Deltares

Enabling Delta Life

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Delft-FEWS Basic Training

For NERC-CCCC

Date: 28 September 2022

Training Overview

- Objective
  - Detailed system introduction of FEWS-Gulf of Guinea
  - System user training
  - System support & maintenance training
  - Simple system configuration training

- Required software:
  - FEWS-GoG Stand Alone system deployed on the participants` local machine with proper internet connection.
  - Optional: Altova XMLSpy should be installed for editing and validating xml files. One can also editing xml files with any other text editor (e.g. Notepad++), however there are several drawbacks compare to an official xml editor.
  - Optional: Total commander, strongly advised for working with FEWS configuration.

Training Overview

- Prerequisite knowledge
  - FEWS-GoG system architecture and forecast data flow, no knowledge of Delft-FEWS configuration is required.

- Agenda: Day 3
  - System architecture and workflows
  - FEWS configuration basics
  - Exercise
- Agenda: Day 4
  - FEWS configuration basics
  - FEWS configuration basics
  - Exercise

Module 4
Basic Configuration Files

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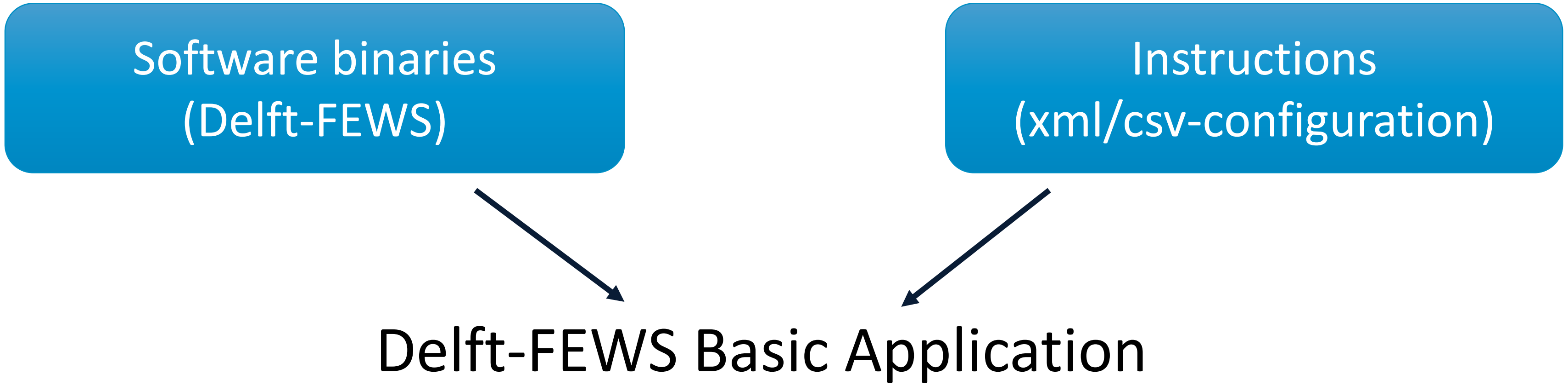
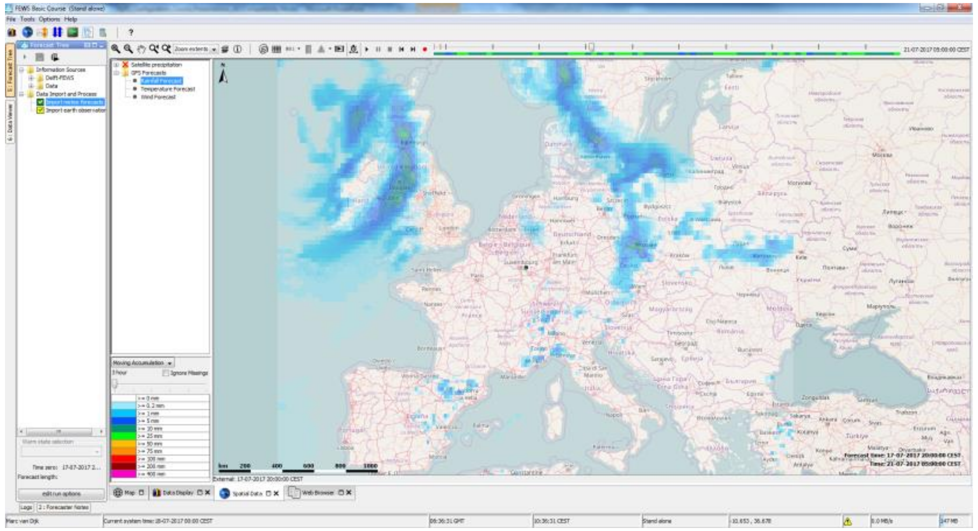
Delft-FEWS Basic Application



Software binaries (Delft-FEWS)

Instructions (xml/csv-configuration)

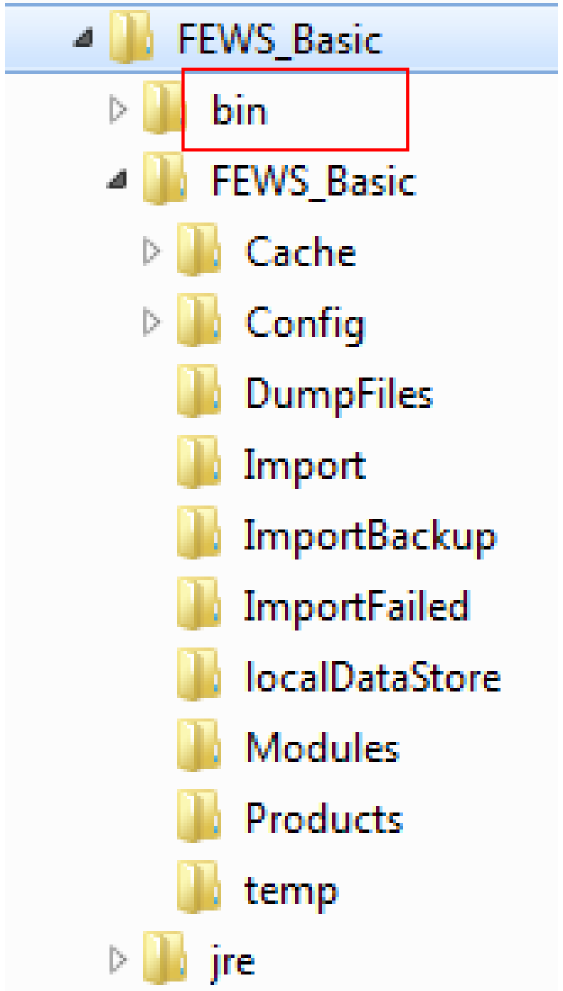
Delft-FEWS Basic Application



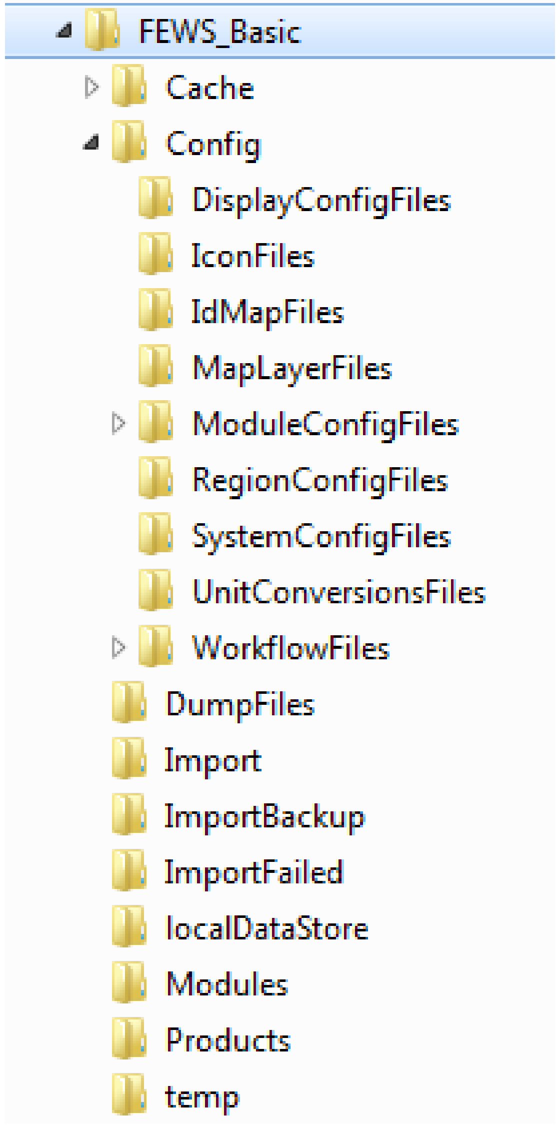
FEWS-Basic Application Folder

What is in the FEWS_Basic folder?

- **bin** – Delft-FEWS binaries
- **FEWS_Basic** – FEWS application folder
  - **Cache** – folder with map caches
  - **Config** – folder where the configuration/instructions are held
  - **localDataStore** – Database cache with local data
  - **Import/Export** – for data exchange with outside world
  - **Modules** – for model execution (Wflow, DFlow)
  - **temp** – folder with temporary files
- **jre** – Java runtime (32 or 64 bit)


```
FEWS_Basic
  bin
  FEWS_Basic
    Cache
    Config
    DumpFiles
    Import
    ImportBackup
    ImportFailed
    localDataStore
    Modules
    Products
    temp
  jre
```

FEWS-Basic Folder Names



```
FEWS_Basic
    Cache
    Config
        DisplayConfigFiles
        IconFiles
        IdMapFiles
        MapLayerFiles
        ModuleConfigFiles
        RegionConfigFiles
        SystemConfigFiles
        UnitConversionsFiles
        WorkflowFiles
    DumpFiles
    Import
    ImportBackup
    ImportFailed
    localDataStore
    Modules
    Products
    temp
```

%REGION_HOME%

Created by Delft-FEWS software

Fixed folder naming, holds the instructions

Free to define folder naming

Created by Delft-FEWS software

Free to define folder naming

Created by
Delft-FEWS software

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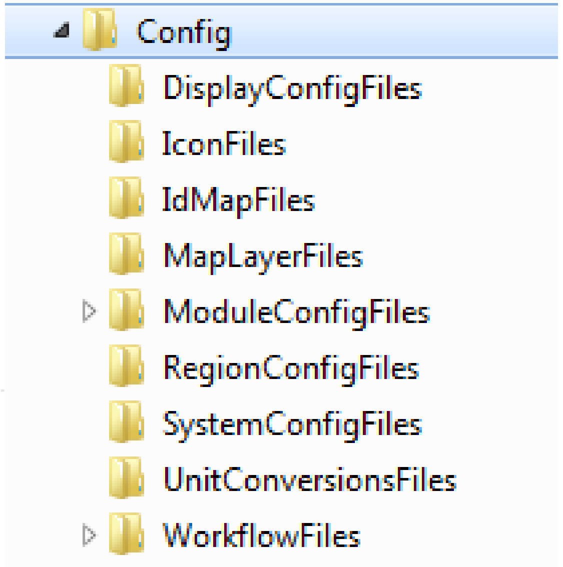
Main FEWS configuration – “Config” folder

- Most sub-folders contain XML configuration files
- Only a sub-set of all possible Delft-FEWS configuration files
- Check WIKI for detailed information on XML files



