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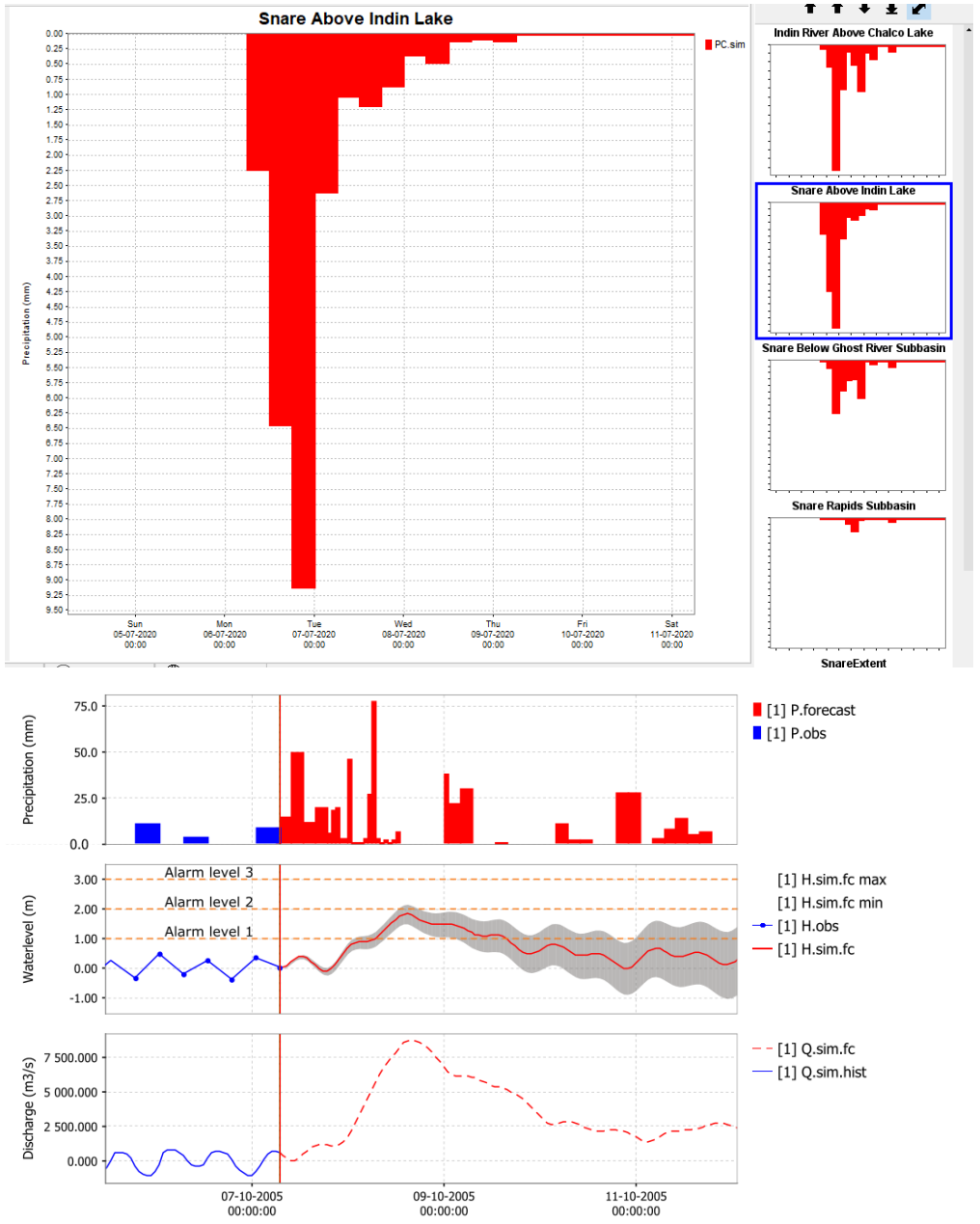
Delft-FEWS

Basic Configuration Course

Module: Visualising Data in Plots

Module Motivation

- Visualizing data is key to understanding.
- Delft-FEWS is highly configurable, and this extends to the look and feel of plot displays.
- Besides configuration, many options are available in the plot displays itself.
- The look of parameters can be set at a system level, or customized for each plot.
- Who doesn't love a beautiful ensemble plot?



