide

Version: OHD-CORE-21.1.1
Last Updated: 21 June 2022

National Weather Service
Office of Hydrologic Development

Table of Contents

1 Overview

The MEFP Parameter Estimator (MEFPPE) is a FEWS explorer plug-in designed to guide the user through the process of estimating parameters for use with MEFP. This guide provides instructions for configuring a CHPS standalone to include the MEFPPE plug-in and basic instructions for using MEFPPE to estimate parameters (more detailed instructions are provided in the *MEFP User's Manual*). It also includes installation instructions for a workflow that imports NWS-DATACARD format files in local time and shifts the imported time series to the 12Z-12Z clock assumed by MEFPPE in order to estimate parameters.

In cases where a configuration file is new and generic (valid for all RFCs), the file is included in the release-package and added to the configuration. For cases where a configuration change contains text that is specific to an RFC (new or existing file) a description of the text and/or a sample file is provided.

No configuration changes performed herein should be synchronized with a central server; all changes are only made in the *parameter estimation standalone*.

1.1 *Notation*

Within this document, the following notation is used:

- All graphical interface components are **Capitalized and in Bold**.
- All XML snippets are in this font or this font.
- All command line entries are in this font.
- All important terms defined in the Section 1.2, Terminology, are *italicized*.

1.2 *Terminology*

- *parameter estimation standalone*: The standalone in which the MEFPPE components will be installed, setup in Section 1.4.
- *installation forecast group* –or– *fgroup*: The forecast group determined in Section 1 of the *MEFP Configuration Guide: Data Ingest Components*. It will be denoted <*fgroup*> below when used in the name of a directory or file, except when referred to within a snippet of XML, in which case it will be referred to as *fgroup*; this is to avoid confusion with other uses of '<' and '>' in the XML syntax.
- *installation segment*: The id of the first segment for which MEFP is to execute, determined in Section 1 of the *MEFP Configuration Guide: Data Ingest Components*.
- *installation catchments*: The locationIds of all of the stations for which MEFP must generate ensembles of FMAP and FMAT, determined in Section 1 of the *MEFP Configuration Guide: Data Ingest Components*.

1.3 *Directories of Note*

The following directories will be referred to in the instructions provided below:

- <*region_dir*>: The *parameter estimation standalone* region home directory, typically "##rfc_sa".
- <*configuration_dir*>: The *parameter estimation standalone* Config directory, typically <*region_dir*>/Config.
- <*tar_root_dir*>: The directory where the release package was untarred.
- <*mefp_root_dir*>: The directory in which a subdirectory, mefpParameters, stores the parameter files generated by the MEFPPE. This directory structure is created when installing the MEFP data ingest components. See the *MEFP Configuration Guide: Data Ingest Components*.
- <*mefp_run_area*>: The directory in which MEFPPE stores files as it gathers data and estimates parameters. It is <*region_dir*>/Models/hefs/mefppeRunArea and is setup during the installation process (Section 2.1). You should not need to interact with this area directly except when debugging problems.

1.4 *Pre-installation Steps*

1. Install the HEFS release as described in the *HEFS Install Notes*. This puts the needed jar files in place for execution of MEFPPE.

2. Install the MEFP data ingest components as described in the *MEFP Configuration Guide: Data Ingest Components*. Data ingest is a necessary precursor to executing the MEFP operationally. Furthermore, the instructions therein define the catchments (stations) for which the MEFP must execute and, therefore, parameters must be estimated. Specifically, the location sets defined via those instructions will be reused herein. Also, it creates the <*mefp_root_dir*> in which parameter files generated by the MEFPPE are stored.

3. Create the *parameter estimation standalone* using an operational configuration (that includes the MEFP data ingest components) as the basis with an empty localDataStore. This standalone will only be used for parameter estimation of both the MEFP and EnsPost. This standalone must not be deleted, as it will be used for parameter estimation indefinitely into the future, so place it on the file system accordingly. However, it may be necessary to rebuild the standalone if your operational configurations change significantly. As such instructions for porting the MEFPPE to another standalone are provided in Section 5.1.1. Lastly, it may be necessary to update the standalone as new versions of the software are released. Instructions for that will be provided with each release.

4. Identify the source of historical 6-hour precipitation (MAP) and temperature (MAT) time series to be used as input to the MEFPPE parameter estimation process. By default, modules are configured as part of this release to allow for importing those time series from NWS-DATACARD files in local time. However, an alternative source can be used, if desired, and instructions for how to do so are included below.

1.5 *Release Package*

As part of installing the HEFS release, the release package was acquired and untarred in a directory referred to in the *HEFS Install Notes* as <*tar_root_dir*>. Within this document, only the contents of the subdirectory mefppe are used. The mefppe subdirectory contents are as follows, with a description of each subdirectory:

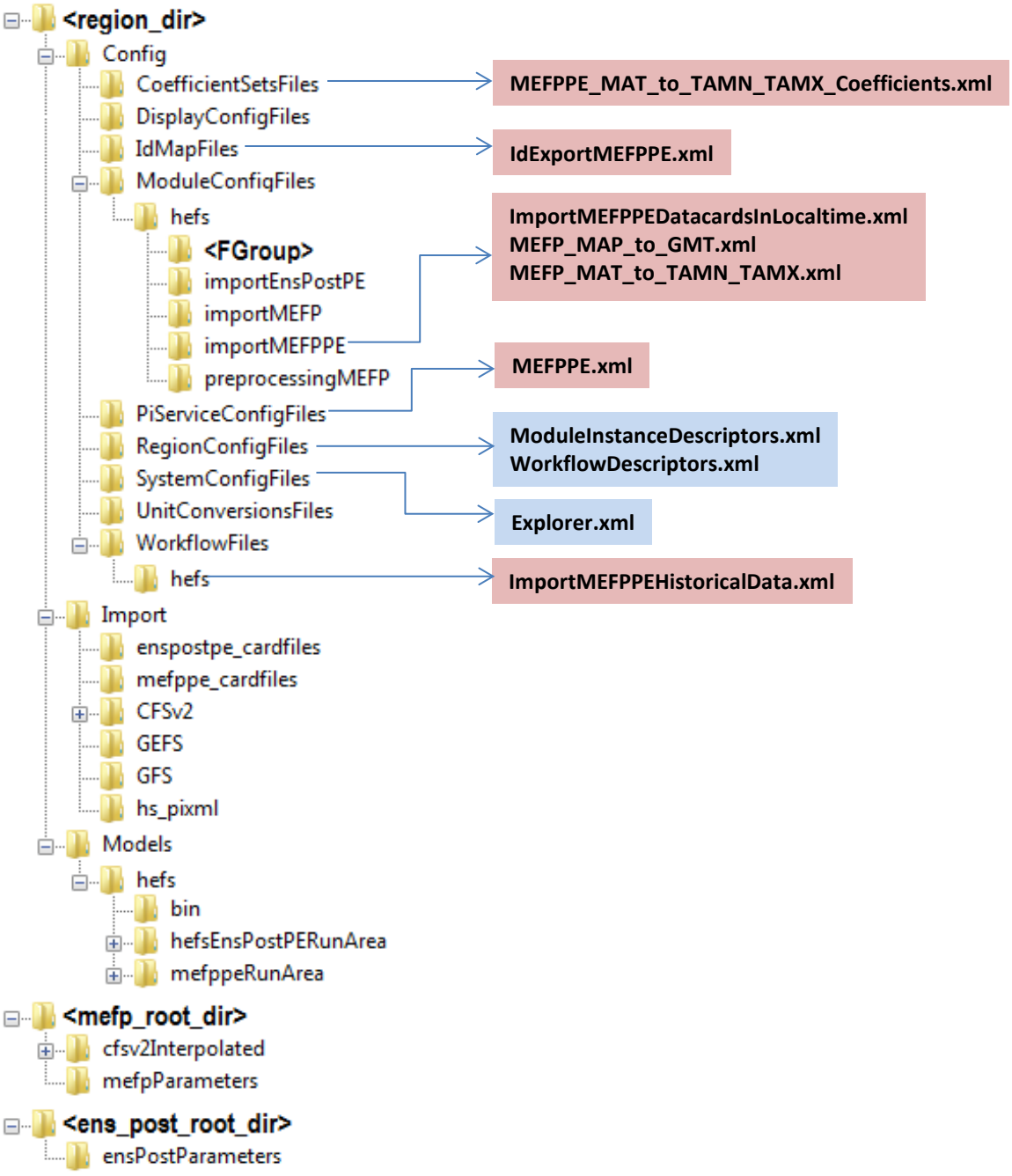
<*tar_root_dir*>/mefppe/…
Config – Configuration files to be copied to the parameter estimation standalone.
Import – Import directory structure to be copied to the parameter estimation standalone.
Models – Models directory structure to be put in place in the parameter estimation standalone.
samples – Sample files referred to in the instructions below as needed.

1.6 *Affected Configuration Files*

The diagram in Figure 1 summarizes all configuration files created or modified by the installation steps provided in this document. The directory structure shown includes all directories affected by any HEFS component. Files with a light red background are new for this release, while those with a light blue background are specific to each RFC and require editing. Note the following:

- The directory corresponding to **<mefp_root_dir>** was created during the installation of the MEFP data ingest components; see the *MEFP Configuration Guide: Data Ingest Components*.
- The directories shown under **<region_dir>**/Models will be created during installation.
- The directory corresponding to **<ens_post_root_dir>** is used by the EnsPost and EnsPostPE application and will not be used herein.

Figure 1: Configuration files created or modified during installation.



2 Configuring MEFPPE

This section provides instructions for the following:

- Making needed changes to configuration in the parameter estimation standalone.
- Confirming the configuration.

By the end of this section, the MEFPPE will be configured for use in the *parameter estimation standalone*.

2.1 *Copy New Files and Directories (Required)*

Execute the following command to copy *all* new files and directories that are necessary for running the MEFP parameter estimation components into the installation standalone directory structure (replace <*region_dir*> and <*tar_root_dir*> appropriately):

```
cd <tar_root_dir>/mefppe
cp –r Config <region_dir>/.
cp –r Models <region_dir>/.
cp –r Import <region_dir>/.
```

No existing files are overwritten or removed by these commands. Most of the files and directories just copied will not be modified further.

2.2 *Modify Global Properties (Required)*

Action: Modify the global properties file:

<*region_dir*>/sa_global.properties

Add the following property if it does not already exist:

```
HEFSMODELSDIR=%REGION_HOME%/Models/hefs
```

2.3 *Configuration File Changes*

Described in the following sections are changes that must be made to the configuration files to setup the MEFP data ingest. Before proceeding, recall that the source of the historical 6-hour precipitation (MAP) and temperature (MAT) time series was identified as part of the pre-installation steps in Section 1.4.

If the default NWS-DATACARD import mechanism will be used, skip Section 2.3.1 and start with Section 2.3.2.

If an alternative source of historical time series will be used, start with Section 2.3.1 and then skip Sections 2.3.2, 2.3.3, and 2.3.4.

2.3.1 Modify File Added in Step 2.1: MEFPPE.xml (Optional)

This step must only be performed if you are not *going to use imported NWS-DATACARD as the source of historical 6-hour MAP/MAT time series required for MEFPPE. Instead, an alternative source of that time series data will be used.*

Action: Modify the file

<*configuration_dir*>/PiServiceConfigFiles/MEFPPE.xml

as needed in order to specify the historical MAP/TMIN/TMAX time series that will be used to estimate MEFP parameters. See the example below which shows the default configuration.

Description: By default, the file makes use of the output from the ImportMEFPPEHistoricalData workflow and associated modules put in place in Section 2.1. However, if your RFC has a source of historical time series already appropriately defined with data in the localDataStore, then, in the MEFPPE.xml file, modify the timeSeriesSet XML elements defined for the timeSeries element with id "All Historical Data".

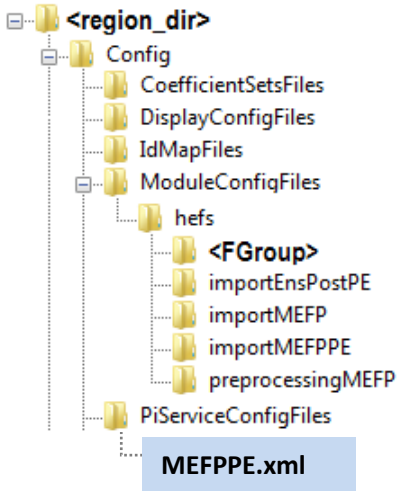
The requirements for the time series specified by the timeSeriesSet elements are as follows:

- *Historical precipitation time series*: Must have 6-hour time steps and use parameterId MAP. The locationIds must match those of the *installation catchments*. The time zone of the data must be GMT and include values recorded only at the standard synoptic times: 0, 6, 12, and 18Z.
- *Historical minimum temperature time series*: Must have 24-hour time steps and be the minimum temperature values observed for the period ending at 12Z (i.e., the times of the values in the time series must be 12Z). The locationIds must match those of the *installation catchments*. The parameterId can be either TMIN or TAMN.
- *Historical maximum temperature time series*: Must have 24-hour time steps and be the maximum temperature values observed for the period ending at 12Z (i.e., the times of the values in the time series must be 12Z). The locationIds must match those of the *installation catchments*. The parameterId can be either TMAX or TAMX.