- Config
  - DisplayConfigFiles
  - IconFiles
  - IdMapFiles
  - MapLayerFiles
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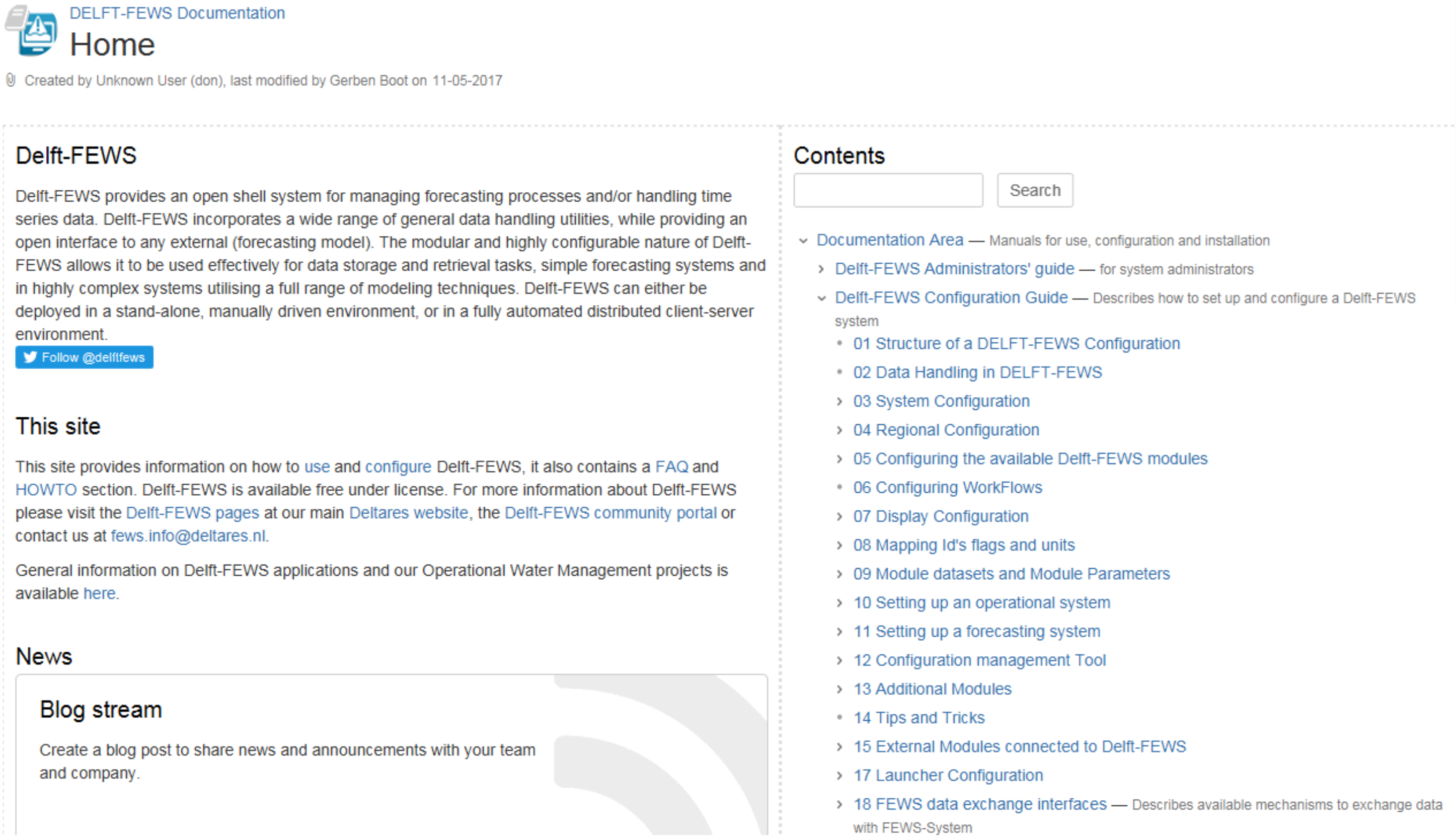
  - SystemConfigFiles
  - UnitConversionsFiles
  - WorkflowFiles



DELFT-FEWS Documentation

Home

Created by Unknown User (don), last modified by Gerben Boot on 11-05-2017

Delft-FEWS

Delft-FEWS provides an open shell system for managing forecasting processes and/or handling time series data. Delft-FEWS incorporates a wide range of general data handling utilities, while providing an open interface to any external (forecasting model). The modular and highly configurable nature of Delft-FEWS allows it to be used effectively for data storage and retrieval tasks, simple forecasting systems and in highly complex systems utilising a full range of modeling techniques. Delft-FEWS can either be deployed in a stand-alone, manually driven environment, or in a fully automated distributed client-server environment.

This site

This site provides information on how to use and configure Delft-FEWS, it also contains a FAQ and HOWTO section. Delft-FEWS is available free under license. For more information about Delft-FEWS please visit the Delft-FEWS pages at our main Deltares website, the Delft-FEWS community portal or contact us at fews.info@deltares.nl.

General information on Delft-FEWS applications and our Operational Water Management projects is available here.

News

Blog stream

Create a blog post to share news and announcements with your team and company.

Contents

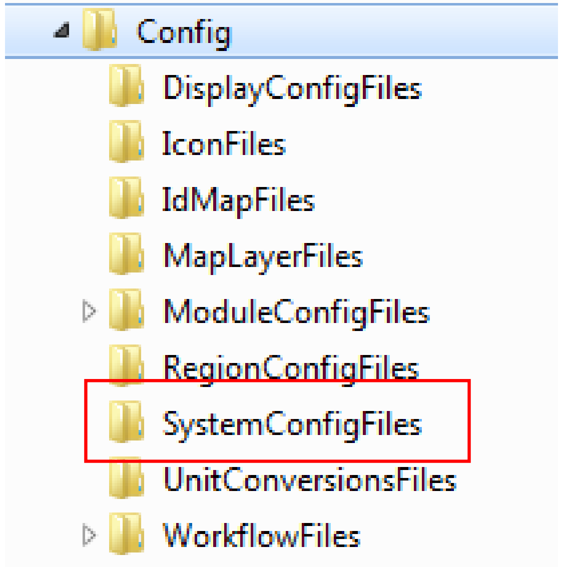
Main FEWS configuration – “SystemConfigFiles”

SystemConfigFiles Folder

- *Explorer.xml* – User interface defaults (Example is Exercise 2)
- *LocationIcons.xml* – Icons for different location sets
- *TimeSeriesDisplayConfig.xml* - Default line colours, styles, views

Also, but not included in basic course

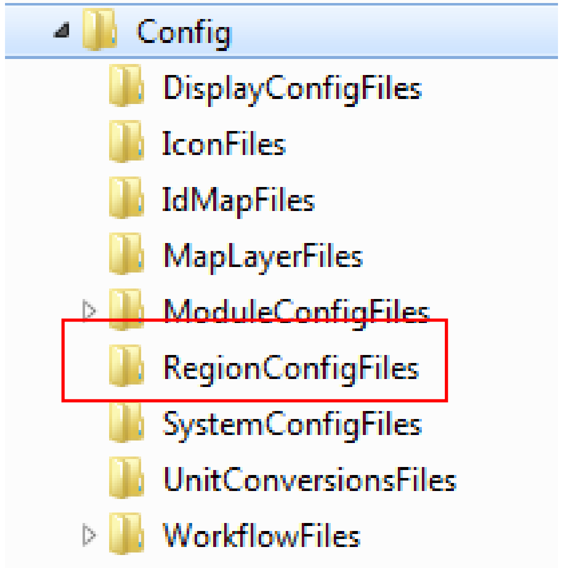
- *DisplayGroups.xml* – predefined plots
- *UserGroups.xml* – known users
- *Permissions.xml* – permissions allocated to user groups
- *DisplayDescriptors.xml* – available displays components
- …



Main FEWS configuration – “RegionConfigFiles”

RegionConfigFiles Folder

- *Locations.xml* – Point locations
- *LocationSets.xml* – Groups of locations
- *Grids.xml* – Grid geometries
- *Filters.xml* – Pre-defined filters in the user interface
- *Parameters.xml* – Available parameters e.g. P.obs
- *Qualifiers.xml* – Extra tags for time series identification
- *ModuleInstanceDescriptors.xml* - Registration file for Modules
- *WorkflowDescriptors.xml* - Registration file Workflows
- *ValidationRulesSets.xml* – Validation rules for scalar time series
- *Thresholds.xml* – Thresholds definition
- *ThresholdWarningLevels.xml* – Layout for threshold crossings
- *ThresholdValuesSets.xml* – Assigns time series to thresholds
- *Topology.xml* – Layout of forecast tree



Config
- DisplayConfigFiles
- IconFiles
- IdMapFiles
- MapLayerFiles
- ModuleConfigFiles
- RegionConfigFiles
- SystemConfigFiles
- UnitConversionsFiles
- WorkflowFiles

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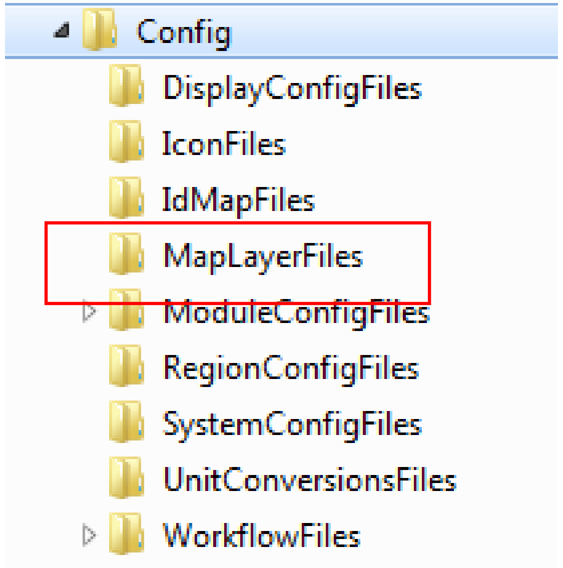
Main Delft-FEWS configuration – “MapLayerFiles”

MapLayerFiles Folder

- Additional map layers (e.g. shapefiles)
- Metadata for
  - Stations
  - Sensors
  - Catchments
  - Parameters
- Only folder that does not contain XML instruction files



Config
DisplayConfigFiles
IconFiles
IdMapFiles
MapLayerFiles
ModuleConfigFiles
RegionConfigFiles
SystemConfigFiles
UnitConversionsFiles
WorkflowFiles

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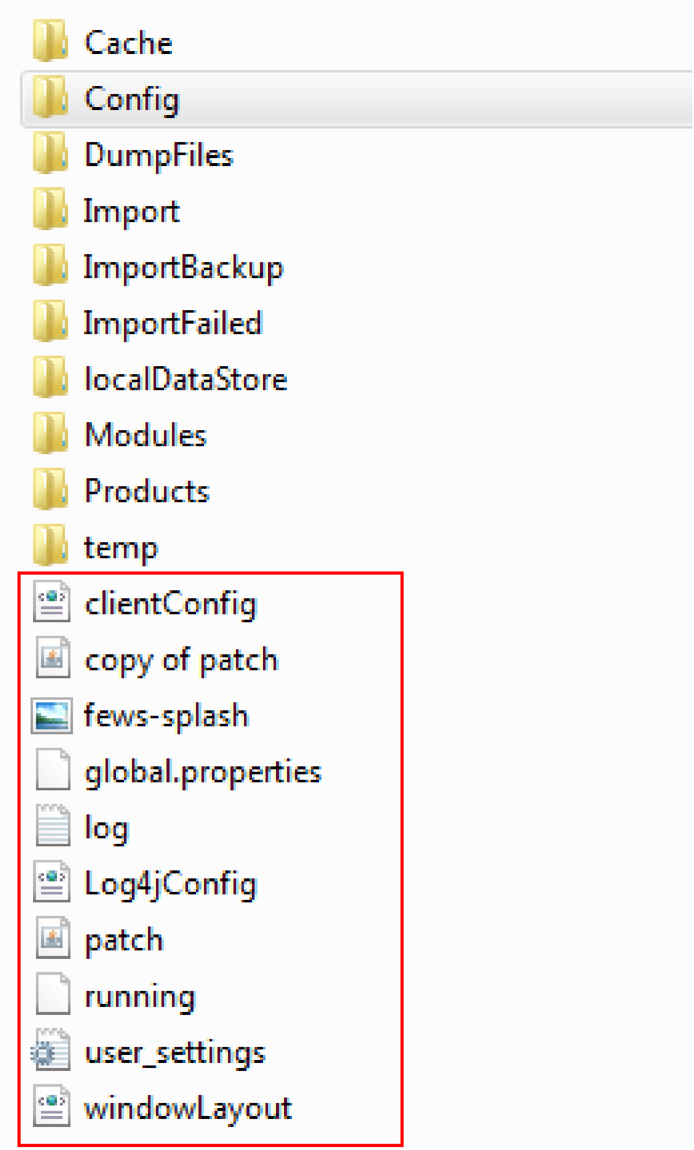
Main Delft-FEWS configuration – Root Files

Every Delft-FEWS application has a Root or Region folder

Delft-FEWS application root files:

- *clientConfig.xml* – Type of FEWS client (Stand Alone or OC)
- *fews-splash.jpg* – Splash screen when FEWS Application starts
- *global.properties* – additional properties of FEWS Application
- *log.txt* – log file of Application
- *log4jConfig* – configuration of log level (DEBUG, INFO,..)
- *patch.jar* – Java code with solved Delft-FEWS issues.