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Learning Objectives

By the end of this module, you will have met the following learning objectives:

1) Know how to find, open and change settings of plot displays in the FEWS interface

2) Understand how data can be added to the DataViewer using the Filters file.

3) Be aware of pre-defined displays in the DisplayGroups, and how they are connected to the Topology

Plot Displays

- Delft-FEWS has several displays to show time series and other information
- This session will focus specifically on the Time Series, or Plot Display:
  - Display where scalar and longitudinal time series are presented

- Will look at 3 specific components

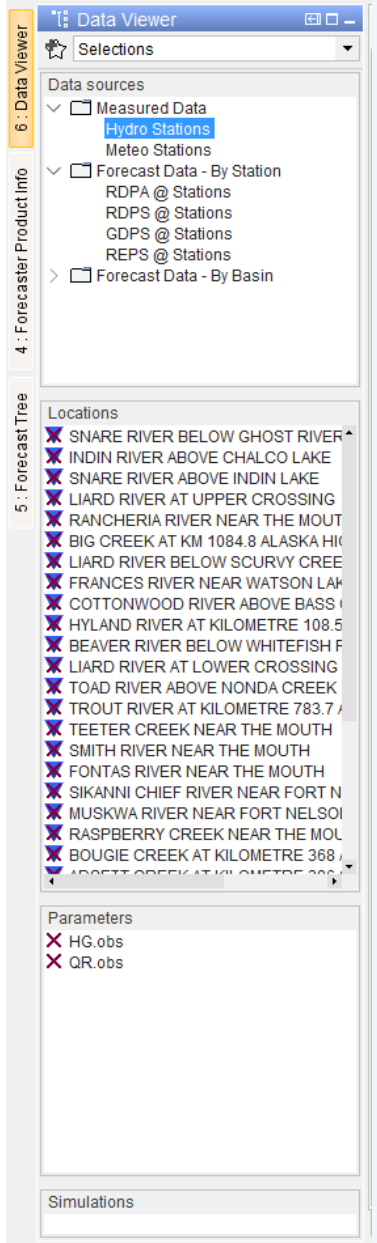
1) Data Viewer – Ability to see Timeseries Data “On-the-Fly” using Filters.xml

2) Pre-defined plots – Setting plots ahead of time, using templates and linking DisplayGroups.xml and Topology.xml

3) Global settings for Time Series Display – Setting defaults (i.e. how is precipitation displayed?) via the TimeSeriesDisplayConfig.xml

Data Viewer – Using Filters to View Timeseries Data On the Fly

- While there are many ways to view timeseries data, it is very worthwhile to set up the DataViewer to provide quick and easy access.
- Filters are used in Delft-FEWS to define the locations that are displayed on the main map display, and that can be selected to display data.
- Filters are defined to arrange locations, with associated parameters in logical groups. Each filter is defined as a collection of time series sets.
- Filters may be defined as a nested structure, allowing for the definition of a hierarchical set of filters.

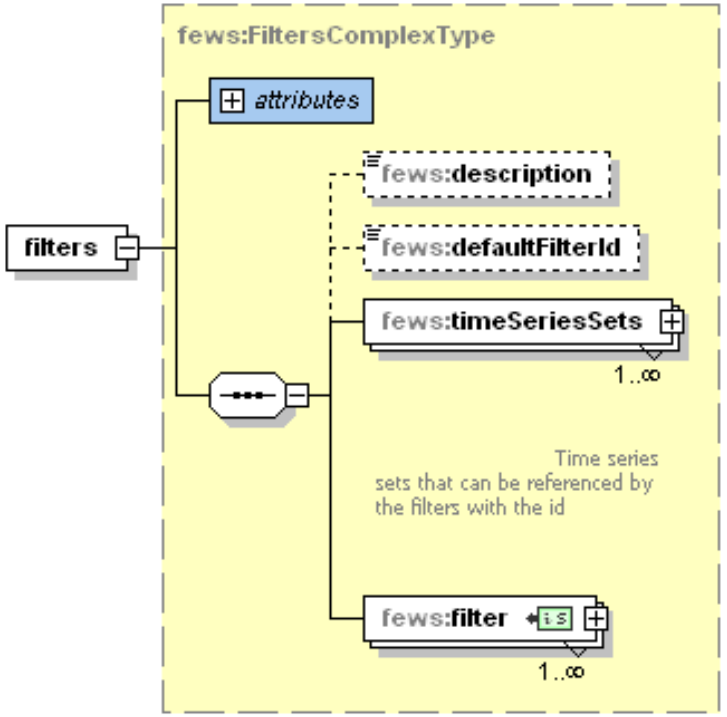


Filters

- You can define a description and a defaultFilterId, which will be what shows up when you open FEWS