The default import workflow provided with this release, ImportMEFPPEHistoricalData, performs all steps necessary above: importing 6h MAP/MAT in local time, converting them to the synoptic GMT times using nearest neighbor, and computing the 24-hour minimum/maximum temperature time series.

- An id-mapping file is used within MEFPPE converts the TAMN/TAMX parameterIds to TMIN/TMAX, which are the ids MEFPPE expects. Hence, the time series can use either TAMN/TAMX or TMIN/TMAX parameterIds, and MEFPPE will be able to process it.

- If MEFP will be used to generate only precipitation forecast ensembles, then only the historical precipitation time series are required. If it will be used to generate only temperature forecast ensembles, then only the historical minimum and maximum (both) temperature time series are required.

Standard Location: <*configuration_dir*>**/PiServiceConfigFiles**	**Contents:** ***MEFPPE.xml***
	<?xml version="1.0" encoding="UTF-8"?> <!-- edited with XMLSpy v2007 sp2 (http://www.altova.com) by WL | Delft Hydraulics (WL | Delft Hydraulics) --> <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> <exportIdMap>IdExportMEFPPE</exportIdMap> </general> <!-- This one query is used to extract historical time series from the localDataStore export them to files under Models/hefs/mefppeRunArea/historicalData. It should be configured to include ALL historical time series that will be used to estimate parameters for MEFP. Within the software, the time series will be extracted one at a time, so don't worry about the size of the query results. The examples below can be considered as a template and should work if the needed time series were imported from datacard files and you have the location set "Catchments_HEFS" defined appropriately. It allows for up to 100 years of data prior to the current T0. --> <timeSeries> <id>All Historical Data</id> <timeSeriesSet> <moduleInstanceId>MEFP_MAP_to_GMT</moduleInstanceId> <valueType>scalar</valueType> <parameterId>MAP</parameterId> <locationSetId>Catchments_HEFS</locationSetId> <timeSeriesType>external historical</timeSeriesType> <timeStep unit="hour" multiplier="6"/> <readWriteMode>read complete forecast</readWriteMode> </timeSeriesSet> <timeSeriesSet> <moduleInstanceId>MEFP_MAT_to_TAMN_TAMX</moduleInstanceId> <valueType>scalar</valueType> <parameterId>MAT</parameterId> <qualifierId>GMT sampled</qualifierId> <locationSetId>Catchments_HEFS</locationSetId> <timeSeriesType>external historical</timeSeriesType> <timeStep unit="hour" multiplier="6"/>

Standard Location: <*configuration_dir*>**/PiServiceConfigFiles**	**Contents:** ***MEFPPE.xml***
	<readWriteMode>read only</readWriteMode> </timeSeriesSet> <timeSeriesSet> <moduleInstanceId>MEFP_MAT_to_TAMN_TAMX</moduleInstanceId> <valueType>scalar</valueType> <parameterId>TAMX</parameterId> <locationSetId>Catchments_HEFS</locationSetId> <timeSeriesType>external historical</timeSeriesType> <timeStep id="12Z"/> <relativeViewPeriod unit="day" start="-36500" startOverrulable="true" end="0" endOverrulable="true"/> <readWriteMode>read only</readWriteMode> </timeSeriesSet> <timeSeriesSet> <moduleInstanceId>MEFP_MAT_to_TAMN_TAMX</moduleInstanceId> <valueType>scalar</valueType> <parameterId>TAMN</parameterId> <locationSetId>Catchments_HEFS</locationSetId> <timeSeriesType>external historical</timeSeriesType> <timeStep id="12Z"/> <relativeViewPeriod unit="day" start="-36500" startOverrulable="true" end="0" endOverrulable="true"/> <readWriteMode>read only</readWriteMode> </timeSeriesSet> </timeSeries>

2.3.2 Modify the Datacard Import to Use the Correct Time Zone (Optional)

This step must only be performed if you are going to use imported NWS-DATACARD as the source of historical 6-hour MAP/MAT time series required for MEFPPE.

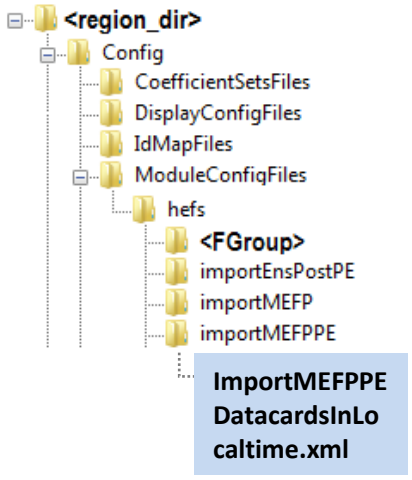
Action: Open the file

<*configuration_dir*>/ModuleConfigFiles/hefs/importMEFPPE/ImportMEFPPEDatacardsInLocaltime.xml

in your editor of choice. Change all instances of the timeZoneOffset element and timeZone attribute to the appropriate time zone. See the example below; all XML elements to change are **highlighted and in bold**.

Description: MEFPPE include this module for importing datacard files in local time. Changes must be made to the datacard file to correctly identify the local time zone to use for importing.

This import module uses the id-mapping IdImportDataCard, which should already be defined for datacard importing in your configuration. If it is not defined, remove the idMapId XML element from the general XML element of this import module configuration file.

Standard Location: <*configuration_dir*>**/ModuleConfigFiles/hefs/importMEFPPE**	**Contents:** ***ImportMEFPPEDatacardsInLocaltime.xml***
	<?xml version="1.0" encoding="UTF-8"?> <timeSeriesImportRun xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wldelft.nl/fews http://chps1/schemas/timeSeriesImportRun.xsd"> <!-- NOTE: Replace all timeZone attributes below with the appropriate time zone for the imported data. --> <import> <general> <importType>NWS-DATACARD</importType> <folder>$IMPORT_FOLDER_ROOT$/cardfiles_local</folder> <idMapId>IdImportDataCard</idMapId> <unitConversionsId>ImportEnglishUnits</unitConversionsId> <missingValue>-999.0</missingValue> <importTimeZone> **<timeZoneOffset>-05:00</timeZoneOffset>** </importTimeZone> </general> <timeSeriesSet> <moduleInstanceId>ImportMEFPPEDatacardsInLocaltime</moduleInstanceId> <valueType>scalar</valueType> <parameterId>MAP</parameterId>

Standard Location: <*configuration_dir*>**/ModuleConfigFiles/hefs/importMEFPPE**	**Contents:** ***ImportMEFPPEDatacardsInLocaltime.xml***

```
            <locationSetId>Catchments_HEFS</locationSetId>
            <timeSeriesType>external historical</timeSeriesType>
            <timeStep unit="hour" multiplier="6" timeZone="GMT-5"/>
            <readWriteMode>add originals</readWriteMode>
        </timeSeriesSet>
        <timeSeriesSet>

          <moduleInstanceId>ImportMEFPPEDatacardsInLocaltime</moduleInstanceId>
            <valueType>scalar</valueType>
            <parameterId>MAT</parameterId>
            <locationSetId>Catchments_HEFS</locationSetId>
            <timeSeriesType>external historical</timeSeriesType>
            <timeStep unit="hour" multiplier="6" timeZone="GMT-5"/>
            <readWriteMode>add originals</readWriteMode>
        </timeSeriesSet>
    </import>

</timeSeriesImportRun>
```

2.3.3 Modify File Added in Step 2.1: MEFP_MAP_to_GMT.xml (Optional)

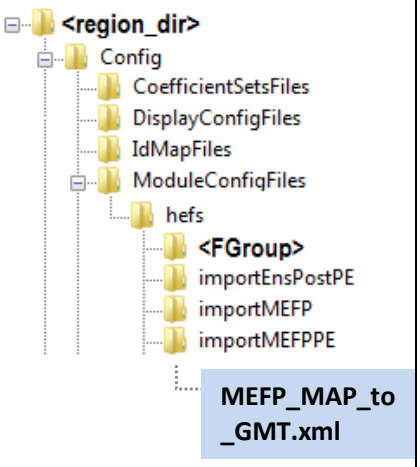
This step must only be performed if you are going to use imported NWS-DATACARD as the source of historical 6-hour MAP/MAT time series required for MEFPPE.

Action: Open the file

<*configuration_dir*>/ModuleConfigFiles/hefs/importMEFPPE/MEFP_MAP_to_GMT.xml

in your editor of choice. Change the timeZone attributes within the timeStep XML elements to match that used in Step 2.3.2. See the example below; the field to change is **highlighted and in bold**.

Description: If the timeStep XML element was modified in Step 2.3.2, then all modules that use those time series must be updated with a matching change. This is one such module.

Standard Location: <*configuration_dir*>**/ModuleConfigFiles/hefs/importMEFPPE**	**Contents:** ***MEFP_MAP_to_GMT.xml***
	<?xml version="1.0" encoding="UTF-8"?> <transformationModule xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wldelft.nl/fews http://c hps1/schemas/transformationModule.xsd" version="1.0"> <!-- NOTE: This module converts 6h MAP data imported in local time to a GMT synoptic time clock (0, 6, 12, 18Z). It is done using nearest neighbor, shifting the local time time series accordingly. --> <!-- Input variable: FMAP --> <variable> <variableId>hist_fmap</variableId> <timeSeriesSet> <moduleInstanceId>ImportMEFPPEDatacardsInLocaltime</moduleInstanceId> <valueType>scalar</valueType> <parameterId>MAP</parameterId> <locationSetId>Catchments_HEFS</locationSetId> <timeSeriesType>external historical</timeSeriesType> <timeStep unit="hour" multiplier="6" **timeZone="GMT-5"**/> <relativeViewPeriod unit="day" start="-36500" startOverrulable="true" end="0" endOverrulable="true"/> <readWriteMode>read only</readWriteMode> </timeSeriesSet> </variable> <!-- Intermediary variable: stores the GMT version of the input series, acquired by nearest neighbor interpolation.--> <variable>

Standard Location: <*configuration_dir*>**/ModuleConfigFiles/hefs/importMEFPPE**	**Contents:** ***MEFP_MAP_to_GMT.xml***

```
      <variableId>gmt_fmap</variableId>
      <timeSeriesSet>
         <moduleInstanceId>MEFP_MAP_to_GMT</moduleInstanceId>
         <valueType>scalar</valueType>
         <parameterId>MAP</parameterId>
         <locationSetId>Catchments_HEFS</locationSetId>
         <timeSeriesType>external historical</timeSeriesType>
         <timeStep unit="hour" multiplier="6"/>
      <relativeViewPeriod unit="day" start="-36500" startOverrulable="true" end="0"
endOverrulable="true"/>
         <readWriteMode>add originals</readWriteMode>
      </timeSeriesSet>
   </variable>

   <!--
   ============================================================
   TRANSFORMATIONS
   ============================================================
   -->

   <!-- Create the GMT time series from the local time time series using nearest
neighbor sampling. -->
   <transformation id="sample_gmt_fmat">
      <sample>
         <equidistant>
            <equidistantInputVariable>
               <variableId>hist_fmap</variableId>
            </equidistantInputVariable>
            <timeReferenceInputVariable>
               <variableId>gmt_fmap</variableId>
            </timeReferenceInputVariable>
            <interpolationType>closest</interpolationType>
            <outputVariable>
               <variableId>gmt_fmap</variableId>
            </outputVariable>
         </equidistant>
      </sample>
   </transformation>

</transformationModule>
```

2.3.4 Modify File Added in Step 2.1: MEFP_MAT_to_TAMN_TAMX.xml (Optional)

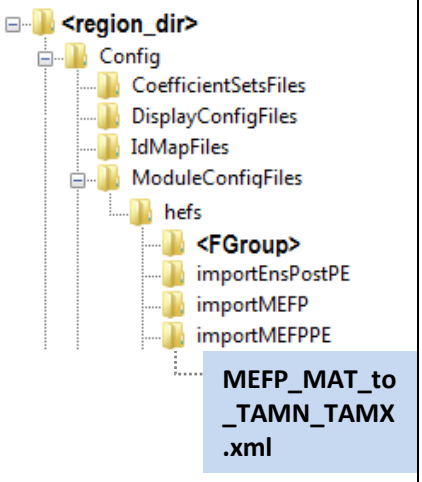
This step must only be performed if you are going to use imported NWS-DATACARD as the source of historical 6-hour MAP/MAT time series required for MEFPPE.

Action: Open the file

<*configuration_dir*>/ModuleConfigFiles/hefs/importMEFPPE/MEFP_MAT_to_TAMN_TAMX.xml

in your editor of choice. Change the timeZone attributes within the timeStep XML elements to match that used in Step 2.3.2. See the example below, which only includes the first part of module where the change must be made; the field to change is **highlighted and in bold**.