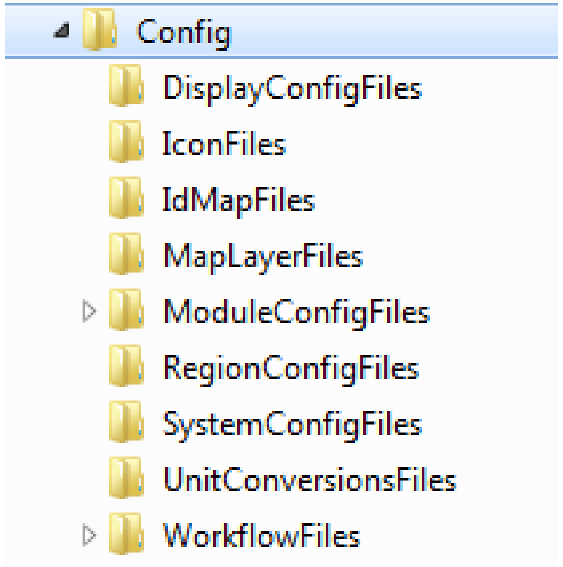
  (Additional FEWS classes not included in the \bin folder)
- *running* – File only present when FEWS Application is running
- *user_settings.ini* – Local settings of FEWS Application
- *windowsLayout.xml* – Layout of FEWS displays on start-up



Cache
Config
DumpFiles
Import
ImportBackup
ImportFailed
localDataStore
Modules
Products
temp
clientConfig
copy of patch
fews-splash
global.properties
log
Log4jConfig
patch
running
user_settings
windowLayout

Flexible File Naming Conventions

- Free to choose your own file (readable) name
- Identifies what your XML configuration does
- Examples:
  - *Import_GFS.xml*
  - *Import_GPM.xml*
- Applies to all folders except:
  - RegionConfigFiles
  - SystemConfigFiles
  - RootConfigFiles
- Workflows, module instances and display instances need to be ‘registered’ in a descriptor file
  - Identifies what configuration it is
  - Give “readable” name (consistent naming conventions are handy)



Config
- DisplayConfigFiles
- IconFiles
- IdMapFiles
- MapLayerFiles
- ModuleConfigFiles
- RegionConfigFiles
- SystemConfigFiles
- UnitConversionsFiles
- WorkflowFiles

What is XML anyway?

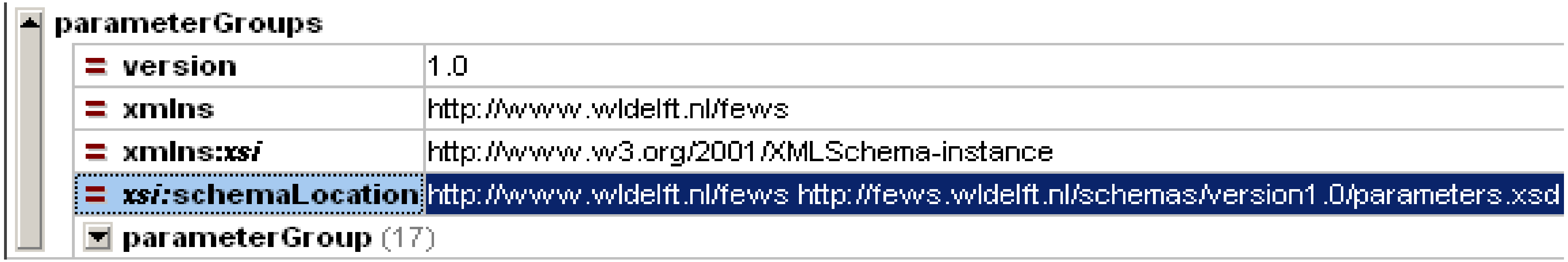
- Most Delft-FEWS configuration files are written in XML format
- XML stands for EXtensible Markup Language – written in simple plain text
- Delft-FEWS interprets and validates the XML files using an XSD

Example:

```
<location id=“Amsterdam" name=" RainStationAmsterdam">
          <x>4.35</x>
          <y>52.011</y>
</location>
```

What is an XSD?

- XSD = XML Schema Definition
- Defines the building blocks of an XML document
- Defines the order in which these elements can be included
- XML is valid when organized according to the (open) schema XSD.
  Every time you start a Delft-FEWS application it checks if all configuration files are valid
- XSD files are available
  - on the internet (www.wldelft.nl/schemas/version1.0/)
  - in a zipped file in the ‘bin’ folder (Delft_FEWS_schemas.jar)



parameterGroups

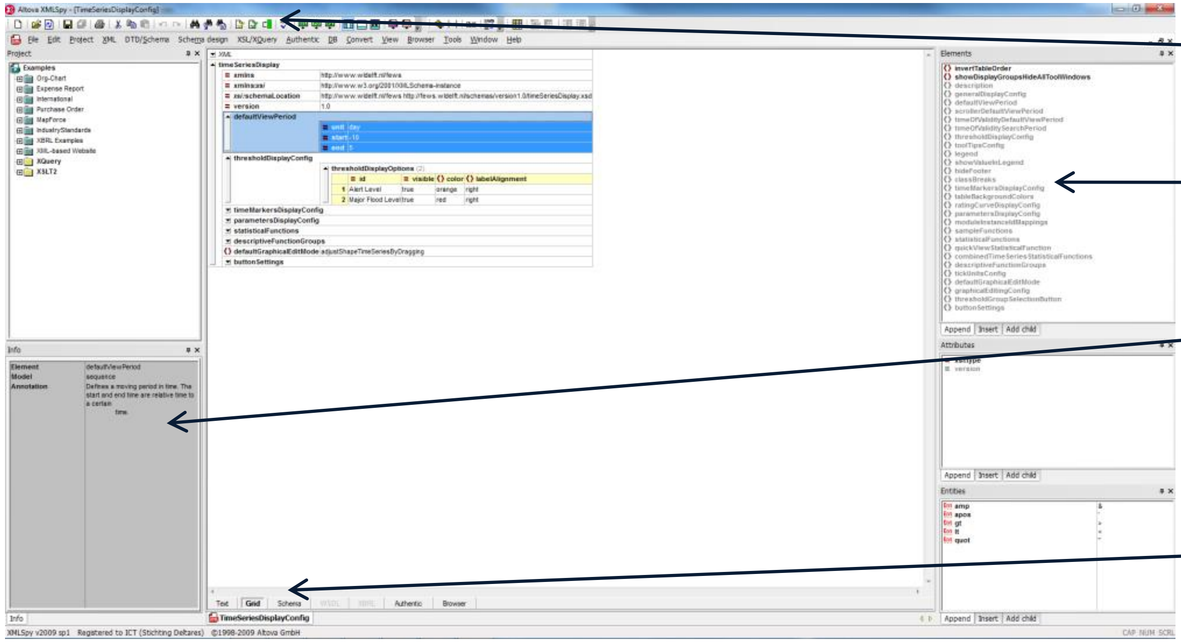
version	1.0
xmlns	http://www.wldelft.nl/fews
xmlns:*xsi*	http://www.w3.org/2001/XMLSchema-instance
xsi:schemaLocation	http://www.wldelft.nl/fews http://fews.wldelft.nl/schemas/version1.0/parameters.xsd

parameterGroup (17)

XML Editors

An XML editor is required to edit and validate XML files

- XML-Spy is a nice editor, however it is not free: https://www.altova.com/xmlspy-xml-editor
    - A free trial can be downloaded from website
- XMLPad is free http://www.wmhelp.com/


Altova XMLSpy - [TimeSeriesDisplayConfig]
File Edit Project XML DTD/Schema Schema design XSL/XQuery Authentic DB Convert View Browser Tools Window Help
Project
Examples
Org-Chart
Expense Report
International
Purchase Order
MapForce
IndustryStandards
XBRL Examples
XML-based Website
XQuery
XSLT2
Elements
Attributes
Entities
Append Insert Add child
Text Grid Schema WSDL XBRL Authentic Browser
TimeSeriesDisplayConfig
XMLSpy v2009 sp1 Registered to ICT (Stichting Deltares) ©1998-2009 Altova GmbH
CAP NUM SCRL

XML
timeSeriesDisplay
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/timeSeriesDisplay.xsd
version 1.0
defaultViewPeriod
unit day
start -10
end 5
thresholdDisplayConfig
thresholdDisplayOptions (2)

	id	visible	color	labelAlignment
1	Alert Level	true	orange	right
2	Major Flood Level	true	red	right

timeMarkersDisplayConfig
parametersDisplayConfig
statisticalFunctions
descriptiveFunctionGroups
defaultGraphicalEditMode adjustShapeTimeSeriesByDragging
buttonSettings

Info

Element defaultViewPeriod
Model sequence
Annotation Defines a moving period in time. The start and end time are relative time to a certain time.