To add data to the DataViewer using Filters

- Step 1: Add the TimeSeriesSets you would like to be able to see
- Step 2: Add the TimeSeriesSets identifier to a (Child) Filter
- Step 3: Add the Child Filter into a Parent Filter.
  - This creates a folder structure (i.e. click first on the Parent Filter, and all the Child will be shown).



Steps to Adding TimeSeries to Filters.xml

Step 1: Add the TimeSeriesSets you would like to be able to see

```
<filters version="1.1" xmlns="http://www.wldelft.nl/fews" xmlns:xsi="htt
  <!-- Add default filter Id -->
  <defaultFilterId>HydroStations</defaultFilterId>
  <!-- Timeseries Sets -->
  <timeSeriesSets id="HydroStations">
    <timeSeriesSet>
      <moduleInstanceId>ImportHydroStations</moduleInstanceId>
      <valueType>scalar</valueType>
      <parameterId>HG.obs</parameterId>
      <locationSetId>DisplayHydroStations</locationSetId>
      <timeSeriesType>external historical</timeSeriesType>
      <timeStep unit="minute" multiplier="5"/>
      <relativeViewPeriod unit="day" start="-5" end="0"/>
      <readWriteMode>add originals</readWriteMode>
    </timeSeriesSet>
    <timeSeriesSet>
      <moduleInstanceId>ImportHydroStations</moduleInstanceId>
      <valueType>scalar</valueType>
      <parameterId>QR.obs</parameterId>
      <locationSetId>DisplayHydroStations</locationSetId>
      <timeSeriesType>external historical</timeSeriesType>
      <timeStep unit="minute" multiplier="5"/>
      <relativeViewPeriod unit="day" start="-5" end="0"/>
      <readWriteMode>add originals</readWriteMode>
    </timeSeriesSet>
  </timeSeriesSets>
```

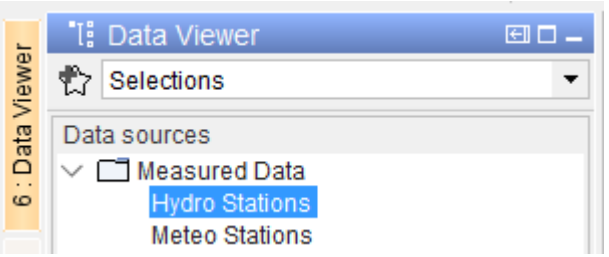
Step 2: Add the TimeSeriesSets identifier to a (Child) Filter

```
<!-- Second Level Filters -->
<filter id="HydroStations" name="Hydro Stations">
  <validationIconsVisible>false</validationIconsVisible>
  <timeSeriesSetsId>HydroStations</timeSeriesSetsId>
</filter>
```

Step 3: Add the Child Filter into a Parent Filter.

```
<!-- First Level Filters -->
<filter id="MeasuredData" name="Measured Data">
  <mapExtentId>$REGION$</mapExtentId>
  <child foreignKey="HydroStations"/>
  <child foreignKey="MeteoStations"/>
</filter>
```