Description: If the timeStep XML element was modified in Step 2.3.2, then all modules that use those time series must be updated with a matching change. This is one such module.

Standard Location: <*configuration_dir*>**/ModuleConfigFiles/hefs/importMEFPPE**	**Contents:** ***MEFP_MAT_to_TAMN_TAMX.xml***
	<?xml version="1.0" encoding="UTF-8"?> <transformationModule xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wldelft.nl/fews http://c hps1/schemas/transformationModule.xsd" version="1.0"> <!-- NOTE: This module uses coefficient sets to define coefficients and a divider to employ in the diurnal computations needed to transform 6h MAT to 24h TAMN (TMIN) and TAMX (TMAX). See the coefficient set defined with the name of this module to see the coefficients used, which by default are the same coefficients used in the scientific prototype of MEFP (or EPP3). This module is meant to run for all MEFP catchments at one time and will need to be changed if memory problems occur. Testing for 250+ catchments has not encountered any problems, however. --> <!-- Input variable: FMAT, or MAT in the future --> <variable> <variableId>hist_fmat</variableId> <timeSeriesSet> <moduleInstanceId>ImportMEFPPEDatacardsInLocaltime</moduleInstanceId> <valueType>scalar</valueType> <parameterId>MAT</parameterId> <locationSetId>Catchments_HEFS</locationSetId> <timeSeriesType>external historical</timeSeriesType> <timeStep unit="hour" multiplier="6" **timeZone="GMT-5"**/> <relativeViewPeriod unit="day" start="-36500" startOverrulable="true" end="0" endOverrulable="true"/> <readWriteMode>read only</readWriteMode> </timeSeriesSet> </variable> ...

Standard Location: <*configuration_dir*>**/ModuleConfigFiles/hefs/importMEFPPE**	**Contents:** ***MEFP_MAT_to_TAMN_TAMX.xml***

2.3.5 Modify Existing File: ModuleInstanceDescriptors.xml (Required)

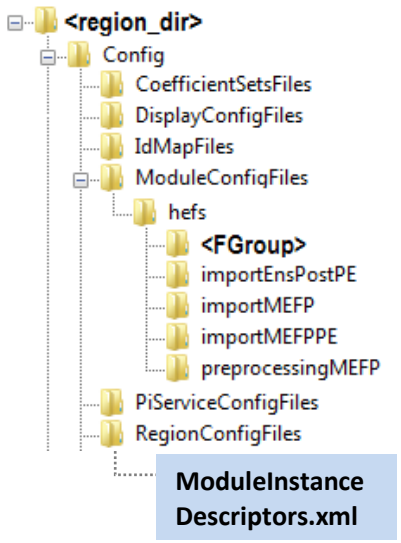
Action: Define new module instance descriptors in the file

<*configuration_dir*>/RegionConfigFiles/ModuleInstanceDescriptors.xml

See the example below for text to add immediately before the closing "</moduleInstanceDescriptors>" at the end of the file. A sample is provided in the following file:

<*tar_root_dir*>/mefppe/samples/Config/RegionConfigFiles/ModuleInstanceDescriptors.xml

Description: The added modules are used to import datacard data in the RFC local time zone, convert the historical MAP data to GMT, and compute 24-hour min/max temperature time series from imported 6-hour MAT time series.

Standard Location: <*configuration_dir*>**/RegionConfigFiles/**	**Contents:** ***ModuleInstanceDescriptors.xml***
	<?xml version="1.0" encoding="UTF-8"?> <moduleInstanceDescriptors xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wldelft.nl/fews http://chps1/schemas/moduleInstanceDescriptors.xsd" version="1.0"> … **<!-- ADDED FOR MEFPPE ================================== -->** **<!-- MEFP Parameter Estimator Modules: Import datacard file in appropriate local time, turn MAT into GMT based TAMN/TAMX, and Convert MAP to GMT. -->** **<moduleInstanceDescriptor id="ImportMEFPPEDatacardsInLocaltime">** **<description>Imports Datacards in Local Time</description>** **<moduleId>TimeSeriesImportRun</moduleId>** **</moduleInstanceDescriptor>** **<moduleInstanceDescriptor id="MEFP_MAT_to_TAMN_TAMX">** **<moduleId>TransformationModule</moduleId>** **</moduleInstanceDescriptor>** **<moduleInstanceDescriptor id="MEFP_MAP_to_GMT">** **<moduleId>TransformationModule</moduleId>** **</moduleInstanceDescriptor>** **<!-- END MEFPPE ====================================== -->** </moduleInstanceDescriptors>

2.3.6 Modify Existing File: WorkflowDescriptors.xml (Required)

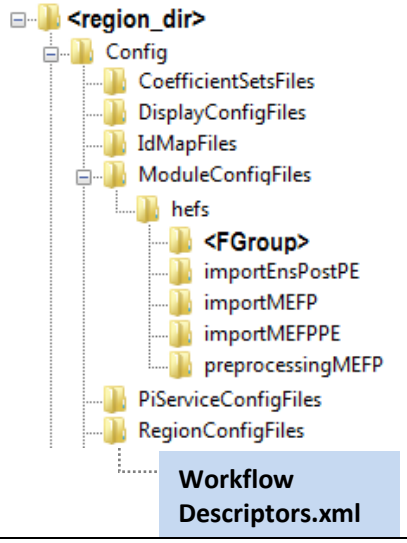
Action: Define a new workflow descriptor in the file

<configuration_dir>/RegionConfigFiles/WorkflowDescriptors.xml

See the example below for text to add immediately before the closing "</workflowDescriptors>" at the end of the file. A sample is provided in the following file:

<tar_root_dir>/mefppe/samples/Config/RegionConfigFiles/WorkflowDescriptors.xml

Description: The added workflow executes the import modules.

Standard Location: *<configuration_dir>*/**RegionConfigFiles/**	**Contents:** ***WorkflowDescriptors.xml***
	<?xml version="1.0" encoding="UTF-8"?> <workflowDescriptors xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wldelft.nl/fews http://chps1/schemas/workflowDescriptors.xsd" version="1.0"> … **<!-- ADDED FOR MEFPPE ========================== -->** **<!-- Import datacard files workflow for MEFPPE -->** **<workflowDescriptor id="ImportMEFPPEHistoricalData" forecast="true"** **visible="true" name="ImportMEFPPEHistoricalData"** **allowApprove="false">** **<description>Import MAP and MAT for MEFPPE</description>** **</workflowDescriptor>** **<!-- END MEFPPE ================================ -->** </workflowDescriptors>

2.3.7 Modify Existing File: Explorer.xml (Required)

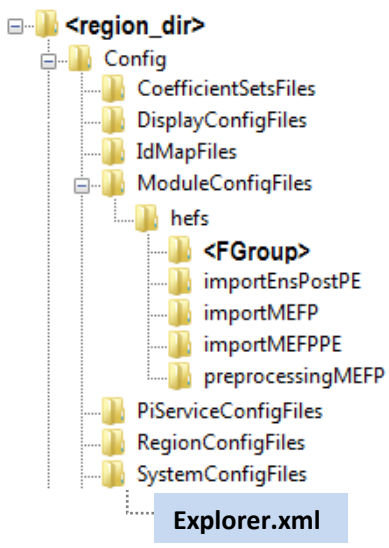
Action: Add a new explorer task for MEFPPE to the following file:

<configuration_dir>/SystemConfigFiles/Explorer.xml

See the example below for the exact text to add immediately before the closing "</explorerTasks>" and after the last already defined explorerTask XML element. A sample is provided in the following file (search for "HEFS" to find added workflow descriptors):

<tar_root_dir>/mefppe/samples/Config/SystemConfigFiles/Explorer.xml

Description: The added explorer task allows MEFPPE to be accessed as a plug-in to the CHPS interface. By installing it as the last explorerTask defined within the explorerTasks XML element, it will show up as the last button in the CHPS interface toolbar.

Standard Location: *<configuration_dir>***/SystemConfigFiles/**	**Contents:** ***Explorer.xml***
	<?xml version="1.0" encoding="UTF-8"?> <explorer version="1.1" xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wldelft.nl/fews http://chps1/schemas/explorer.xsd"> … <explorerTasks> … **<!-- ADDED FOR MEFPPE ========== -->** **<explorerTask name="MEFPPE"> <taskClass>ohd.hseb.hefs.mefp.pe.MEFPPEExplorerPlugIn</taskClass> <toolbarTask buttonType="text">true</toolbarTask> <menubarTask>true</menubarTask> </explorerTask>** **<!-- END MEPPE ========== -->** </explorerTasks> … </explorer >

2.4 *Confirm Installation*

To confirm the installation, follow the instructions in Section 3 for estimating parameters for the installation catchments. Once completed, confirm that appropriate parameter files were created under the directory

<*mefp_root_dir*>/mefpParameters/.

3 Estimating Parameters

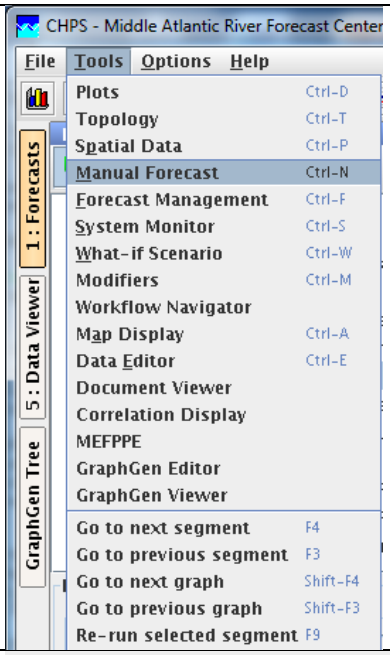
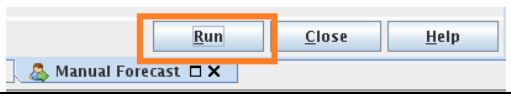
This section presents basic instructions for estimating parameters for any catchment for which MEFP must generate forecast ensembles. It is assumed that datacard files are used as the source of historical MAP/MAT time series. If an alternative source is used (see Sections 1.4 and 2.3.1), that alternative source must be prepared for the *installation catchments* and skip any step that involves importing datacard files. Though the instructions will be general for all catchments, the *installation catchments* will be used as examples. The general steps are as follows:

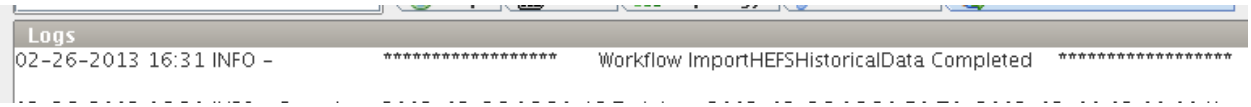
1. Populate <*region_dir*>/Import/mefppe_cardfiles directory with MAP and MAT datacard files.
2. Start CHPS.
3. Import datacard files that contain the historical MAP and MAT time series data to be used for parameter estimation.
4. Confirm the imported time series using the CHPS **Database Viewer**.
5. Start the MEFPPE.
6. Define the appropriate connection to the PI-service.
7. Use the **Export Historical Data Subpanel** of the **Setup Panel** to extract the historical MAP/TMIN/TMAX time series from the localDataStore via the FEWS PI-service and make it available to MEFPPE.
8. Perform all steps necessary for the installation catchments by clicking on the **Run All Button** in the **Location Summary Panel** of the MEFPPE.
9. Close MEFPPE and shutdown CHPS.