Validate XML file

Available XSD Elements

Info from XSD files

Grid view

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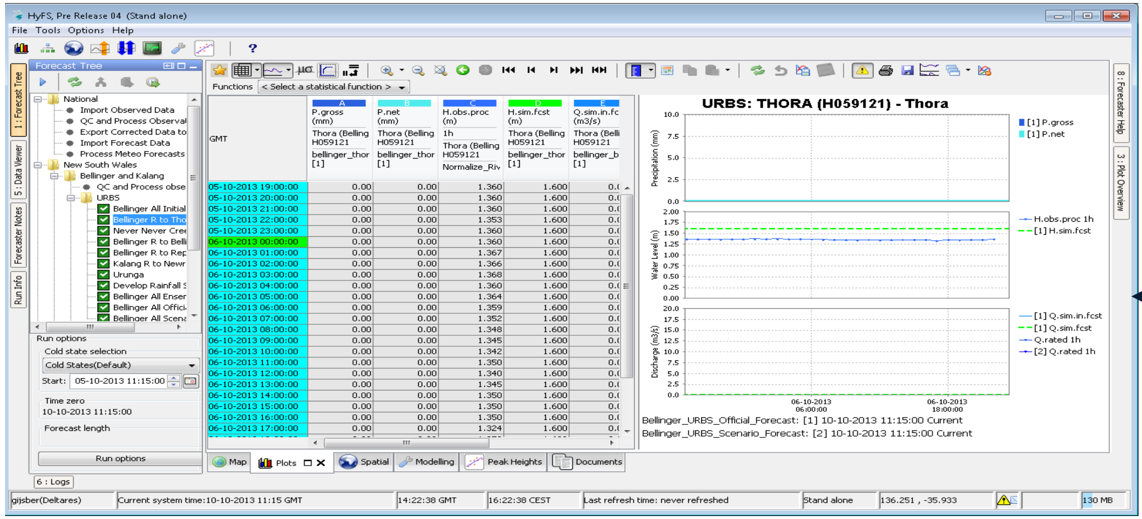
Exercise 2: Explore the config folder

- See Exercises.ppt

Module 5
Delft-FEWS Concepts: Workflows, Modules, and Time Series

Delft-FEWS Concepts - Workflows

- Workflow – A sequence of modules
- Module instance – Configured module
- Task run – Actual execution of a workflow



- National
  - Import Observed Data
  - QC and Process Observal
  - Export Corrected Data to
  - Import Forecast Data
  - Process Meteo Forecasts
- New South Wales
  - Bellinger and Kalang
    - QC and Process obse
    - URBS
      - ☑ Bellinger All Initial
      - ☑ Bellinger R to Tho
      - ☑ Never Never Cree
      - ☑ Bellinger R to Belli
      - ☑ Bellinger R to Rep
      - ☑ Kalang R to Newr
      - ☑ Urunga
      - ☑ Develop Rainfall S
      - ☑ Bellinger All Enser
      - ☑ Bellinger All Offici
      - ☑ Bellinger All Scena

Run options

Cold state selection: Cold States(Default)

Start: 05-10-2013 11:15:00

Time zero: 10-10-2013 11:15:00

Forecast length

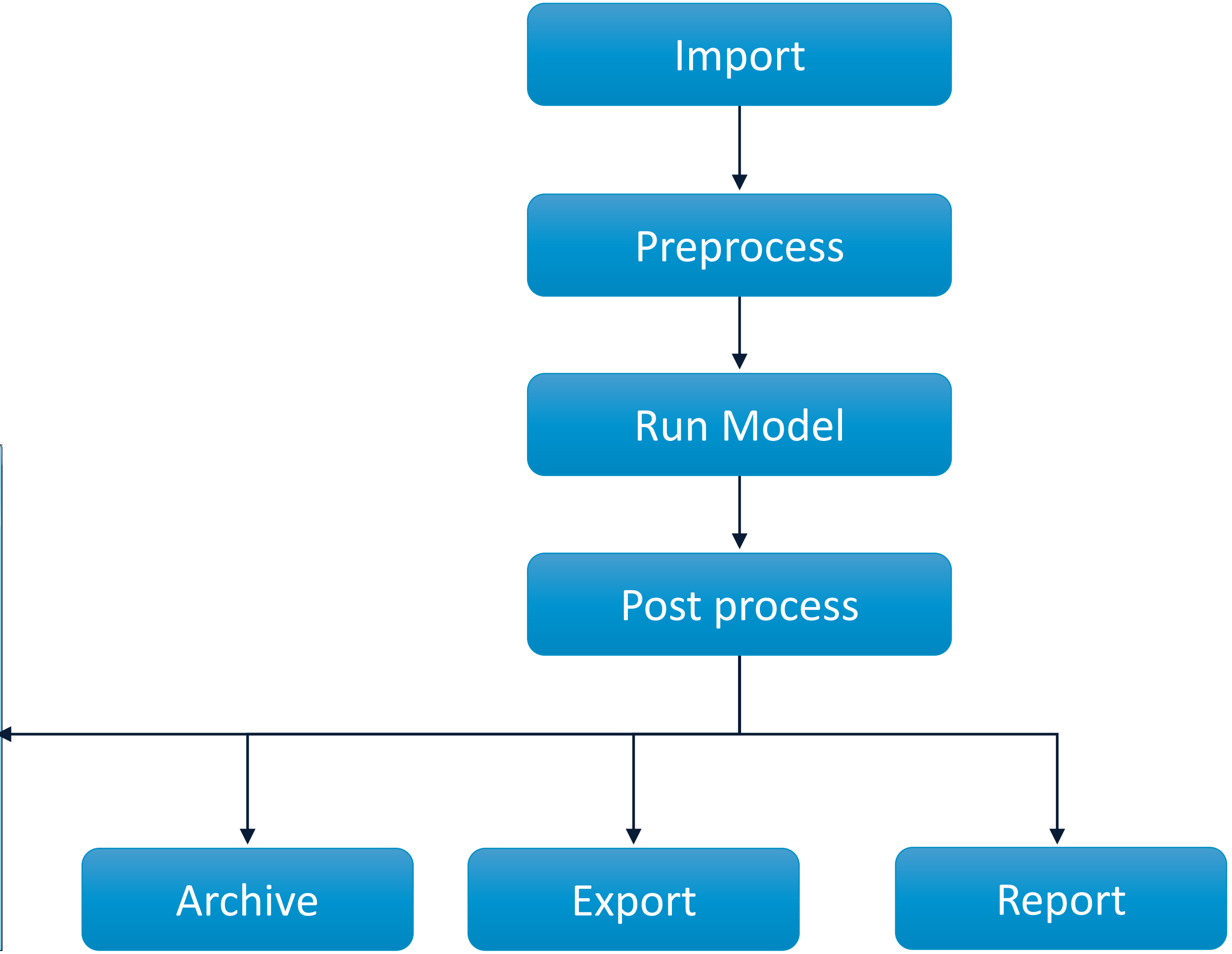
Run options

GMT	A P.gross (mm) Thora (Belling H059121 bellinger_thor [1]	B P.net (mm) Thora (Belling H059121 bellinger_thor [1]	C H.obs.proc (m) 1h Thora (Belling H059121 Normalize_Riv	D H.sim.fcst (m) Thora (Belling H059121 bellinger_thor [1]	E Q.sim.in.fc (m3/s) Thora (Belli H059121 bellinger_b [1]
05-10-2013 19:00:00	0.00	0.00	1.360	1.600	0.0
05-10-2013 20:00:00	0.00	0.00	1.360	1.600	0.0
05-10-2013 21:00:00	0.00	0.00	1.360	1.600	0.0
05-10-2013 22:00:00	0.00	0.00	1.353	1.600	0.0
05-10-2013 23:00:00	0.00	0.00	1.360	1.600	0.0
06-10-2013 00:00:00	0.00	0.00	1.360	1.600	0.0
06-10-2013 01:00:00	0.00	0.00	1.367	1.600	0.0
06-10-2013 02:00:00	0.00	0.00	1.366	1.600	0.0
06-10-2013 03:00:00	0.00	0.00	1.368	1.600	0.0
06-10-2013 04:00:00	0.00	0.00	1.360	1.600	0.0
06-10-2013 05:00:00	0.00	0.00	1.364	1.600	0.0
06-10-2013 06:00:00	0.00	0.00	1.359	1.600	0.0
06-10-2013 07:00:00	0.00	0.00	1.352	1.600	0.0
06-10-2013 08:00:00	0.00	0.00	1.348	1.600	0.0
06-10-2013 09:00:00	0.00	0.00	1.345	1.600	0.0
06-10-2013 10:00:00	0.00	0.00	1.342	1.600	0.0
06-10-2013 11:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 12:00:00	0.00	0.00	1.340	1.600	0.0
06-10-2013 13:00:00	0.00	0.00	1.345	1.600	0.0
06-10-2013 14:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 15:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 16:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 17:00:00	0.00	0.00	1.324	1.600	0.0

Bellinger_URBS_Official_Forecast: [1] 10-10-2013 11:15:00 Current

Bellinger_URBS_Scenario_Forecast: [2] 10-10-2013 11:15:00 Current

gijsber(Deltares) | Current system time:10-10-2013 11:15 GMT | 14:22:38 GMT | 16:22:38 CEST | Last refresh time: never refreshed | Stand alone | 136.251 , -35.933 | 130 MB



Import

Preprocess

Run Model

Post process

Archive

Export

Report

Delft-FEWS Concepts - Modules

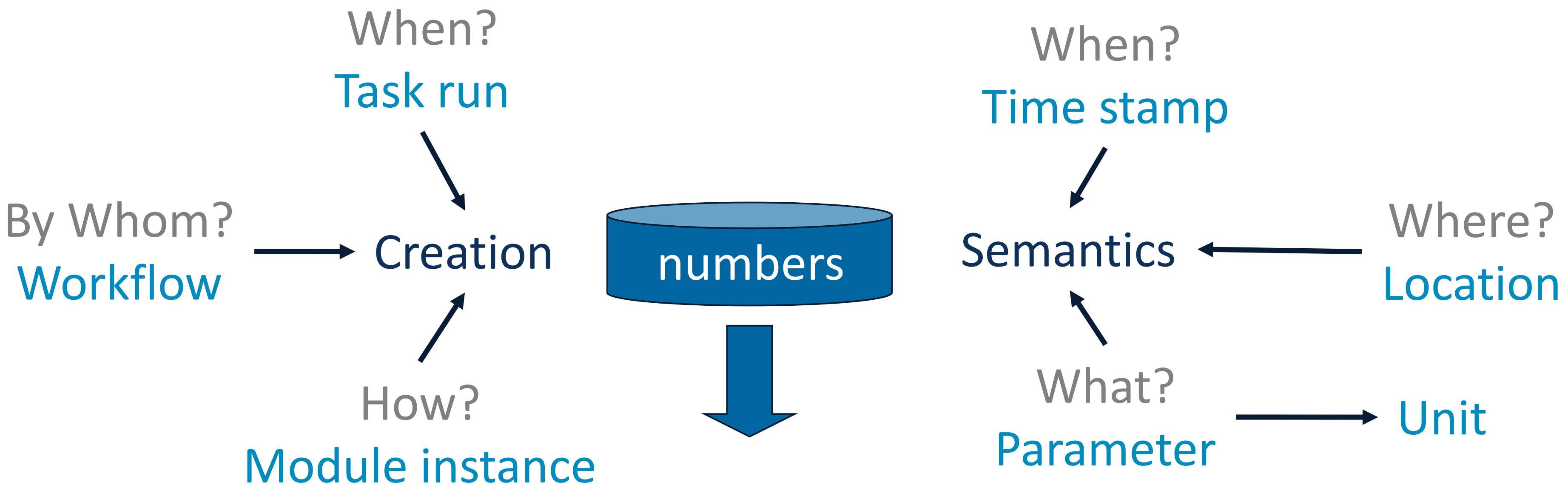
Module activities

- Requests data (from database)
- Does something…
- Writes data (to database)

Types of Modules

- Import
- Interpolation
- General Adapter
- Transformation
- Scenario
- Export
- Report
- Archive
- Many other Modules…