Result



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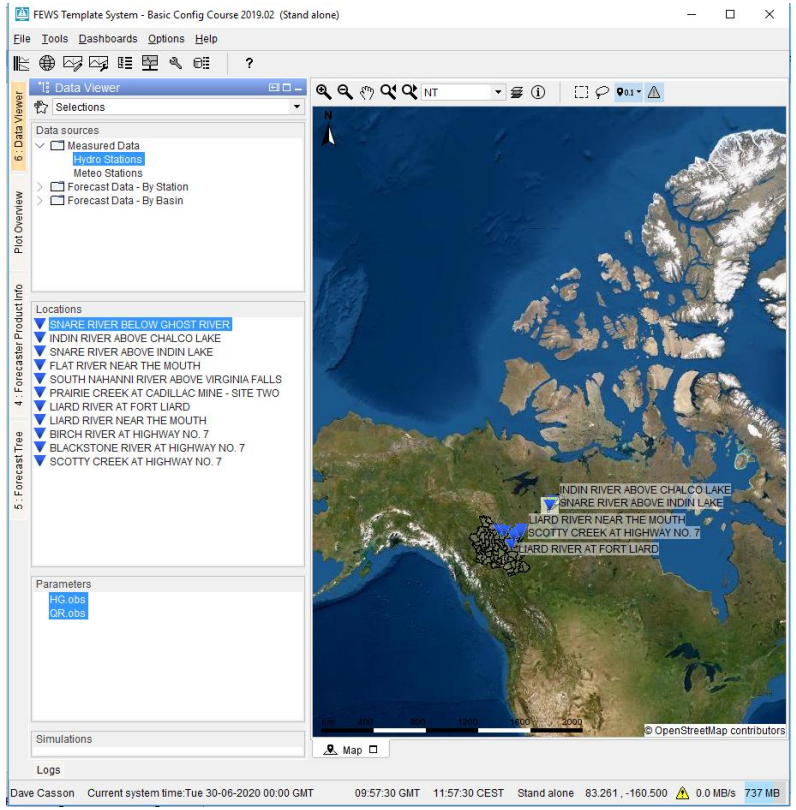
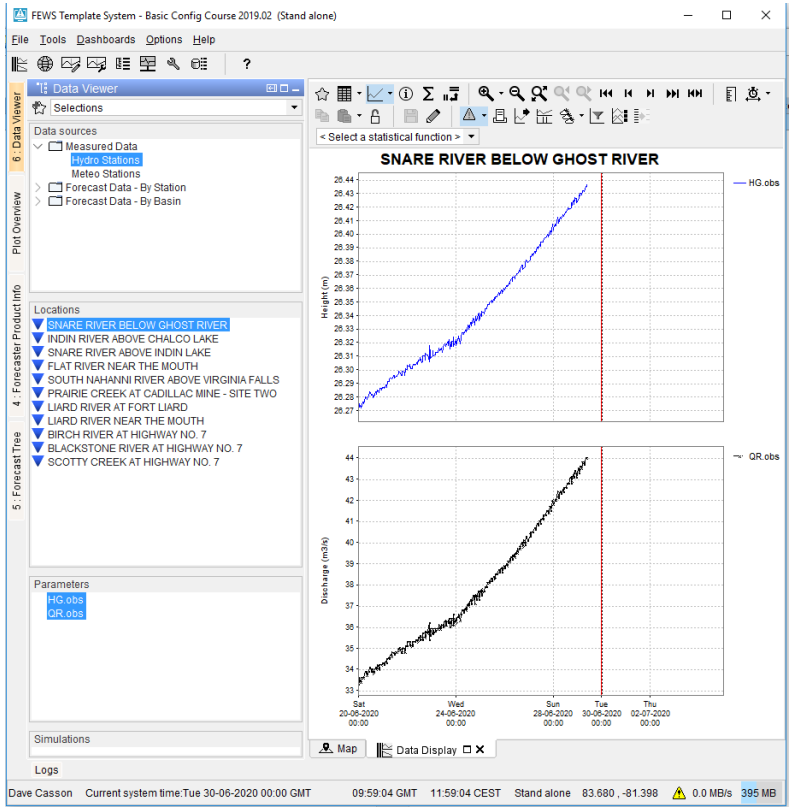
Viewing DataViewer Results