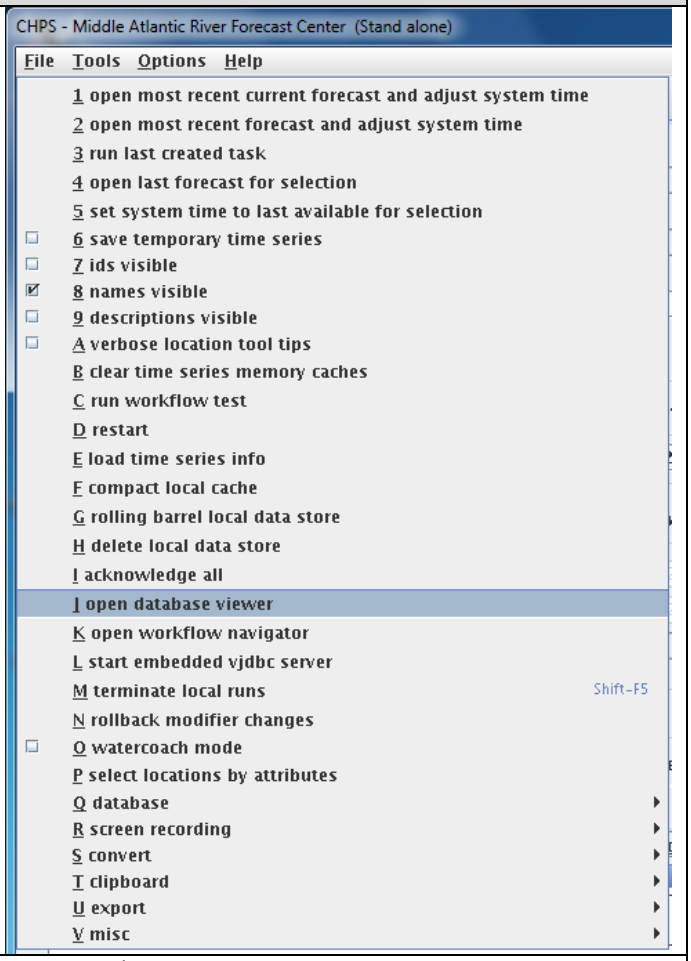
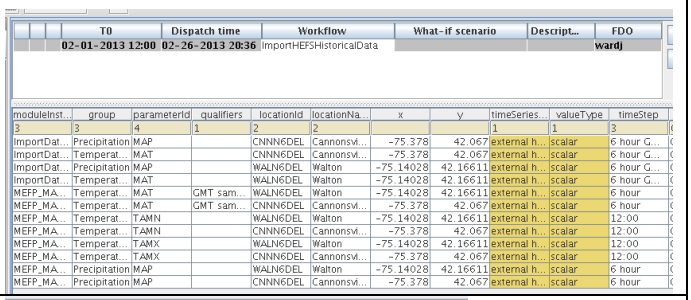
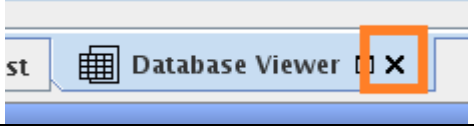
The following steps are not described here, but are described in the *MEFP User's Manual*:

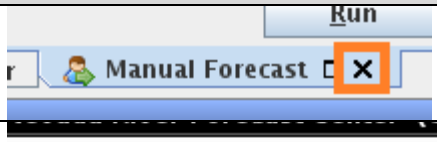
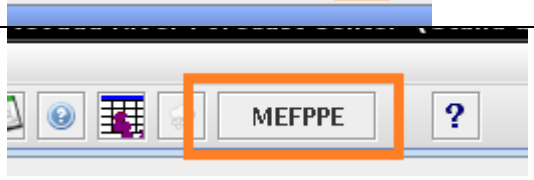
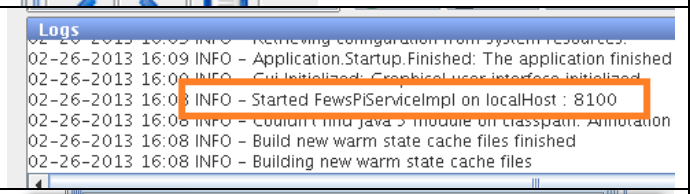
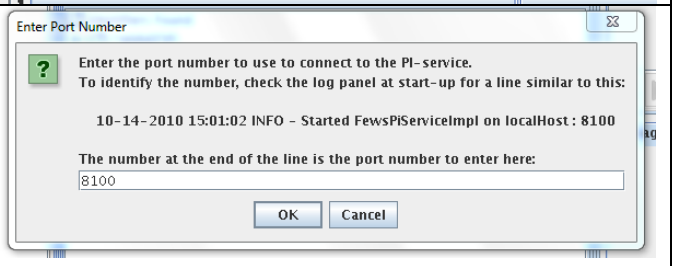
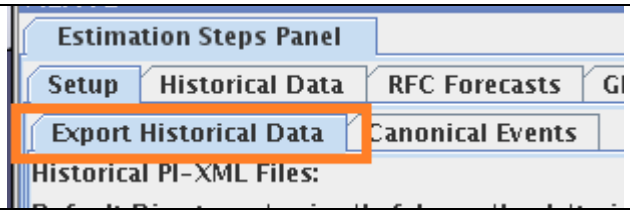
- Creating binary historical data files via the **Historical Data Panel**.
- Acquiring RFC QPF/QTF reforecasts via the **RFC Forecasts Panel**. In addition to the *MEFP User's Manual*, see Appendices B and C for instructions for making RFC QPF/QTF data available to the MEFPPE.
- Acquiring gridded reforecast data files for the gridded forecast sources via the **GEFS** and **CFSv2 Panels**.
- Setting estimation options and estimating the parameters via the **Estimation Panel**.
- Accepting the parameters, which copies parameter files from the MEFPPE run area to the <*mefp_root_dir*>/mefpParameters directory.
- Using the **Diagnostics Panel** to view data and parameters.

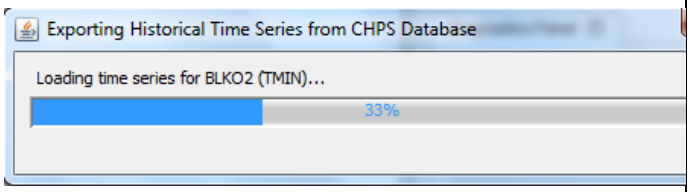
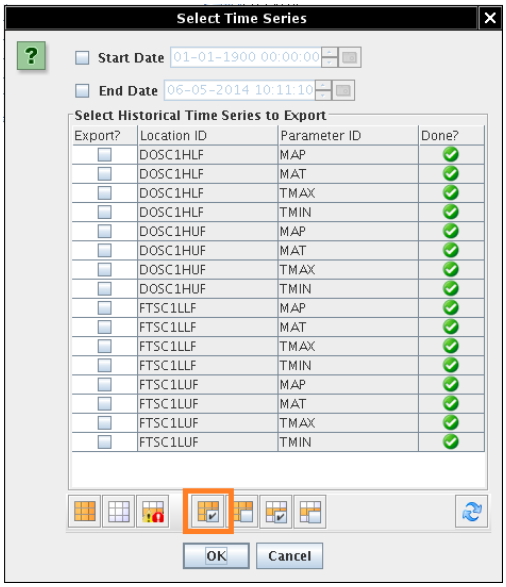
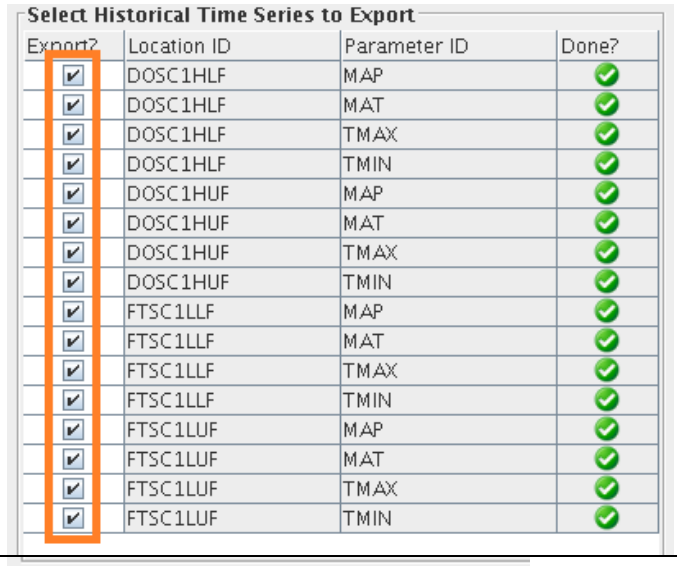
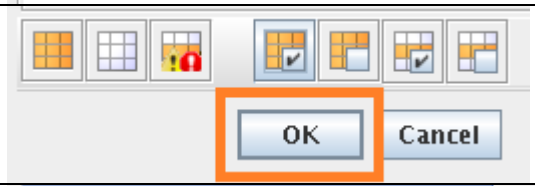
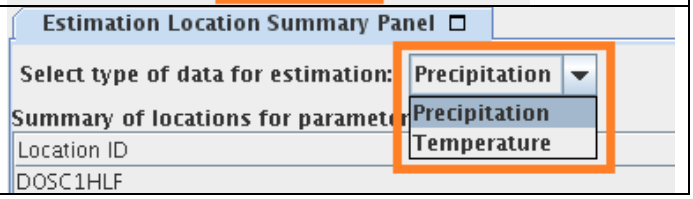
The first five bullets above describe steps that are performed non-interactively using default settings when the **Run All Button** is clicked. The last step can be applied after the fact or step-by-step to quality control data and examine parameter estimation results.

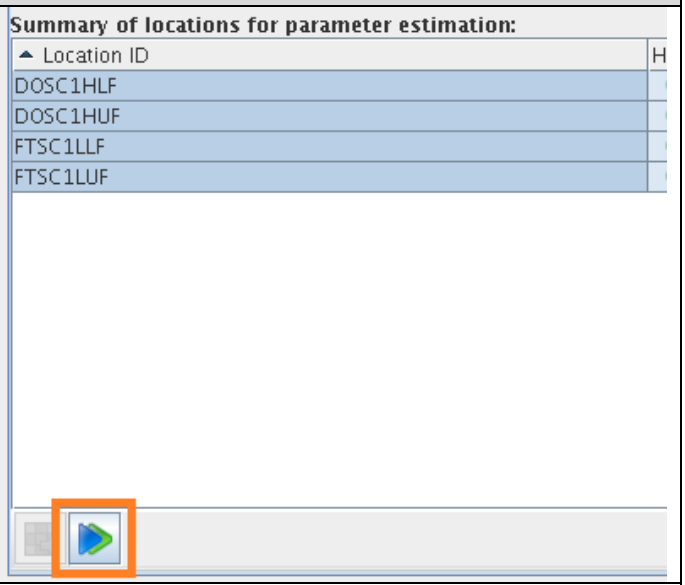
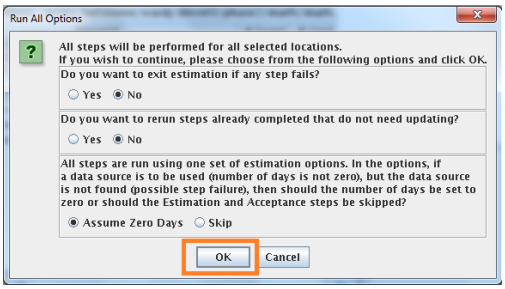
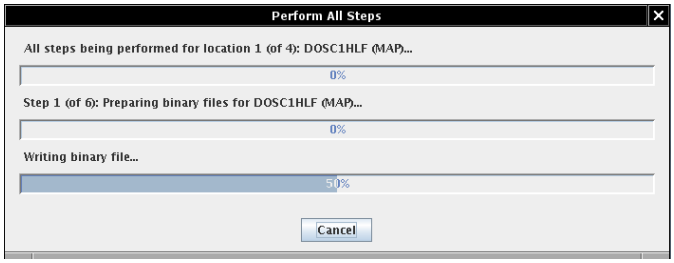
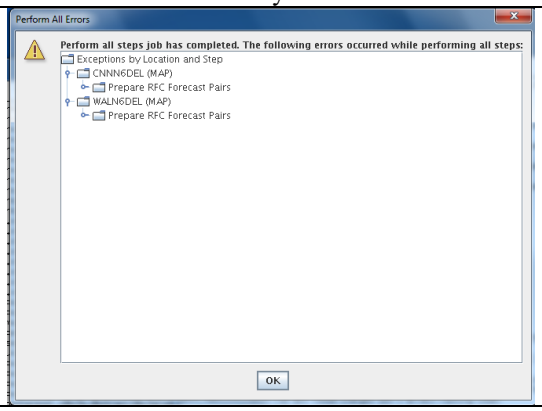
#	Action	Expected Results
0	Place correctly formatted historical MAP/MAT datacard files in the appropriate directory for import: <*region_dir*>/Import/mefppe_cardfiles See Appendix A for tips on modifying the format of datacard files so that CHPS can import them.	
1	Start FEWS using the *installation standalone*: ***cd*** <*region_dir*> ***cd ..*** ***./ohdPlugins/fews_ohdPlugins.sh.rboff ##rfc_sa &***	FEWS will be started. The splash screen displayed will vary by RFC. The default splash screen is:  After a short time, the CHPS interface will open.
2	In CHPS run the "**ImportMEFPPEHistoricalData**" workflow. Choose Tools (menu), Manual Forecast (menu option).	
3	Under Workflow (pull down menu), choose **ImportMEFPPEHistoricalData.** It may be the last Workflow.	
4	Click **Run** (button). 	Output (in the CHPS log area) will have "Workflow ImportMEFPPEHistoricalData Completed", as shown in the following figure. The historical MAP/MAT datacards have been imported.