Delft-FEWS Concepts - Time Series



When?
Task run

By Whom?
Workflow

How?
Module instance

Creation

numbers

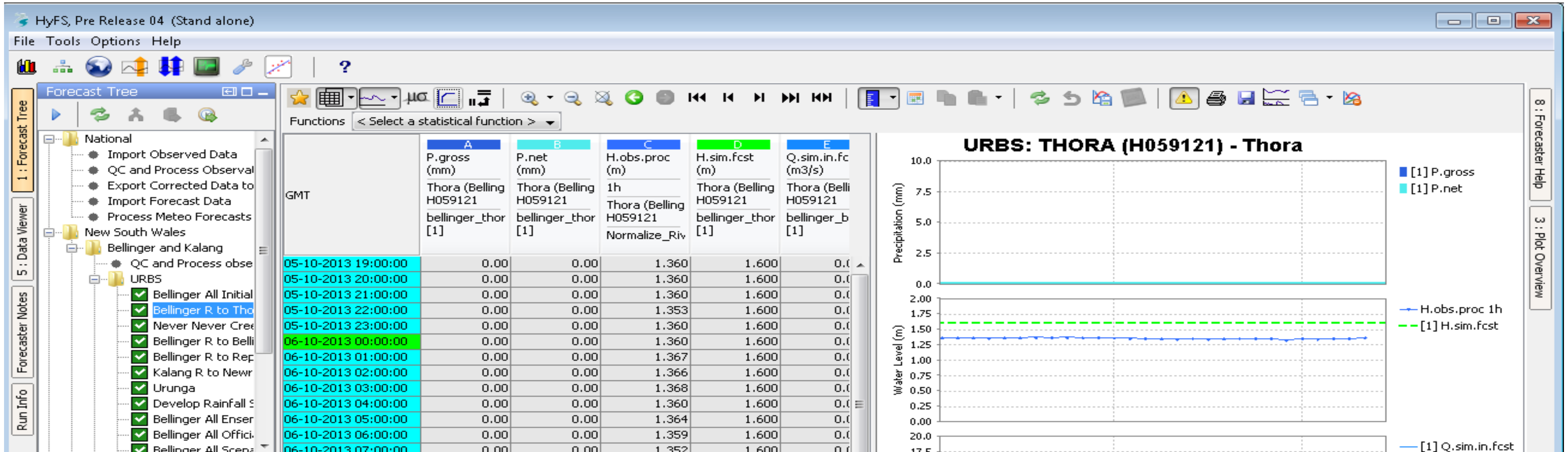
Semantics

When?
Time stamp

Where?
Location

What?
Parameter

Unit



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05-10-2013 19:00:00	0.00	0.00	1.360	1.600	0.0
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06-10-2013 03:00:00	0.00	0.00	1.368	1.600	0.0
06-10-2013 04:00:00	0.00	0.00	1.360	1.600	0.0
06-10-2013 05:00:00	0.00	0.00	1.364	1.600	0.0
06-10-2013 06:00:00	0.00	0.00	1.359	1.600	0.0
06-10-2013 07:00:00	0.00	0.00	1.352	1.600	0.0

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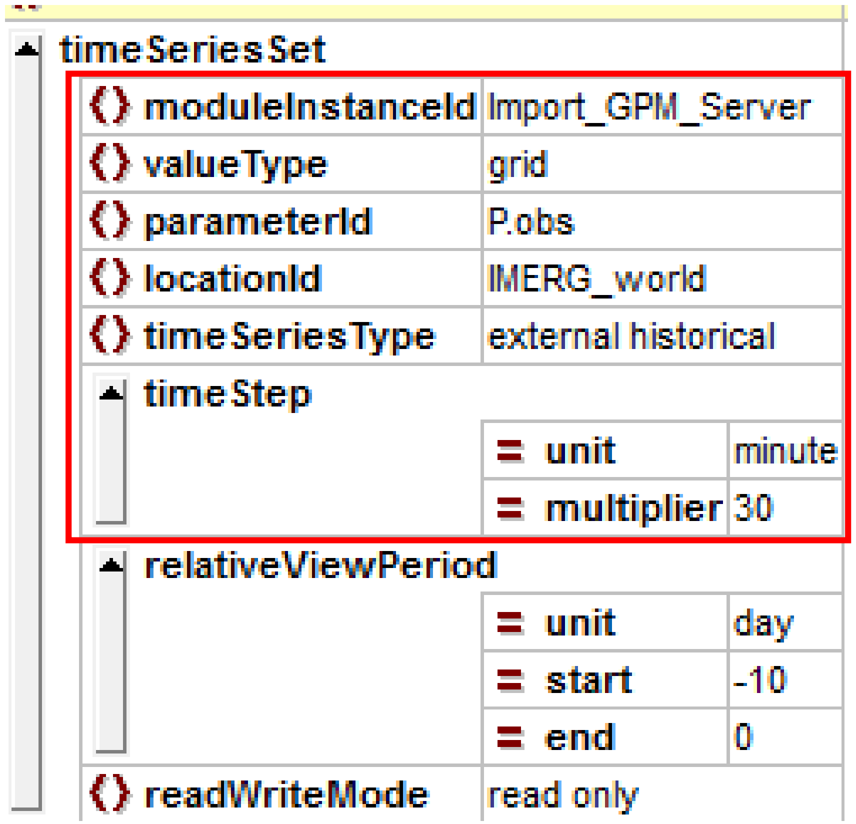
Delft-FEWS Concepts - Time Series

Delft-FEWS elements for time series identification:

• Module instance:	how and who created a time series
• Value type:	its internal data format
• Parameter:	what the time series represents
• Location:	where a time series value applies
• Time series type:	its behavior in the system
• Time step:	when a time series value applies

This combination of information makes the time series unique



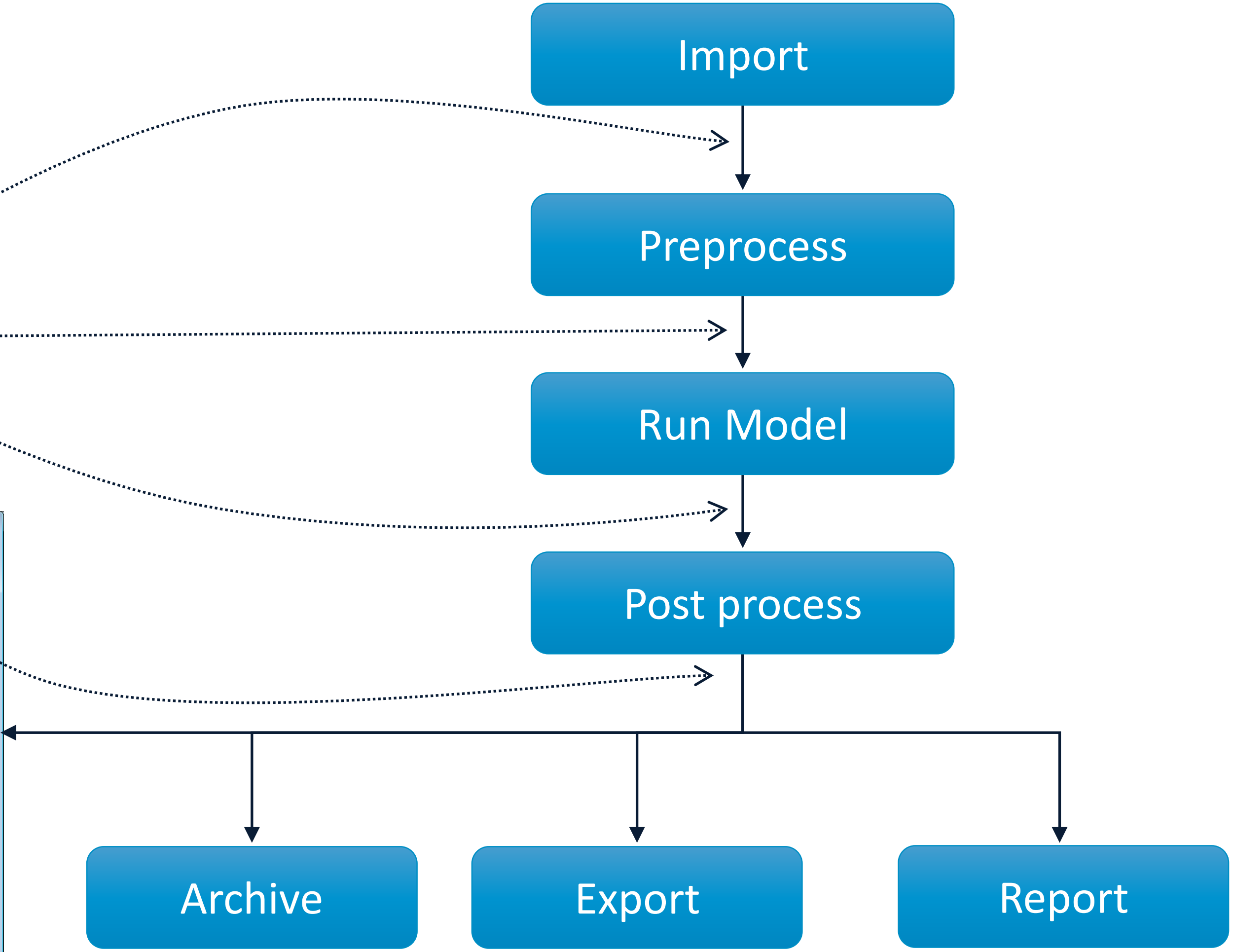
timeSeriesSet

moduleInstanceId	Import_GPM_Server	
valueType	grid	
parameterId	P.obs	
locationId	IMERG_world	
timeSeriesType	external historical	
timeStep	unit	minute
	multiplier	30
relativeViewPeriod	unit	day
	start	-10
	end	0
readWriteMode	read only	

Delft-FEWS Concepts - Workflows

- Workflow – A sequence of modules
- Module instance – Configured module
- Task run – Actual execution of a workflow

- Time series connect the dataflow between the module instances



Import

Preprocess

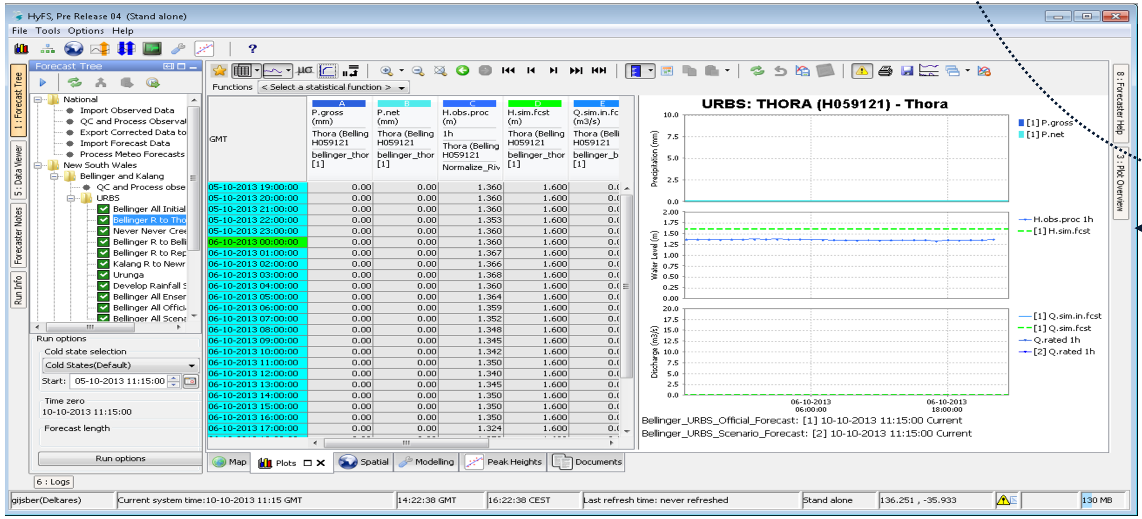
Run Model

Post process

Archive

Export

Report



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      - ☑ Bellinger R to Belli
      - ☑ Bellinger R to Rep
      - ☑ Kalang R to Newr
      - ☑ Urunga
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      - ☑ Bellinger All Enser
      - ☑ Bellinger All Offici
      - ☑ Bellinger All Scena

Run options

Cold state selection: Cold States(Default)