Result using Map Tab



Result using Data Display

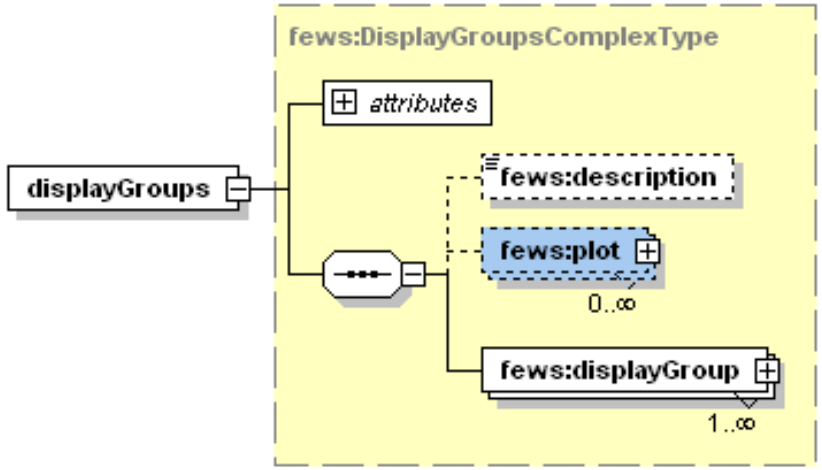


Making Pre-defined Plots with DisplayGroups

Pre-defined plots are very useful to create custom views of timeseries data.

To create a Pre-defined Plot using DisplayGroups.xml

- Step 1: Create a plot template defining the data and TimeSeriesSets to be shown
  - Tip: Keep this general and the TimeSeriesSet definitions broad. ModuleInstanceSets can also be used.
- Step 2: Create a DisplayGroup that uses the plot template.
  - Tip: Filtering and constraints be added to define better specific TimeSeries
- Step 3: Reference a Topology.xml node to link the display to it.



Steps to Adding Pre-defined Displays in DisplayGroups.xml

Step 1: Create a plot template defining the data and TimeSeriesSets to be shown

```
<displayGroups xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.c
version="1.0">
    <!--Plot Templates Section-->
    <!--Plot Template - WSC Data Data-->
    <plot id="WSCHourlyTemplate">
        <visibilityGroup>Discharge</visibilityGroup>
        <visibilityGroup>WaterLevel</visibilityGroup>
        <subplot>
            <line>
                <visibilityGroup>Discharge</visibilityGroup>
                <color>blue</color>
                <lineStyle>constant</lineStyle>
                <axis>left</axis>
                <visibleInLegend>true</visibleInLegend>
                <visibleInTable>true</visibleInTable>
                <visibleInPlot>true</visibleInPlot>
                <timeSeriesSet>
                    <moduleInstanceId>ImportWSC</moduleInstanceId>
                    <valueType>scalar</valueType>
                    <parameterId>QR.obs</parameterId>
                    <locationSetId>$MODELNAME1$HydroStations</locationSetId>
                    <timeSeriesType>external historical</timeSeriesType>
                    <timeStep unit="minute" multiplier="5"/>
                    <readWriteMode>read complete forecast</readWriteMode>
                </timeSeriesSet>
            </line>
```

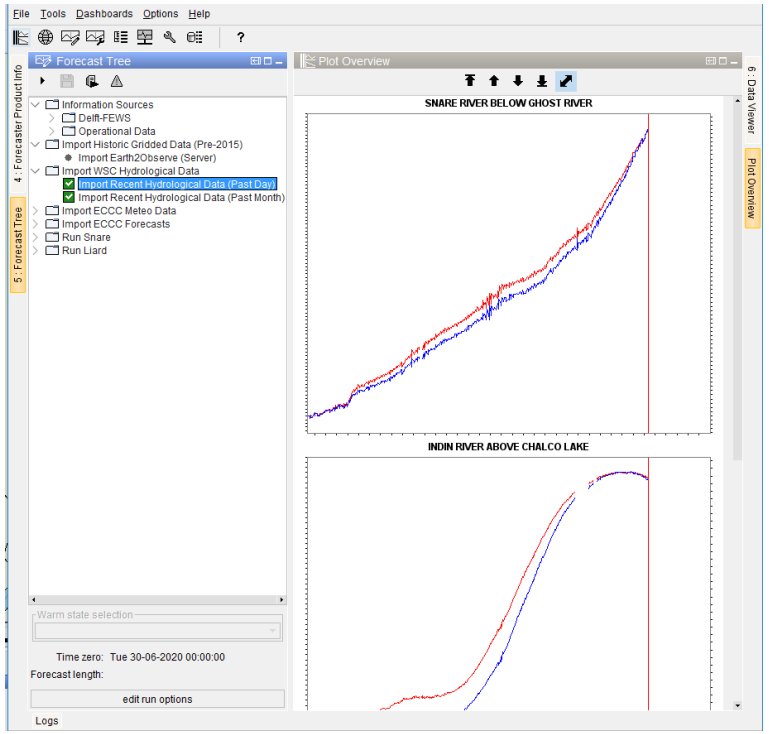
Step 2: Create a DisplayGroup that uses the plot template.

```
<!--Display Groups -->
<displayGroup id="ImportWSCHourly" name="WSC Stations Hourly">
    <nodeId>ImportWSCHourly</nodeId>
    <singleLocationDisplays>
        <locationSetId>$MODELNAME1$HydroStations</locationSetId>
        <plotId>WSCHourlyTemplate</plotId>
    </singleLocationDisplays>
</displayGroup>
```