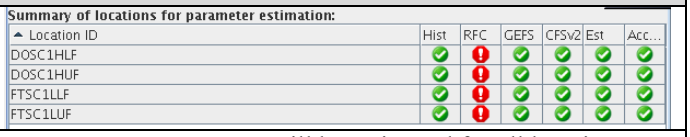
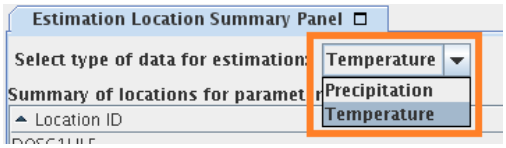
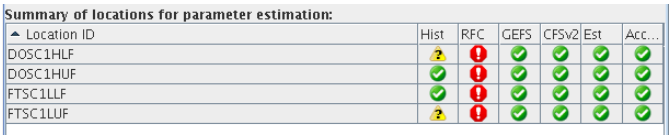


#	Action	Expected Results
5	Click in the CHPS **Logs Panel**, press the <F12 key>, and press the <J> key to open the **Database Viewer**.	
6	Confirm that the imported datacard time series are present and that the imported data appears reasonable. To do so, use the standard **Database Viewer** tool to select the imported time series and view them.	For example: 
7	Close the **Database Viewer** by clicking on the X at the bottom of the panel.	

#	Action	Expected Results
8	Close the **Manual Forecast Dialog** by clicking on the X at the bottom of the window.	
9	Start the MEFPPE by clicking on the **MEFPPE Button** in the toolbar of the CHPS interface. .	
10	Unless Graphics Generator was installed in the *installation standalone*, MEFPPE will not be connected to the PI-service, as indicated by the icon for the **Connect to CHPS PI-service Button** (shown to the right). If the MEFPPE is connected to the PI-service, skip to Step 14.	This icon indicates no connection: 
11	Scroll the **Logs Panel** to find your PI-service port number, looking for a log message that starts with "Started FewsPiServiceImpl on localHost…".	
12	Click on the **Connect to CHPS PI-service Button**, enter your PI-service port number (here 8100), and click **OK**.	 After clicking **OK**, a dialog will open indicating whether or not the connection attempt was successful.
13	If the connection attempt succeeded, the **Connect to CHPS PI-service Button** will show a green checkmark (shown to the right) and the **Export Time Series from CHPS DB Button** will be enabled. If the connection attempt failed and the reason cannot be determined, then the instructions indicated in Section 2.3.1 must be followed to provide historical data through other means.	This icon indicates a connection has been established: 
14	If the tab has not already been selected, select the **Export Historical Data Tab** in the **Setup Subpanel** of the **Estimation Steps Panel** to make the corresponding panel active.	

#	Action	Expected Results
15	Click on the **Export Time Series from CHPS DB Button**: 	A dialog will open indicating the status of acquiring information about available time series momentarily:  After the status dialog closes, a **Select Time Series Dialog** (shown in the next step) will open.
16	Click on the **Check All Rows for Export Button** to check all rows in the table. 	All of the rows will be checked, indicating that those historical (MAP, MAT, TMIN, TMAX) time series are to be acquired via the FEWS PI-service: 
17	When all of the time series rows are checked, click **OK**.	
18	If it is not already selected, select "Precipitation" in the **Select type of data for estimation Choice Box** in the **Location Summary Panel**.	

#	Action	Expected Results
19	Shift + Click to select all rows in the **Summary of location for parameter estimation Table** and click on the **Run All Button**.	
20	Select **OK** in the **Run All Options** window: 	The parameters will be estimated for the Historical, GEFS, and the CFSv2 forecast sources. The RFC data source is not available. (If you wish to add RFC data, see Appendix B and Appendix C below.) Data for forecast sources GEFS and CFSv2 will be acquired via SFTP as described in the Section 2.3.2 of the *HEFS Overview and Getting Started Manual*. A progress dialog will open to display parameter estimation progress:  Parameter estimation may take a few minutes.
21	You may see a **Perform All Errors Dialog** alerting you to missing RFC data. Click **OK** to close the dialog.	

#	Action	Expected Results
22	When finished, all the boxes except RFC should be checked green in the **Summary of location for parameter estimation Table.**	
23	Select "Temperature" in the **Select type of data for estimation Choice Box** in the **Location Summary Panel**:  Perform steps 19 – 22 again.	Temperature parameters will be estimated for all locations, but RFC will not be included as a forecast source because no data has been provided: 
25	As an additional check, the directory ***<mefp_root_dir>***/mefpParameters should contain the generated and accepted *.parameter.tgz files.	Example: DOSC1HLF.precipitation.mefp.parameters.tgz DOSC1HLF.temperature.mefp.parameters.tgz DOSC1HUF.precipitation.mefp.parameters.tgz DOSC1HUF.temperature.mefp.parameters.tgz FTSC1LLF.precipitation.mefp.parameters.tgz FTSC1LLF.temperature.mefp.parameters.tgz FTSC1LUF.precipitation.mefp.parameters.tgz FTSC1LUF.temperature.mefp.parameters.tgz

4 Adding Segments and Forecast Groups

When adding a new segment or forecast group, first follow the instructions provided in the *MEFP Configuration Guide: Data Ingest Components*. When complete, transfer those configuration changes to the *parameter estimation standalone* used herein. No further configuration work should be required to use MEFPPE to estimate parameters for the new locations.

5 Tips and Trouble Shooting

This section provides basic tips and troubleshooting related to the installation and use of MEFPPE.

5.1 *Tips*

5.1.1 Moving the MEFPPE to Another Standalone

To move the MEFPPE to another standalone, first perform the installation steps presented above (Section 2) for that standalone. After installing, copy the MEFP run area from the current standalone to the new standalone:

cp –r <*mefp_run_area*> <new *region_dir*>/Models/hefs/.

After doing this copy, when the MEFPPE is started in the new standalone, it will have access to all files used in the current standalone, including binary historical data files, archived forecast and reforecast data files, and parameters already estimated.

5.1.2 Importing Datacard Data in Multiple Time Zones

Some RFCs may span two time zones. However, this does not mean the datacard data must be imported in two time zones. The results of MEFPPE parameter estimation will likely be the same if only a one of the two time zones is used. This is because the imported data is converted to GMT prior to use in MEFPPE by using a closest-value-by-time transformation, and that GMT time series will likely be the same for both time zones.

Still, to allow for importing datacard data in multiple time zones, the following general changes must be made:

1. In the file <*configuration_dir*>/RegionConfigFiles/LocationSets.xml, define Catchment_HEFS_<*time zone*> location sets specific for each time zone. These must be subsets of the overall Catchments_HEFS location set.

2. In the directory <*region_dir*>/Import create a subdirectory called "mefppe_cardfiles2" (or use another name as appropriate for the second time zone).

3. Modify the file

<*configuration_dir*>/Config/ModuleConfigFiles/hefs/importMEFPPE/ImportMEFPPEDatacardsInLocaltime.xml

   so that the import for the first time zone is performed. This includes modifying the locationSetId (defined in Step 1), timeZoneOffset, and timeZone elements appropriately.

4. Copy the file modified Step 3 creating a new version for the second time zone giving the new file an appropriate name. Do the same modifications to the new file as described in Step 3 but for the second time zone. Also, modify the folder XML element as follows (the name of the subdirectory should match that created in Step 2:

   <folder>$IMPORT_FOLDER_ROOT$/mefppe_cardfiles2</folder>

5. Add a descriptor for the new module created in Step 4 to the file,

   <*configuration_dir*>/RegionConfigFiles/ModuleInstanceDescriptors.xml

6. Call the new module as an activity in the workflow XML file,

   <*configuration_dir*>/WorkflowFiles/hefs/ImportMEFPPEHistoricalData.xml

With these changes, when importing datacard data prior to using MEFPPE, datacard files for the first time zone must be placed in the original import directory:

<*region_dir*>/Import/mefppe_cardfiles

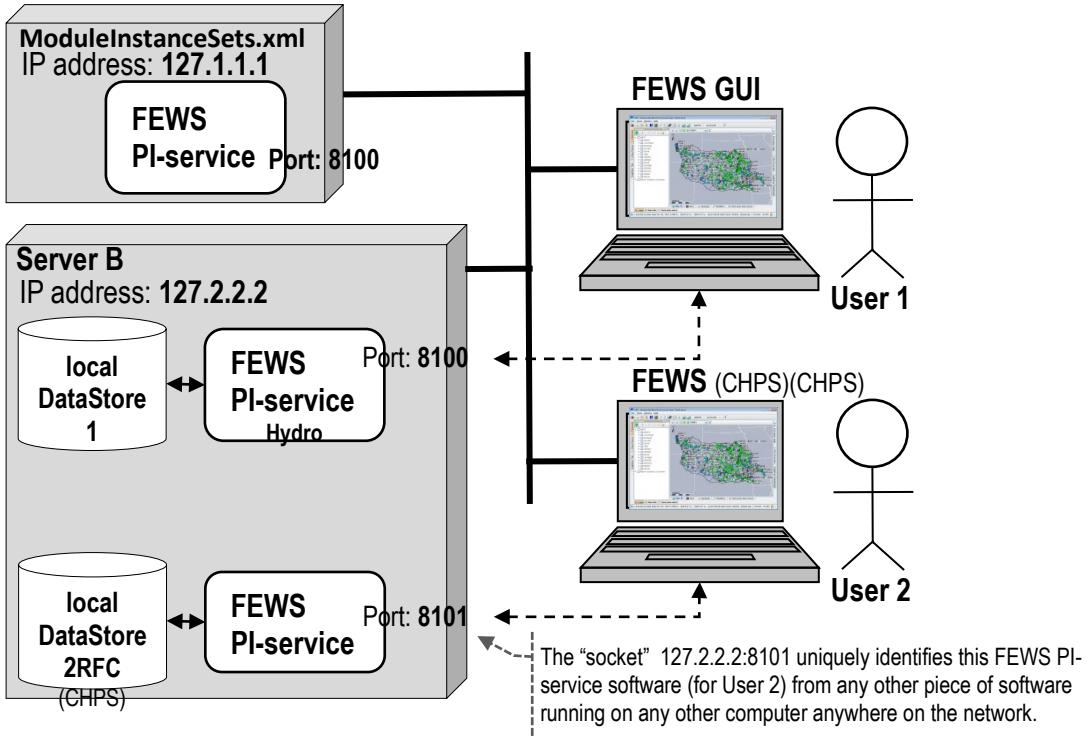
Datacard files to be imported for the second time zone must be placed in the new import directory created in Step 2; for example:

<*region_dir*>/Import/mefppe_cardfiles2.

5.1.3 Setting the FEWS PI-Service Port Number for Interactive Use

MEFPPE makes use of the FEWS Published Interface (PI)-service. However, before MEFPPE can make use of the FEWS PI-service, it must be configured correctly. The below describes the problem of identifying the correct connection and how to direct MEFPPE to use the correct connection.

IP addresses enable computers to be uniquely addressed. Since each computer has its own unique IP address; messages can be correctly delivered (from one computer to the next) as long as the message contains the destination's IP address. However, with **multiple pieces of software on a single computer**, ports are also required:



In the above figure, the FEWS interface for User 2 needs to send a message to the FEWS PI-service software on Server B. However, there are two copies of the PI-service running on Server B. Which copy of the PI-service will receive the message? Using only the IP address for Server B (127.2.2.2) will not indicate which of the two PI-services will receive the message. Moreover, we do not want User 2 changing data in the localDataStore that belongs to User 1. Consequently, we need an addressing mechanism that uniquely identifies both computers **and** FEWS instances running on those computers. Port numbers supply the additional piece of information that uniquely identifies a single FEWS instance on a computer. (The combination of an IP address and a port number is often referred to as a "socket".)

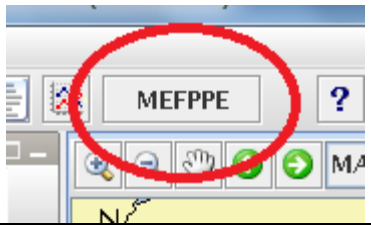
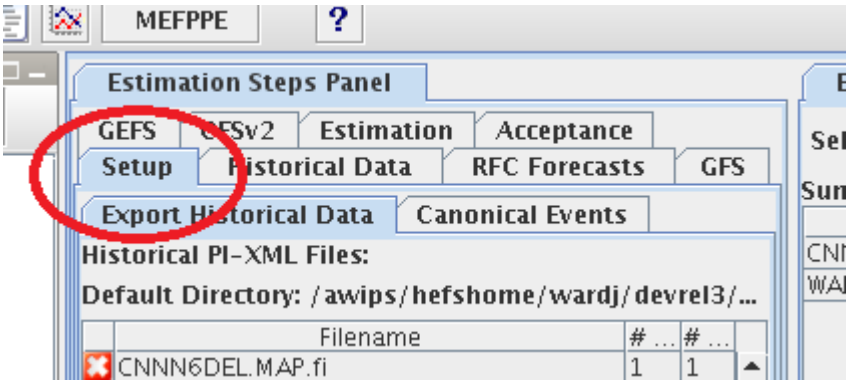
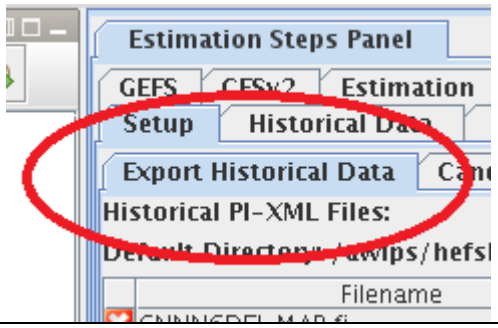
When the first user (on a particular computer) starts FEWS, it automatically starts a FEWS PI-service for that user and assigns the PI-service software a port number of 8100. However, when a second user on the same computer attempts to run FEWS, FEWS recognizes that another user

is already "using" port number 8100 and automatically assigns the next user PI-service port number 8101. The third user will get 8102, and so on.