Start: 05-10-2013 11:15:00

Time zero: 10-10-2013 11:15:00

Forecast length

Run options

6 : Logs

Functions < Select a statistical function >

GMT	A P.gross (mm) Thora (Belling H059121 bellinger_thor [1]	B P.net (mm) Thora (Belling H059121 bellinger_thor [1]	C H.obs.proc (m) 1h Thora (Belling H059121 Normalize_Riv	D H.sim.fcst (m) Thora (Belling H059121 bellinger_thor [1]	E Q.sim.in.fc (m3/s) Thora (Belli H059121 bellinger_b [1]
05-10-2013 19:00:00	0.00	0.00	1.360	1.600	0.0
05-10-2013 20:00:00	0.00	0.00	1.360	1.600	0.0
05-10-2013 21:00:00	0.00	0.00	1.360	1.600	0.0
05-10-2013 22:00:00	0.00	0.00	1.353	1.600	0.0
05-10-2013 23:00:00	0.00	0.00	1.360	1.600	0.0
06-10-2013 00:00:00	0.00	0.00	1.360	1.600	0.0
06-10-2013 01:00:00	0.00	0.00	1.367	1.600	0.0
06-10-2013 02:00:00	0.00	0.00	1.366	1.600	0.0
06-10-2013 03:00:00	0.00	0.00	1.368	1.600	0.0
06-10-2013 04:00:00	0.00	0.00	1.360	1.600	0.0
06-10-2013 05:00:00	0.00	0.00	1.364	1.600	0.0
06-10-2013 06:00:00	0.00	0.00	1.359	1.600	0.0
06-10-2013 07:00:00	0.00	0.00	1.352	1.600	0.0
06-10-2013 08:00:00	0.00	0.00	1.348	1.600	0.0
06-10-2013 09:00:00	0.00	0.00	1.345	1.600	0.0
06-10-2013 10:00:00	0.00	0.00	1.342	1.600	0.0
06-10-2013 11:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 12:00:00	0.00	0.00	1.340	1.600	0.0
06-10-2013 13:00:00	0.00	0.00	1.345	1.600	0.0
06-10-2013 14:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 15:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 16:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 17:00:00	0.00	0.00	1.324	1.600	0.0

Bellinger_URBS_Official_Forecast: [1] 10-10-2013 11:15:00 Current

Bellinger_URBS_Scenario_Forecast: [2] 10-10-2013 11:15:00 Current

gijsber(Deltares) | Current system time:10-10-2013 11:15 GMT | 14:22:38 GMT | 16:22:38 CEST | Last refresh time: never refreshed | Stand alone | 136.251 , -35.933 | 130 MB

Deltares

ModuleInstances and ModuleInstanceDescriptors

- Modules are configured in a **ModuleConfigFile**
  - holds the instructions to retrieve data, do something and store data

- **ModuleInstances** are instances of a module as it is called in the workflow
  - identified by ModuleInstanceId
  - registered in \RegionConfigFiles\ModuleInstanceDescriptors.xml

- One ModuleConfigFile can act as a template for multiple moduleInstances
  - $PROPERTIES$ can be used to make time series explicit
  - $PROPERTIES$ can be provided by the workflow
  - $PROPERTIES$ are resolved at run-time

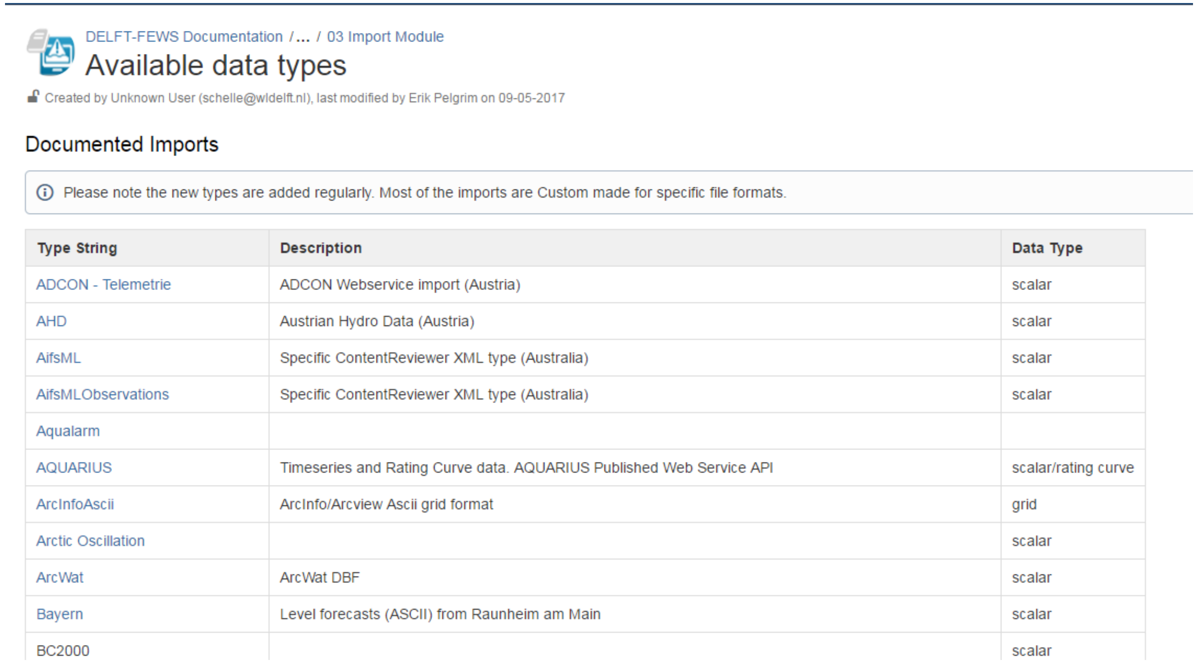
Module 6
Importing external data

Deltares

Delft-FEWS: Import of External Time Series

- Delft-FEWS WIKI has documentation on all import functions in Delft-FEWS
  https://publicwiki.deltares.nl/display/FEWSDOC/Available+data+types

- Import module can import data from
  - import folders
  - FTP servers
  - HTTP
  - Webservices
  - OpenDAP servers
  - databases



DELFT-FEWS Documentation /... / 03 Import Module

Available data types

Created by Unknown User (schelle@wldelft.nl), last modified by Erik Pelgrim on 09-05-2017

Documented Imports

Please note the new types are added regularly. Most of the imports are Custom made for specific file formats.

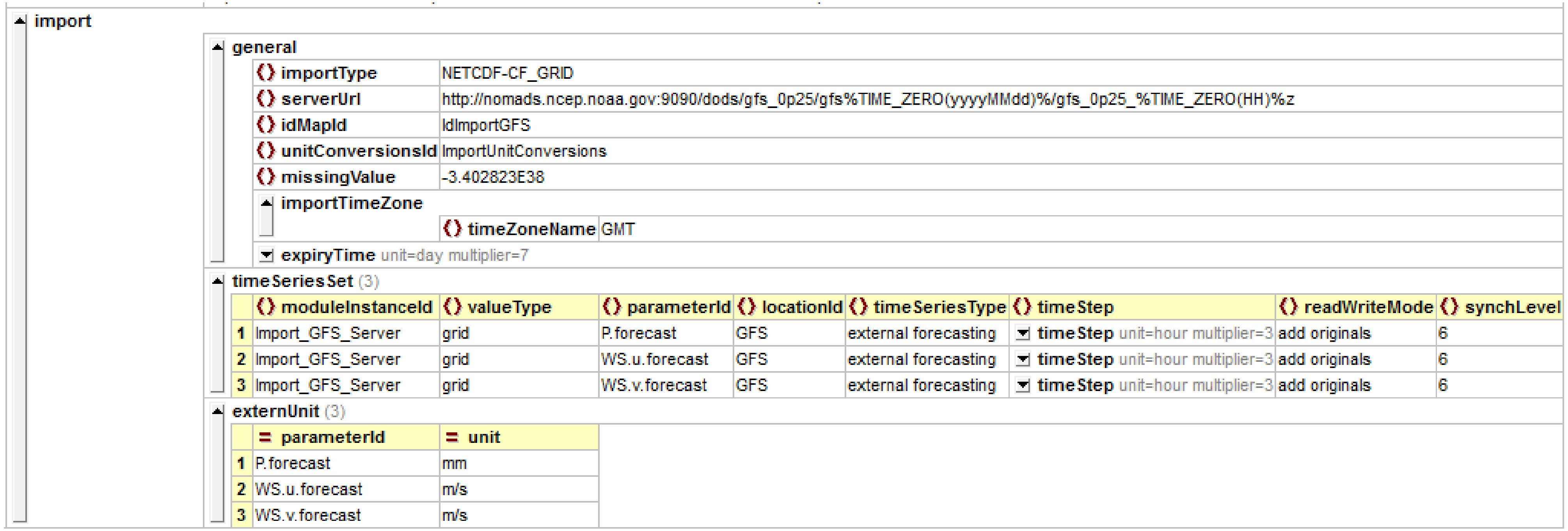
Type String	Description	Data Type
ADCON - Telemetrie	ADCON Webservice import (Austria)	scalar
AHD	Austrian Hydro Data (Austria)	scalar
AifsML	Specific ContentReviewer XML type (Australia)	scalar
AifsMLObservations	Specific ContentReviewer XML type (Australia)	scalar
Aqualarm		
AQUARIUS	Timeseries and Rating Curve data. AQUARIUS Published Web Service API	scalar/rating curve
ArcInfoAscii	ArcInfo/Arcview Ascii grid format	grid
Arctic Oscillation		scalar
ArcWat	ArcWat DBF	scalar
Bayern	Level forecasts (ASCII) from Raunheim am Main	scalar
BC2000		scalar

- Procedure for data import is the same for all data types

Deltares

Delft-FEWS: Data Import Module

- Data Import Module has dedicated functions to read specific file formats
- Its configuration tells the software:
  - What file format to import
  - Where to find the data files
  - How to translate the information in the files to internal Ids
  - How to store the imported time series in the database



import

general

importType	NETCDF-CF_GRID
serverUrl	http://nomads.ncep.noaa.gov:9090/dods/gfs_0p25/gfs%TIME_ZERO(yyyyMMdd)%/gfs_0p25_%TIME_ZERO(HH)%z
idMapId	IdImportGFS
unitConversionsId	ImportUnitConversions
missingValue	-3.402823E38
importTimeZone	
timeZoneName	GMT
expiryTime unit=day multiplier=7	

timeSeriesSet (3)

	moduleInstanceId	valueType	parameterId	locationId	timeSeriesType	timeStep	readWriteMode	synchLevel
1	Import_GFS_Server	grid	P.forecast	GFS	external forecasting	timeStep unit=hour multiplier=3	add originals	6
2	Import_GFS_Server	grid	WS.u.forecast	GFS	external forecasting	timeStep unit=hour multiplier=3	add originals	6
3	Import_GFS_Server	grid	WS.v.forecast	GFS	external forecasting	timeStep unit=hour multiplier=3	add originals	6

externUnit (3)

	parameterId	unit
1	P.forecast	mm
2	WS.u.forecast	m/s
3	WS.v.forecast	m/s

Deltares

Delft-FEWS: Data Import Module

A configured import module instance is required for each file format

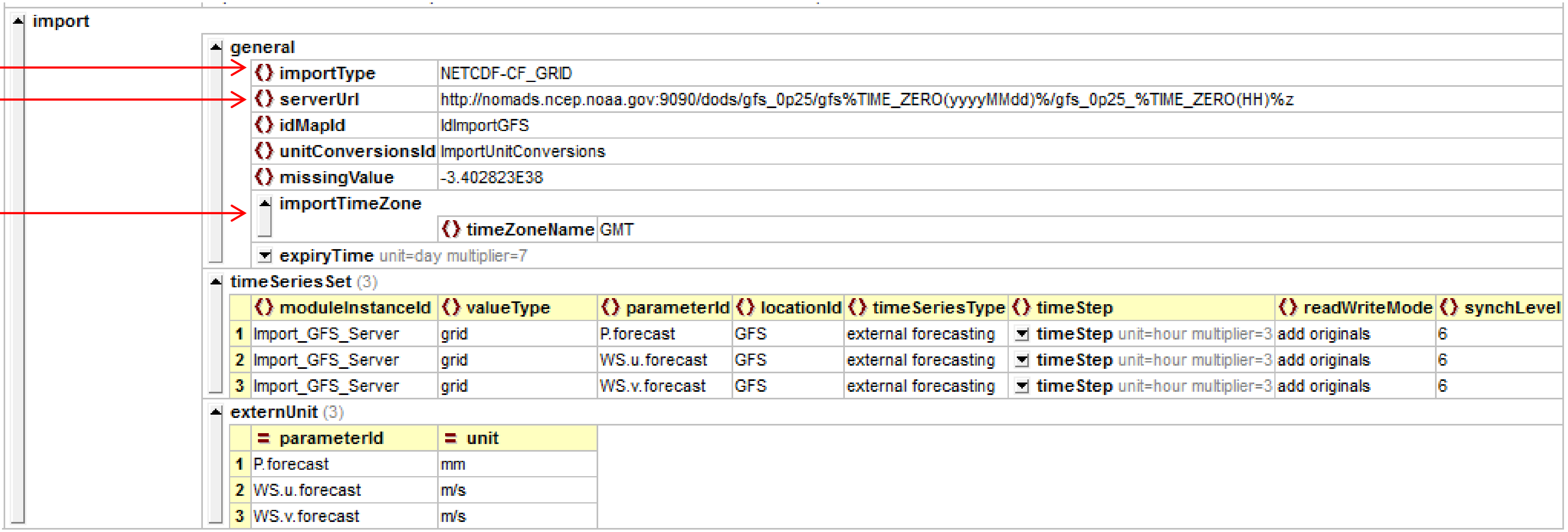
A workflow calls the module instances to import the data