Step 3: Reference a Topology.xml node to link the display to it.
Note: already above. Code below is Topology.xml reference

```
<nodes id="ImportWSC" name="Import WSC Hydrological Data">
    <node id="ImportWSCHourly" name="Import Recent Hydrological Data (Past Day)">
        <workflowId>ImportWSCHourly</workflowId>
        <graceTime unit="hour" multiplier="24"/>
        <localRun>true</localRun>
        <showRunApprovedForecastButton>true</showRunApprovedForecastButton>
    </node>
```

Result



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Additional Options in the DisplayGroups.xml

- There are a wide variety of options in the DisplayGroups.xml to control how data is displayed
- Check the xml schema, or Google “Delft-FEWS Display Groups”

- Use SingleLocationDisplay to show a plot for each location
- Use Constraints to limit either the ModuleInstance, or the Location
- Use patterns (i.e. moduleInstanceIdPattern) to determine what is shown.

- Play around and look at documentation to discover more!

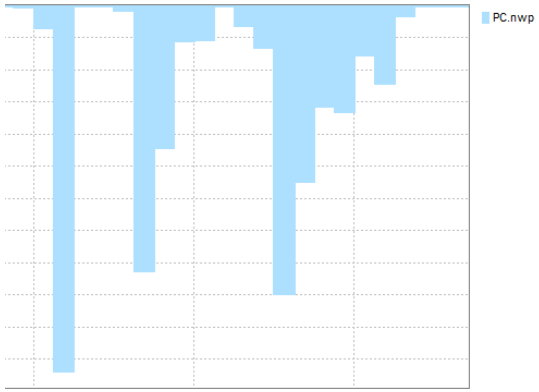
Changing Default Options with the TimeSeriesDisplayConfig.xml

- The global, or default display options can be set in the TimeSeriesDisplayConfig.xml located in the SystemConfig folder.

- Google “Delft-FEWS Time Series Display Configuration”, do it now!

- This files contains also:
  - Default Legend Text
  - Default view period
  - Legend definitions (see Class Breaks)
  - Display parameter settings

```
<parameterDisplayOptions id="PC.nwp">
  <preferredColor>light blue</preferredColor>
  <lineStyle>bar</lineStyle>
  <min>0</min>
  <max>2</max>
  <inverted>true</inverted>
</parameterDisplayOptions>
```



Module Summary

Three main ways to view Time Series in Plots were described in this Module

1. Adding data to the Data Viewer using Filters.xml
   - This allows data to be viewed “on-the-fly”
   - First add TimeSeriesSets, then add to a Filter.

2. Adding pre-defined plots with DisplayGroups.xml, referencing Topology.
   - This allows nicely configured and customized plots for each step of the forecasting process.
   - First create a template plot, then assign to a DisplayGroup, referencing a Topology node.

3. Making Global settings for how legends and parameters are shown.
   - Many options available, Google it!

Additional Resources

- Google “Delft-FEWS WIKI”
- Google “Delft-FEWS Configuration Guide”
- Google “Delft-FEWS Forum”
- Email fews-pm@Deltares.nl

Next Steps

- Now that various ways of Displaying Scalar Data have been described, we can move on to looking at Gridded Data

- Delft-FEWS has many ways of visualizing Gridded Data, including overlays of Geographic Information System (GIS) data

- Will look at configuration of both the Explorer (main starting page) and the Spatial Display (dedicated to spatial display).