Unfortunately, MEFPPE has no way of knowing which PI-service port number was assigned to an instance of FEWS. The FEWS software does not currently provide a mechanism for FEWS explorer plug-in to ask what the current user's FEWS instance port number is. Consequently, **the FEWS PI-service connection must be manually configured by HEFS users**.

To ensure a proper connection to the PI-service, the following should be executed immediately after starting the CHPS interface that has MEFPPE installed:

#	Action
1	To find your PI-service port number, check the **Logs Panel** for lines similar to the following: 11-04-2010 11:16:08 INFO - OHD FEWS explorer plug-in software establishing connection to CHPS FewsPiServiceImpl on localHost : 8100... 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 In the above example, note the yellow highlighted number 8100. 8100 was the port number that the Graphics Generator attempted to connect to in order to access the PI-service. Note also the above warning: "WARN – Failed to start: SocketListener0@0.0.0.0:8100". This is an indicator that port 8100 was not available because another user is already using it. Look for the text "Started FewsPiServiceImpl" which indicates the automatically assigned port number, shown highlighted in green above. In this case, 8101 is the port number of the PI-service started for **your FEWS session** and 8101 is the port number Graphics Generator should use. (Note that in this case the new port number was 8101. This may not always be true since it is not always obvious how many FEWS users are using the same computer.) **You should always check to see which port number was assigned to your FEWS PI-service**. If your assigned port number is not the default (8100), as is the case above, the HEFS GUI components will fail to connect to the PI-service or will connect to the *wrong* PI-service. **If your port number is not 8100, then continue to Step 2. Otherwise, if your port number is 8100 there is no need to make a correction and the steps below can be skipped.**

#	Action
2	Click on the **MEFPPE Button** in the toolbar of the CHPS interface 
3	Make the **Export Historical Data SubPanel** of the **Setup Panel** active by, clicking on **Setup** tab  in the MEFPPE and clicking on the **Export Historical Data** tab, 
4	Click on the **Reconnect to CHPS PI-service Button** ,  , to set the port number.
5	In the **Enter Port Number Dialog** that opens, enter the correct port number (green highlighted number in Step 1 above.) and click **OK**. After a brief delay, a connection will be established ( button will display) or an error message will be displayed if a problem occurred ( button will display).

5.1.4 Specifying the Diurnal Pattern to Convert MAT to TAMN and TAMX

The historical temperature data imported via the module ImportDatacardsInLocaltime modified in Step 2.3.2 is assumed to be 6-hour mean temperature (MAT). However, the data required by MEFPPE, as described in Section 2.3.1, is 24-hour minimum and maximum temperature (TAMN/TMIN and TAMX/TMAX) defined for 24-hour periods ending at 12Z. The conversion of MAT to TAMN/TAMX is performed in the transformation module defined here:

<*configuration_dir*> /ModuleConfigFiles/hefs/importHEFSPE/MEFP_MAT_to_TAMN_TAMX.xml

It performs diurnal computations based on coefficients defined in this file:

<*configuration_dir*>/CoefficientSetsFiles/MEFPPE_MAT_to_TAMN_TAMX_Coefficients.xml

By default, the file defines these coefficients:

```
...
  <coefficientSet id="TAMN">
    <user>
      <simple>
        <coefficient id="COEFF_12Z_START" value="0.0"/>
        <coefficient id="COEFF_18Z" value="9.652"/>
        <coefficient id="COEFF_0Z" value="-6.432"/>
        <coefficient id="COEFF_6Z" value="0.480"/>
        <coefficient id="COEFF_12Z_END" value="0.0"/>
        <coefficient id="DIVIDER" value="3.70"/>
      </simple>
    </user>
  </coefficientSet>
  <coefficientSet id="TAMX">
    <user>
      <simple>
        <coefficient id="COEFF_12Z_START" value="0.0"/>
        <coefficient id="COEFF_18Z" value="-0.670"/>
        <coefficient id="COEFF_0Z" value="10.72"/>
        <coefficient id="COEFF_6Z" value="-0.800"/>
        <coefficient id="COEFF_12Z_END" value="0.0"/>
        <coefficient id="DIVIDER" value="9.25"/>
      </simple>
    </user>
  </coefficientSet>
...
```

The coefficients defined for coefficientSet id "TAMN" are used to compute the 24-hour minimum temperature from 6-hour MAT values aligned with the standard GMT synoptic times: 0, 6, 12,

18Z. The GMT alignment is done using nearest neighbor; i.e., it uses the FEWS sample equidistant transformation with an interpolation type of "closest". The coefficients defined for coefficientSet id "TAMX" are used to compute the 24-hour maximum temperature from the same 6-hour MAT values. The coefficients that start with "COEFF_" are scalars that are multiplied by the corresponding 6-hour value. The coefficient "DIVIDER" then divides the sum of the scalars multiplied by the 6-hour values.

For example, for a given day, the default coefficients define the minimum (TAMN) and maximum (TAMX) temperatures to be the following:

$$TAMN = \frac{9.652 * x_{18z} - 6.432 * x_{0z} + 0.480 * x_{6z}}{3.70}$$

$$TAMX = \frac{-0.670 * x_{18z} + 10.72 * x_{0z} - 0.800 * x_{6z}}{9.25}$$

Modify the diurnal pattern as needed to suit the needs of your RFC. However, this diurnal pattern may need to be kept in synch with the diurnal pattern to convert from 24-hour forecast minimum temperature (TFMN) and maximum temperature (TFMX) to 6-hour forecast instantaneous temperature (FMAT) data, which is used is used by MEFP to generate ensembles (see the appendix in the *MEFP Configuration Guide: Forecast Components*).

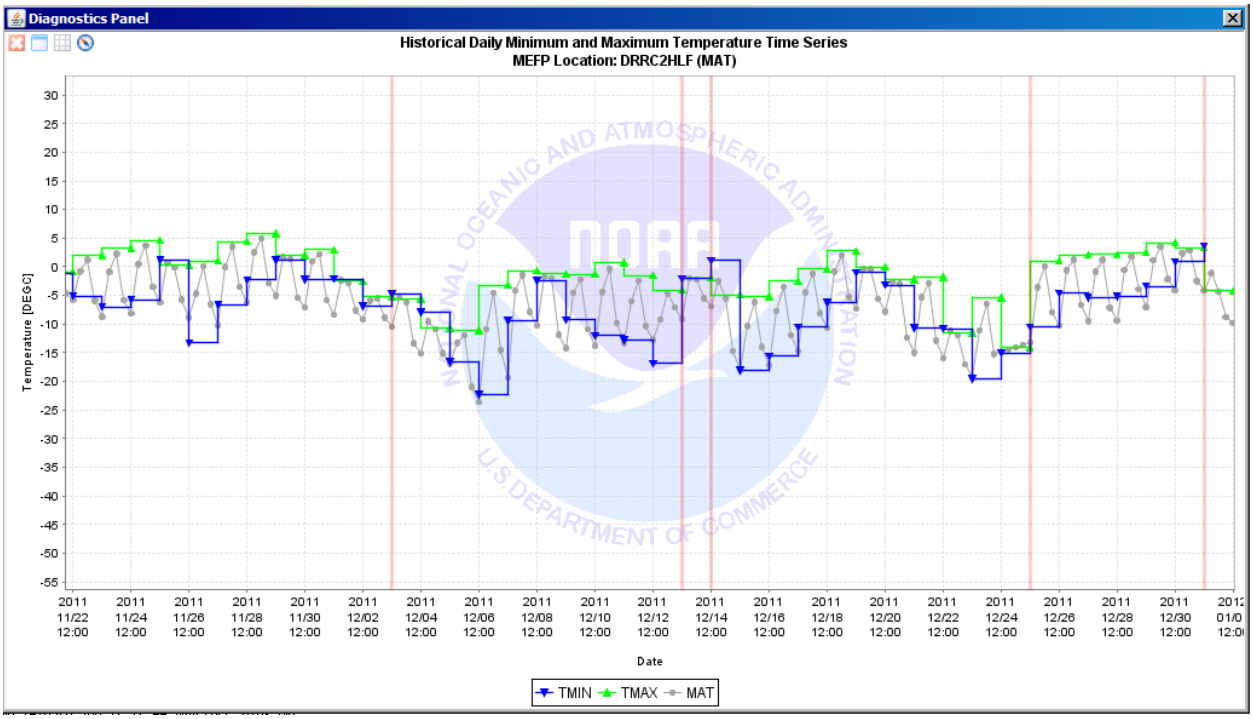
5.2 *Troubleshooting*

5.2.1 Historical Observed Minimum and Maximum Temperatures Appear Unreasonable

If, after viewing the TMIN/TMAX data through CHPS or MEFPPE diagnostics, it is determined that some values are unreasonable (for example, a TMIN value significantly larger than TMAX or impossibly large or small given the time of year), then the problem may be due to diurnal transformation performed as part of the transformations included in the default configuration of the MEFPPE. Specifically, the following module configuration file defines the diurnal transformation employed to convert 6-hour MAT values to 24-hour TMIN/TMAX values:

<*configuration_dir*>/ModuleConfigFiles/hefs/importMEFPPE/MEFP_MAT_to_TAMN_TAMX.xml

See Sections 2.3.4 and 5.1.4 for examples of potential modifications to be made to the file. If the 6-hour MAT data does not match the expected diurnal pattern, implied by the calculations, then the output from the transformation may be unreasonable. For example, the following are unreasonable values for a segment viewed through the **Diagnostics Panel** of the MEFPPE:



The 24-hour TMIN time series, shown in blue, diverges from the 6-hour MAT significantly, and at some points, highlighted in faint red, exceeds the 24-hour TMAX time series.

There are two alternatives for fixing this bad data:

Alternative 1: Modify the Input MAT Data and Execute the Transformation Again

The first option to fix the problem is to modify the time series input to the transformation and execute the transformation again (after re-importing the modified data). Typically, this would require editing the NWS-DATACARD that is the source of the 6-hour MAT data. However, if another data source is employed, but the same transformation is used, then that data must be edited, instead. For example, if the 6-hour historical observed MAT data is stored in a PI-timeseries file, with the transformation modified appropriately to apply to it, then that PI-timeseries file must be modified and the transformation applied again. Yet another option is using CHPS time series editing tools to modify the 6-hour MAT data directory if that data already resides in the localDataStore. Again, the transformation will need to be executed afterwards, but this time without importing the data.

In any case above, the change to make is to re-order the 6-hour values so that the data matches the expected diurnal pattern, **with the largest 6-hour value for a given 24-hour period ending at 12Z being assigned to 0Z and the smallest being assigned to the end (12Z) of the period.**

Alternative 2: Modify the 24-hour TMIN/TMAX Data Directly

The second option that will not require re-executing the transformation is to modify the PI-timeseries XML files directly in the MEFPPE run area (after using the **Export Historical Data Subpanel** of the **Setup Panel** to extract the bad historical TMIN/TMAX time series from the localDataStore via the FEWS PI-service). The files are created as Fastinfoset (.fi) files by default under the directory,

<*mefp_run_area*>/historicalData

Look for the file with the appropriate name based on the locationId. The files can be converted to XML (ASCII) as per usual using CHPS (through the F12 key options).