To import data, configuration is defined in:

%REGION_HOME%\global.properties	location of the import folder
\ModuleConfigFiles\Import\Import<TYPE>.xml	Import instructions
\IdMapFiles\IdImport<TYPE>.xml	Id mapping instructions
\RegionConfigFiles\LocationSets.xml	locations that contain time series
\RegionConfigFiles\ModuleInstanceDescriptors.xml	Registers import module instance
\RegionConfigFiles\WorkflowDescriptors.xml	Registers import workflow
\WorkflowFiles\Import<TYPE>.xml	List with import module instances activities

Let’s have a look at an import module instance

- **General** section with information on the data files that need to be imported
- Module instances specified by file format (**importType**)
- **serverURL** is where the data can be found; GFS server in this example
- **importTimeZone** is what time zone the data is stored in



import

general

{} importType	NETCDF-CF_GRID
{} serverUrl	http://nomads.ncep.noaa.gov:9090/dods/gfs_0p25/gfs%TIME_ZERO(yyyyMMdd)%/gfs_0p25_%TIME_ZERO(HH)%z
{} idMapId	IdImportGFS
{} unitConversionsId	ImportUnitConversions
{} missingValue	-3.402823E38
importTimeZone	
{} timeZoneName	GMT
expiryTime	unit=day multiplier=7

timeSeriesSet (3)

	{} moduleInstanceId	{} valueType	{} parameterId	{} locationId	{} timeSeriesType	{} timeStep	{} readWriteMode	{} synchLevel
1	Import_GFS_Server	grid	P.forecast	GFS	external forecasting	timeStep unit=hour multiplier=3	add originals	6
2	Import_GFS_Server	grid	WS.u.forecast	GFS	external forecasting	timeStep unit=hour multiplier=3	add originals	6
3	Import_GFS_Server	grid	WS.v.forecast	GFS	external forecasting	timeStep unit=hour multiplier=3	add originals	6

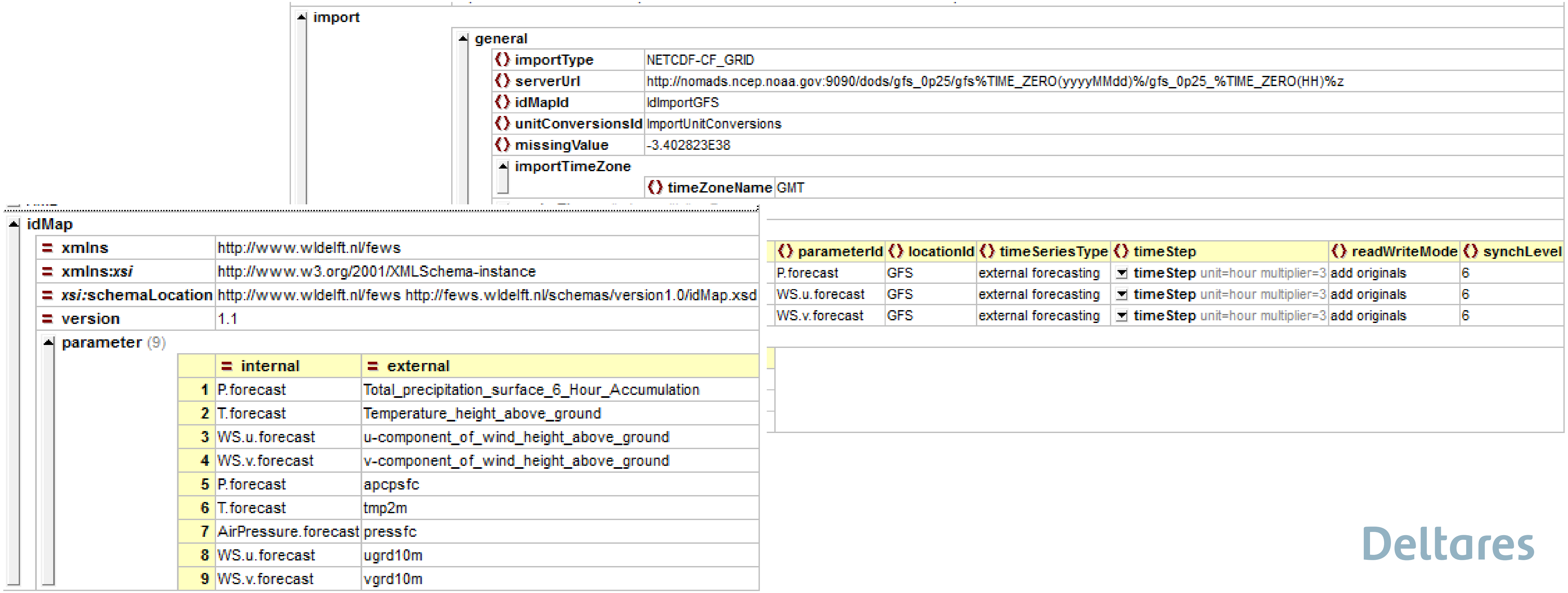
externUnit (3)

	= parameterId	= unit
1	P.forecast	mm
2	WS.u.forecast	m/s
3	WS.v.forecast	m/s

Deltares

Let’s have a look at an import module instance

- **timeSeriesSet** section with information on the time series to store in the database
- **externalUnit** section on the unit the time series are provided in
- Location, parameter and unit mapping is required in most import functions



import

general

{} importType	NETCDF-CF_GRID
{} serverUrl	http://nomads.ncep.noaa.gov:9090/dods/gfs_0p25/gfs%TIME_ZERO(yyyyMMdd)%/gfs_0p25_%TIME_ZERO(HH)%z
{} idMapId	IdImportGFS
{} unitConversionsId	ImportUnitConversions
{} missingValue	-3.402823E38
importTimeZone	
{} timeZoneName	GMT

{} parameterId	{} locationId	{} timeSeriesType	{} timeStep	{} readWriteMode	{} synchLevel
P.forecast	GFS	external forecasting	timeStep unit=hour multiplier=3	add originals	6
WS.u.forecast	GFS	external forecasting	timeStep unit=hour multiplier=3	add originals	6
WS.v.forecast	GFS	external forecasting	timeStep unit=hour multiplier=3	add originals	6

idMap

= 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/idMap.xsd
= version	1.1

parameter (9)

	= internal	= external
1	P.forecast	Total_precipitation_surface_6_Hour_Accumulation
2	T.forecast	Temperature_height_above_ground
3	WS.u.forecast	u-component_of_wind_height_above_ground
4	WS.v.forecast	v-component_of_wind_height_above_ground
5	P.forecast	apcpsfc
6	T.forecast	tmp2m
7	AirPressure.forecast	pressfc
8	WS.u.forecast	ugrd10m
9	WS.v.forecast	vgrd10m

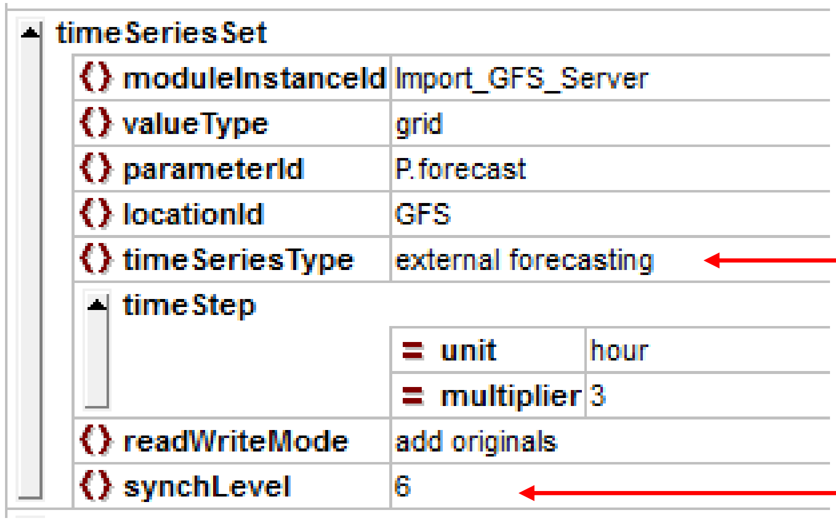
Deltares

Exercise 3: Analyse the import workflow

- See Exercises.ppt

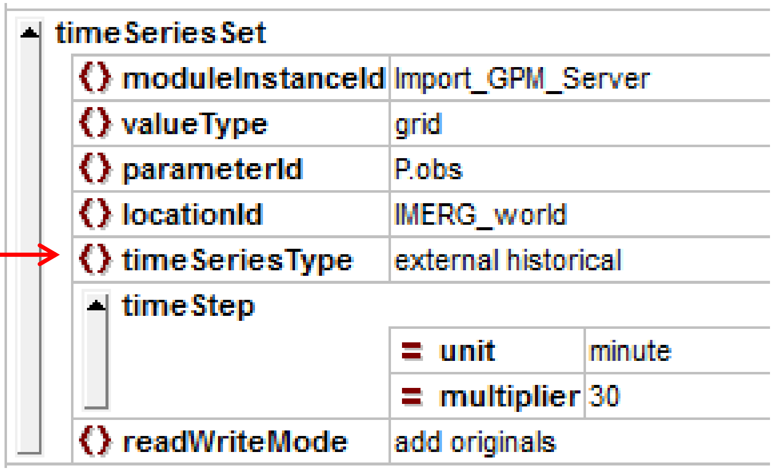
Delft-FEWS Concepts: Time Series Types

- Compare the two timeSeriesSets of Exercise 3



timeSeriesSet

moduleInstanceId	Import_GFS_Server	
valueType	grid	
parameterId	P.forecast	
locationId	GFS	
timeSeriesType	external forecasting	
timeStep	unit	hour
	multiplier	3
readWriteMode	add originals	
synchLevel	6	



timeSeriesSet

moduleInstanceId	Import_GPM_Server	
valueType	grid	
parameterId	P.obs	
locationId	IMERG_world	
timeSeriesType	external historical	
timeStep	unit	minute
	multiplier	30
readWriteMode	add originals	

timeSeriesType?

synchLevel?