There are two general approaches for making the modifications:

- **Assign the TMIN/TMAX Values Directly From the MAT Time Series:** The diurnal pattern assumed by the transformation implies that for a given 24-hour interval ending at 12Z, the TMAX value recorded at the end time of that interval is approximately the value of the 6-hour MAT time series observed at 0Z, while the TMIN value is approximately that observed at the end (12Z) of the 24-hour period. Approximate TMIN/TMAX time series can then be constructed by picking off the 0Z and 12Z values accordingly. For example, if the MAT time series are stored in PI-timeseries XML (ASCII) files, the following algorithm will assign appropriate approximate TMIN/TMAX values:

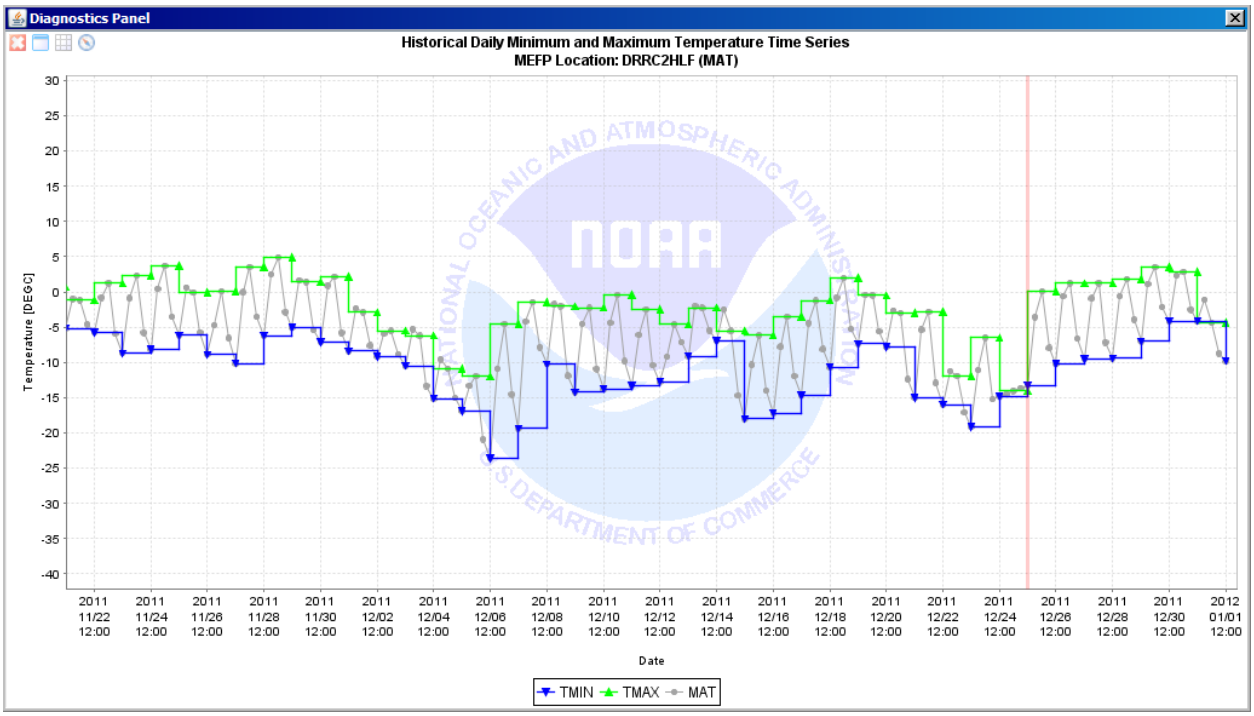
    1. Extract (Linux command grep) all of the lines with string "12:00:00" from the 6-hour MAT XML file and save these lines into a new file for parameterId TMIN.
    2. Extract (Linux command grep) all of the lines with string "00:00:00" from the 6-hour MAT XML file and save these lines into a new file for parameterId TMAX.

3. Edit the file for parameterId TMAX swapping all instances of 00:00:00 to 12:00:00.
4. Edit both files to add the appropriate PI-timeseries XML elements to the beginning and end of the file. You can use the existing (converted) XML files for TMIN and TMAX as guidance for creating the header.

- **Compute the TMIN/TMAX Values Manually From the MAT Time Series:** Process the time series data for a given 24-hour period ending at 12Z through a simple minimum/maximum calculation to acquire the 24-hour minimum and maximum value. Record that value in an appropriately formatted file (e.g., PI-timeseries XML) with an assigned date-time equal to the ending 12Z of the 24-hour period. This is akin to how the 24-hour forecasting minimum and maximum temperature time series are calculated for the GEFS forecast source (see the *MEFP Configuration Guide: Forecast Components*).

Minimum and maximum temperature data may use the parameterIds TAMN or TAMN instead of TMIN and TMAX, respectively.

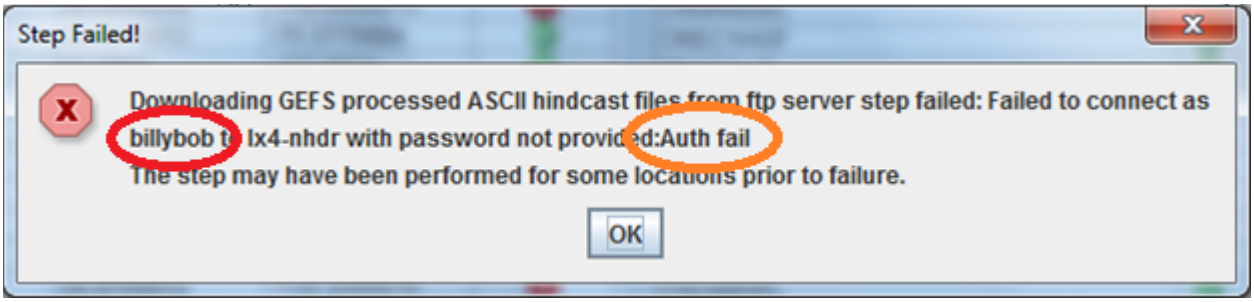
Using the first method described above, the following is the same diagnostic shown above using the "fixed" data:



5.2.2 Gridded Reforecast Files for GEFS and CFSv2 Forecast Sources Cannot be Acquired

Gridded reforecast files for the GEFS and CFSv2 forecast sources are acquired as needed by the MEFPPE whenever the **Perform Step Button**

associated with the **GEFS Subpanel, or CFSv2 Subpanel** are clicked for selected locations. Upon clicking the button and confirming the run, MEFPPE performs an SFTP to NWCT workstation lx1-nwct as your AWIPS user with the password provided. If that connection fails, a **Step Failed! Panel** will be displayed. If MEFPPE connects but fails to acquire a grid, a **Step Failed! Panel** will be displayed for example:



See Section 3.2.4.5 of the *MEFP User's Manual* for more information on how the SFT connection settings are configured. Possible reasons for step failure and mechanisms to confirm are as follows:

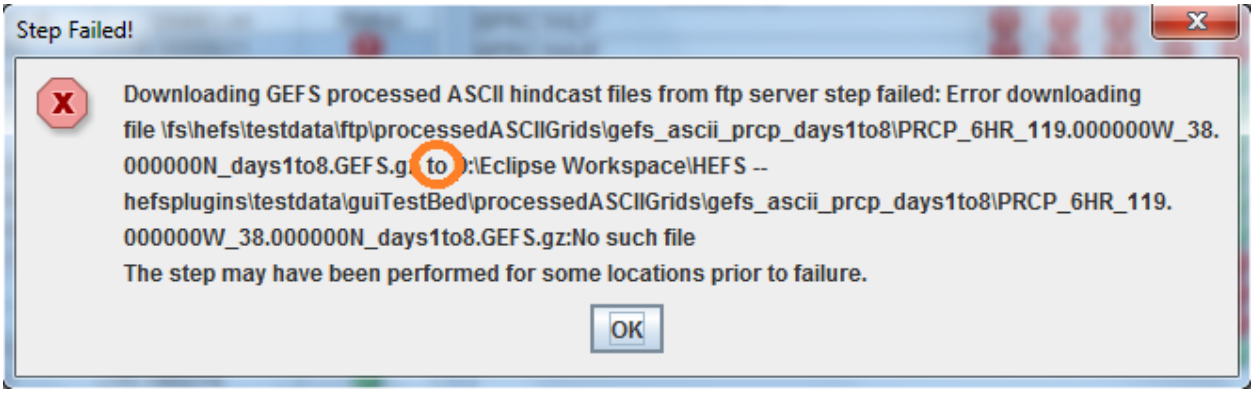
Server cannot be connected to as john.doe
Workstation lx1-nwct is the machine on NWCT used for delivery SFTP. Manually attempt to log-in to the server from the machine which is to execute MEFPPE and logged in as the user as whom MEFPPE will be executed:

```
sftp john.doe@lx1-nwct
```

When a password is requested when attempting this SFTP, then provide your current AWIPS password.

Connection attempted using an invalid username
This will appear as an "Auth fail" error, such as that shown in the image above (circled in orange). The username used for connection is displayed in the error message (circled in red). If the username is not your user, then the SFTP connection settings may be invalid. See Section 3.2.4.5 of the *MEFP User's Manual* and report the problem through Redmine.

Data does not exist on the server or local directory cannot be written to
If the **Step Failed! Dialog** displays a message similar to the following:



Then either the source file does not exist on the SFTP server or the target file cannot be written to the local machine for access by MEFPPE. The word "to" is circled above: the source file on the server is specified to its left, while the target file on the local machine is to its right (the files shown in the image above are from local-machine testing; the directories will not match those used at RFCs). First, confirm that the target file can be created by checking if the directory to containing it exists and can be written to. If not, then the MEFP run area may have been installed incorrectly. Perform this copy:

cp <*tar_root_dir*>/mefppe/Models <*region_dir*>/.

If this does not fix the problem, report the problem through Redmine. Second, if the target file can be created, then the problem is in the software or on the server side. Report the problem through Redmine.

Appendix A: Formatting Datacard Files for Import

To estimate parameters, MEFPPE requires historical precipitation (MAP) and temperature (MAT) data. The recommended mechanism for making this data available to MEFPPE is via the FEWS PI-service. However, in order for MEFPPE to acquire that data, it must first be imported into the parameter estimation standalone localDataStore.

With this release is provided a workflow, ImportMEFPPEHistoricalData, designed to import MAP and MAT data from a datacard file in local time. For that workflow to successfully import a datacard file, however, the datacard file must be properly formatted.

This appendix describes errors commonly found in datacard files to be imported and how best to correct those errors prior to importing the files.

A.1 Location identifier in the datacard file is a number, does not match the expected locationId, or is missing

The locationId assumed by CHPS when it imports a datacard file is specified in the header of that file. The position of the locationId is highlighted in the following datacard file examples:

Example 1: Numerical/Invalid locationId

```
...
              QME  L3   CFSD 24   01431500      Lackawaxen River At
10  1948 09   1999  6   F9.3
01431500    1048   0   55.000   52.000   48.000   43.000   41.000   45.000
01431500    1048   0   42.000   40.000   43.000   45.000   48.000   63.000
01431500    1048   0   57.000   48.000   42.000   38.000   36.000   74.000
01431500    1048   0  128.000   84.000   66.000   55.000   50.000   46.000
...
```

Example 2: Missing locationId

```
...
DATACARD      QME  L3   CFSD 24
 1  1951  9   2006  4   F14.5
DOLC2        151   1      42.00000      39.00000      37.00000      39.00000
DOLC2        151   2      41.00000      37.00000      33.00000      36.00000
DOLC2        151   3      39.00000      37.00000      38.00000      40.00000
...
```

In either case, edit the file manually in order to modify or insert an appropriate locationId in the file. Optionally, for the first case where a numerical or invalid locationId is used, an import id-mapping can be applied to the module ImportDatacardsInLocaltime,

A.2 A '0' is used in front of single digit months within lines of the datacard file

The following is an example of a datacard file that will not import successfully because of a zero preceding single digit months:

```
...
01431500    1248   0  150.000  140.000  130.000  135.000  160.000 4100.000
01431500    1248   0 5300.000
01431500    0149   0 2060.000 1350.000  950.000  687.000 1450.000 6030.000
01431500    0149   0 3090.000 1930.000 1360.000 1100.000  980.000  766.000
01431500    0149   0  652.000  574.000  440.000  455.000  480.000  495.000
01431500    0149   0  538.000  624.000  465.000  465.000  450.000  506.000
01431500    0149   0  822.000  673.000  556.000  708.000  893.000  600.000
01431500    0149   0  500.000
01431500    0249   0  520.000  460.000  350.000  435.000  420.000  370.000
01431500    0249   0  382.000  350.000  340.000  320.000  290.000  270.000
...
```

To fix the problem, the problematic zeros must be removed:

```
...
01431500    1248   0  150.000  140.000  130.000  135.000  160.000 4100.000
01431500    1248   0 5300.000
01431500     149   0 2060.000 1350.000  950.000  687.000 1450.000 6030.000
01431500     149   0 3090.000 1930.000 1360.000 1100.000  980.000  766.000
01431500     149   0  652.000  574.000  440.000  455.000  480.000  495.000
01431500     149   0  538.000  624.000  465.000  465.000  450.000  506.000
01431500     149   0  822.000  673.000  556.000  708.000  893.000  600.000
01431500     149   0  500.000
01431500     249   0  520.000  460.000  350.000  435.000  420.000  370.000
01431500     249   0  382.000  350.000  340.000  320.000  290.000  270.000
...
```

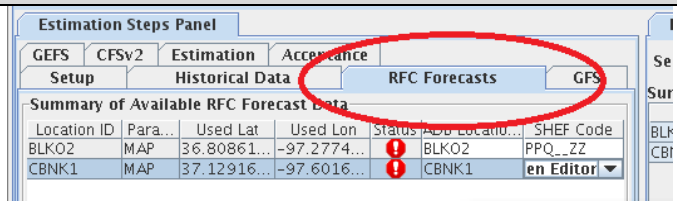
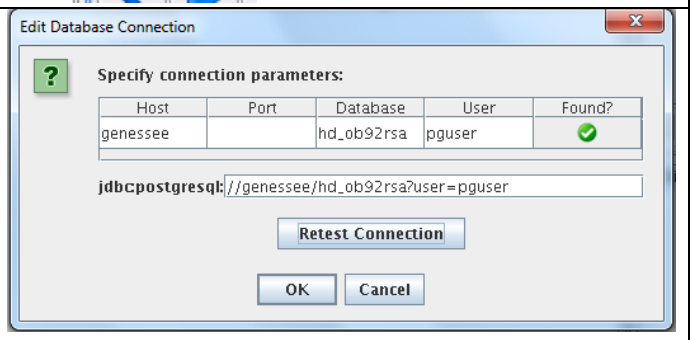
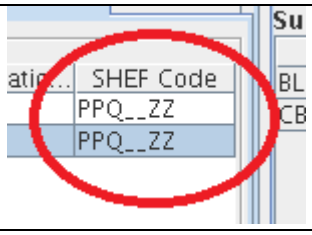
Appendix B: Adding RFC Forecasts from Archive Database vfypairs Table (Optional)

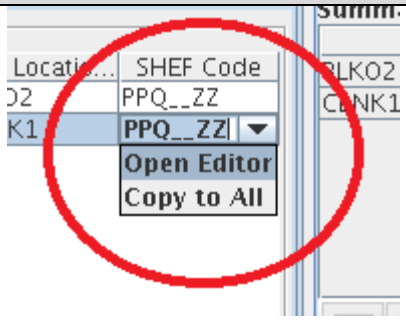
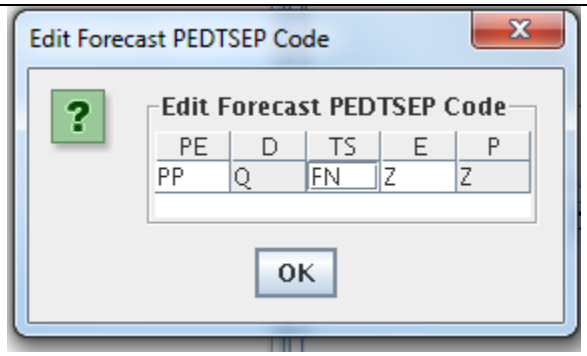
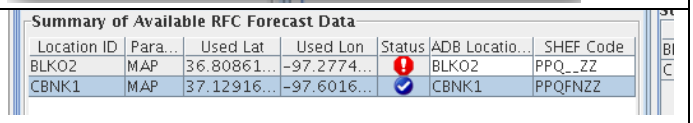
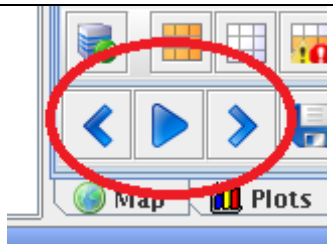
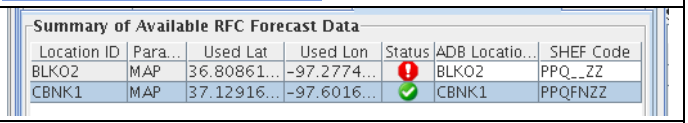
RFC QPF/QTF archived forecast time series to be used to estimate MEFP parameters can be acquired in one of two ways:

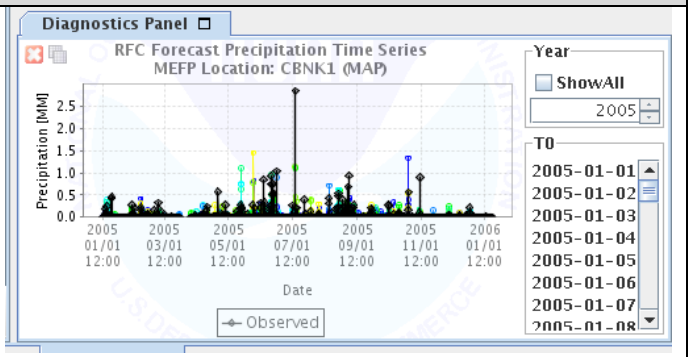
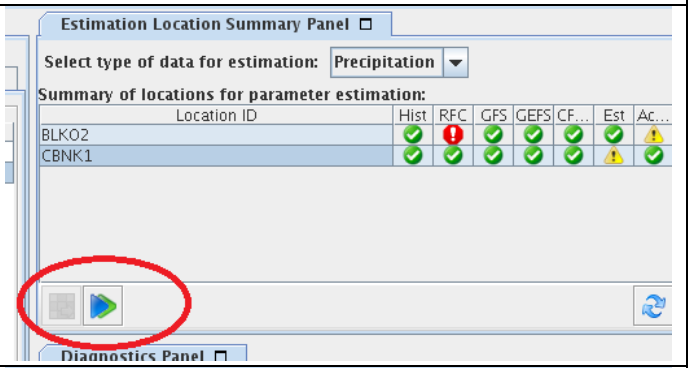
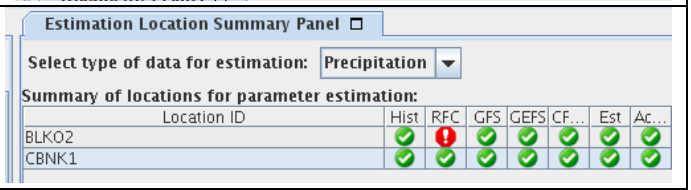
- From the vfypairs table of the archive database.
- From files constructed by hand to be imported by MEFPPE.

In either case, the requirements needed to either populate the vfypairs table or construct appropriately formatted files are described in the *MEFP User's Manual*.

Below are steps for how to pull the required archived forecasts and corresponding observed values from the vfypairs table of the archive database.

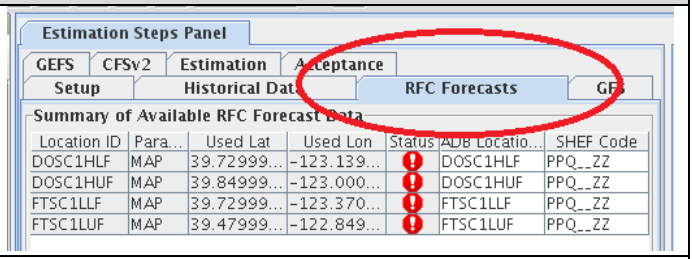
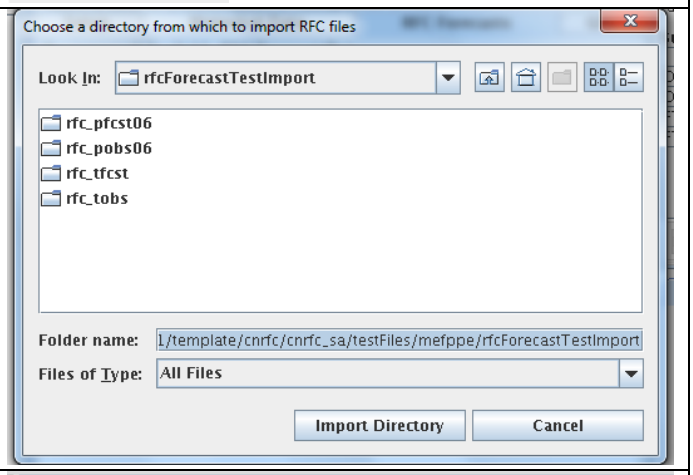
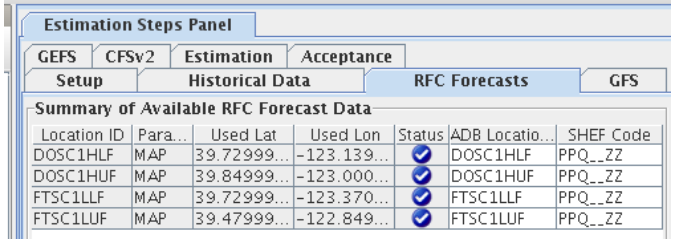
#	Action	Expected Results
1	Select **RFC Forecasts** in the **Estimation Steps Panel**.	
2	Click on the **Database Connection Button** to connect to the database with the vfypairs table.	
3	Enter your host, port number, database name and user to use for access to the archive database in the **Edit Database Connection** window (the "Port" is typically left blank, while the "User" should typically be set to pguser). These will vary from RFC to RFC. Click on the **Retest Connection Button**. A green check should appear in the Found? box. Click **OK**.	
4	In the **Summary of Available RFC Forecast Data** subpanel, click on the **SHEF Code** for each Location ID you wish to add data.	

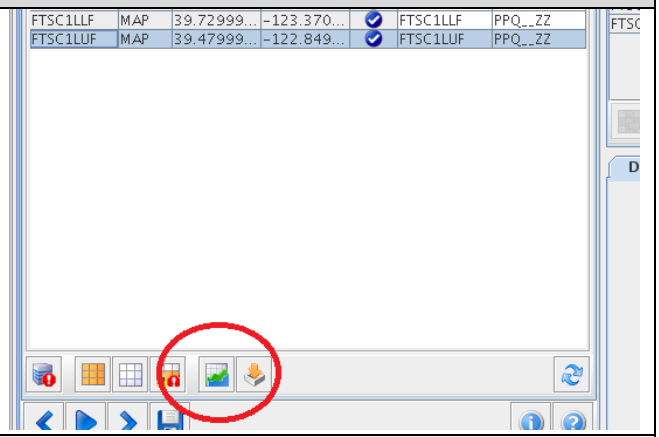
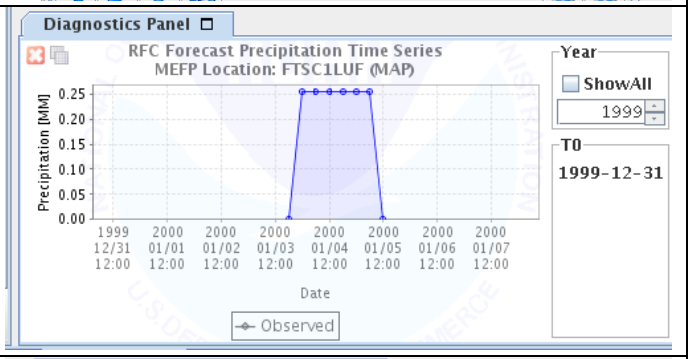
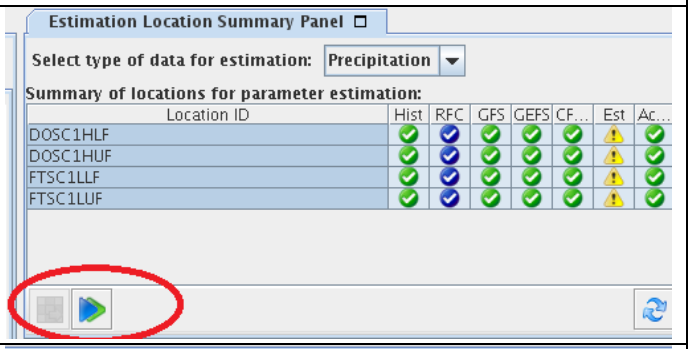
#	Action	Expected Results
5	Select **Open Editor**.	
6	Enter your PEDSTEP Code. This will vary from RFC to RFC. FN is a Forecast code. Click **OK**.	
7	Select each row that you have RFC Forecast Data. It will have a blue checkmark. In this example we have data for CBNK1, but not for BLK02.	
8	Click the **Prepare RFC Forecast Pairs Button** to retrieve the RFC Forecasts.	
9	The blue checkmark(s) should turn green.	
10	To confirm the RFC Forecasts loaded, select the **View RFC Forecasts Button**.	

#	Action	Expected Results
11	The Forecast should appear in the **Diagnostics Panel**.	
12	To estimate parameters with the RFC Forecasts, return to the **Estimation Location Summary Panel,** select Location ID CBNK1, and click the **Run All Steps Button**.	
13	When done, all the check marks for Location ID CBNK1 should now be green.	

Appendix C: Adding RFC Forecasts from Files (Optional)

See the header for Appendix B. Below are provided the steps needed to import the RFC archived forecast and corresponding observed files from an appropriately populated directory structure, as described in the *MEFP User's Manual*.

#	Action	Expected Results
1	Select **RFC Forecasts** in the **Estimation Steps Panel**.	
2	Click on the **Import Directory Button**.	
3	Enter your <import directory>. This will vary from RFC to RFC. There should be four subdirectories under the <import directory>, rfc_pfcst06, rfc_pobs06, rfc_tfcst, and rfc_tobs . Click the **Import Directory Button**.	
4	The RFC Forecasts Status column should have blue checkmarks. A blue checkmark indicates data manually constructed, while a green checkmark indicates data automatically pulled from an archive database	

#	Action	Expected Results
5	To confirm the RFC Forecasts loaded, select a Location ID and click on the **View RFC Forecasts Button**.	
6	The Forecast should appear in the **Diagnostics Panel**.	
7	To estimate parameters with the RFC Forecasts, return to the **Estimation Location Summary Panel**, select all the Location IDs, and click the **Run All Steps Button**.	
8	When done, the check marks for all the Location IDs should now be green, with the exception of RFC, which are blue.