Delft-FEWS Time Series Characterisation

- Time series are available from two sources:
  - external
  - simulated
- Time series are in two categories in relation to time:
  - historical (continuous in time)
  - forecasting (characterised by its start time)

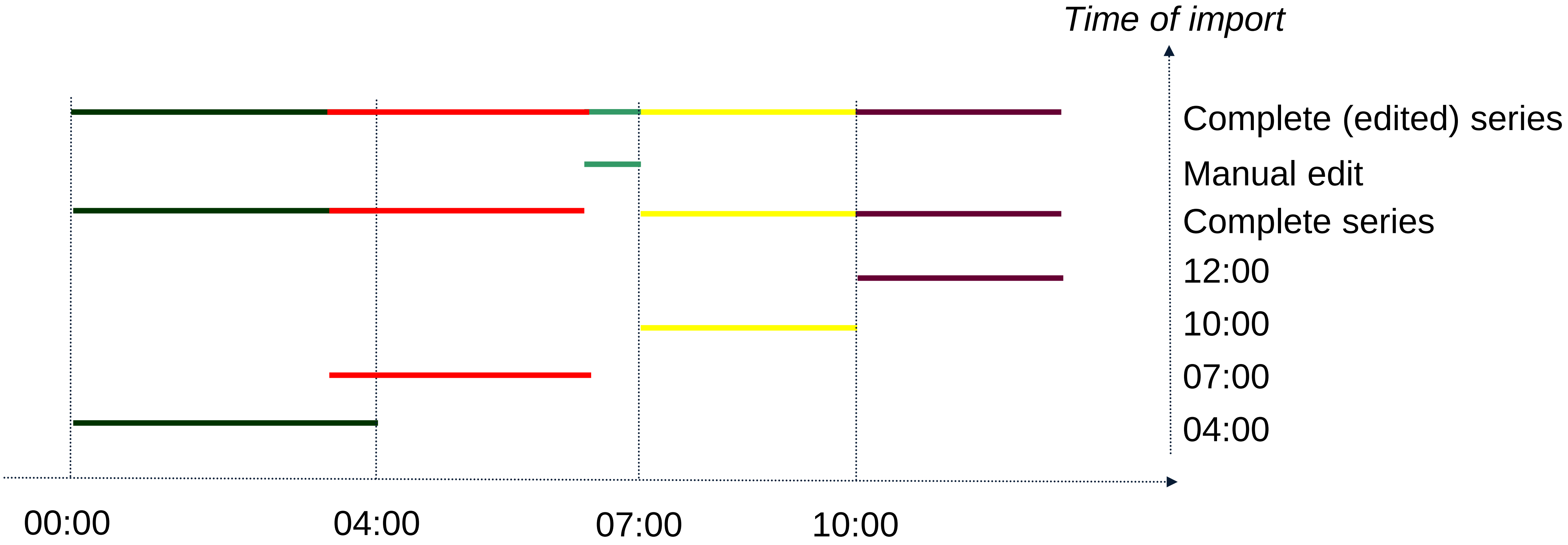
timeSeriesType
(behaviour)

- Time series can be in various formats:
  - 0D – scalar
  - 1D – vector or longitudinal profile
  - 2D – grid
  - rating curve
  - sample
  - spectra

valueType
(data storage format)

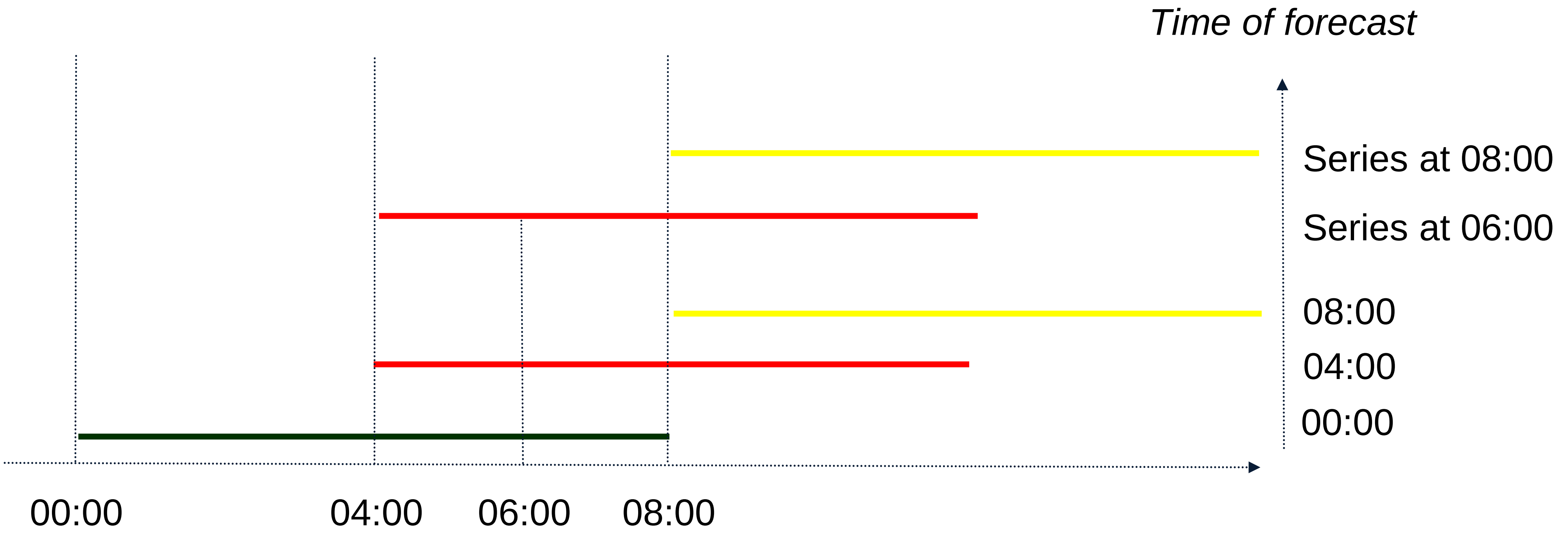
FEWS timeSeriesType – external historical

- Added incrementally
- Can be edited by the user
- Only new and changed values are stored



FEWS timeSeriesType – external forecasting

- Added and stored individually
- Can be edited by the user
- Usage of series depends on T0



Deltares

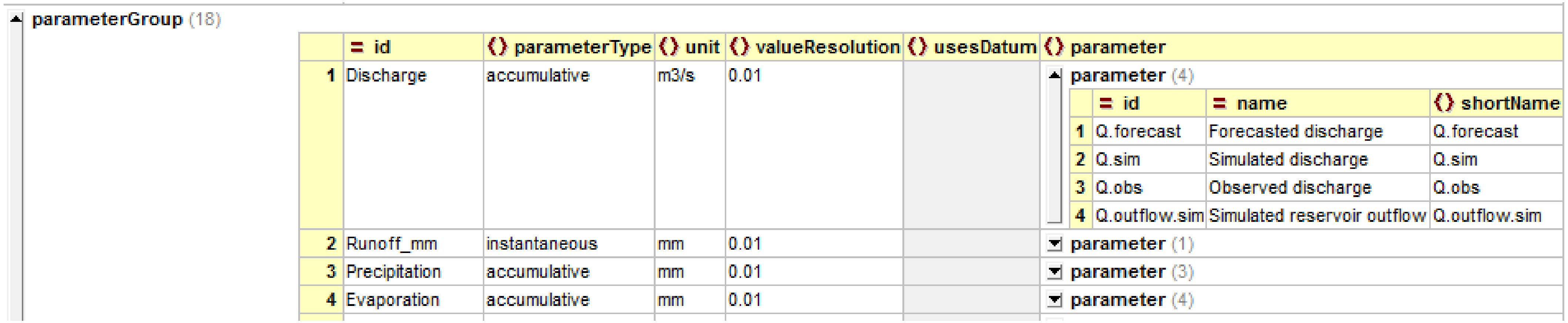
Exercise 4: Missing meteo forecast

- If external forecast is missing, what is expected behaviour of the system;
- **Exercise: import NOAA GFS of 24 hours ago, schedule a meteo-postprocessing run of today 06:00, what happened?**
- **Can you explain the system behaviour?**

Module 7
Delft-FEWS Locations and Parameters

Parameters in Delft-FEWS

- The **parameterId** is a primary key in the time series of Delft-FEWS
- Parameters have a unique id and a name
- Organised into parameter groups
  - unique id
  - type (accumulative, instantaneous)
  - unit
  - value resolution (→ affects data compression)



parameterGroup (18)

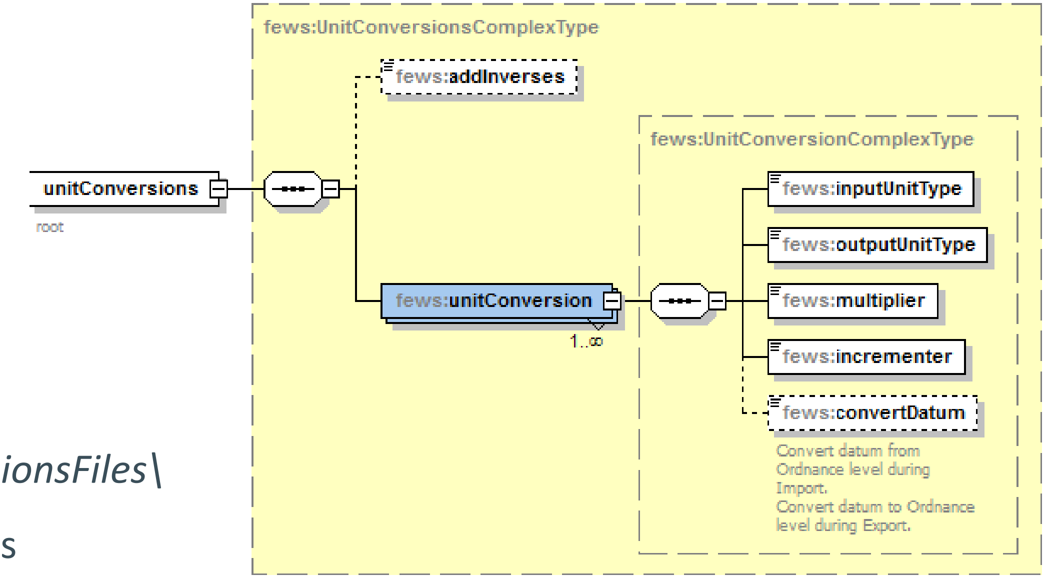
	= id	{} parameterType	{} unit	{} valueResolution	{} usesDatum	{} parameter
1	Discharge	accumulative	m3/s	0.01		parameter (4)
2	Runoff_mm	instantaneous	mm	0.01		parameter (1)
3	Precipitation	accumulative	mm	0.01		parameter (3)
4	Evaporation	accumulative	mm	0.01		parameter (4)

parameter (4)

	= id	= name	{} shortName
1	Q.forecast	Forecasted discharge	Q.forecast
2	Q.sim	Simulated discharge	Q.sim
3	Q.obs	Observed discharge	Q.obs
4	Q.outflow.sim	Simulated reservoir outflow	Q.outflow.sim

Deltares

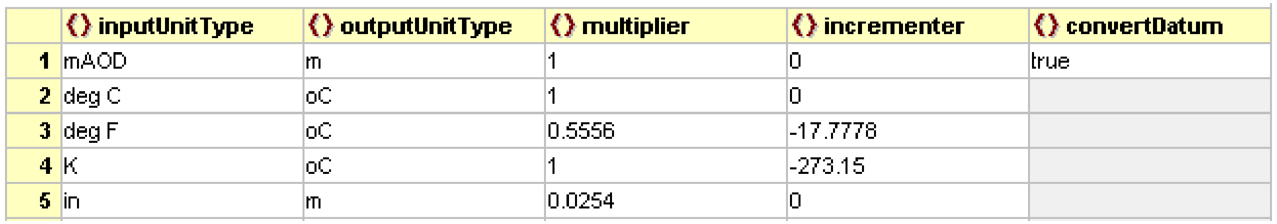
Parameters - unit conversion



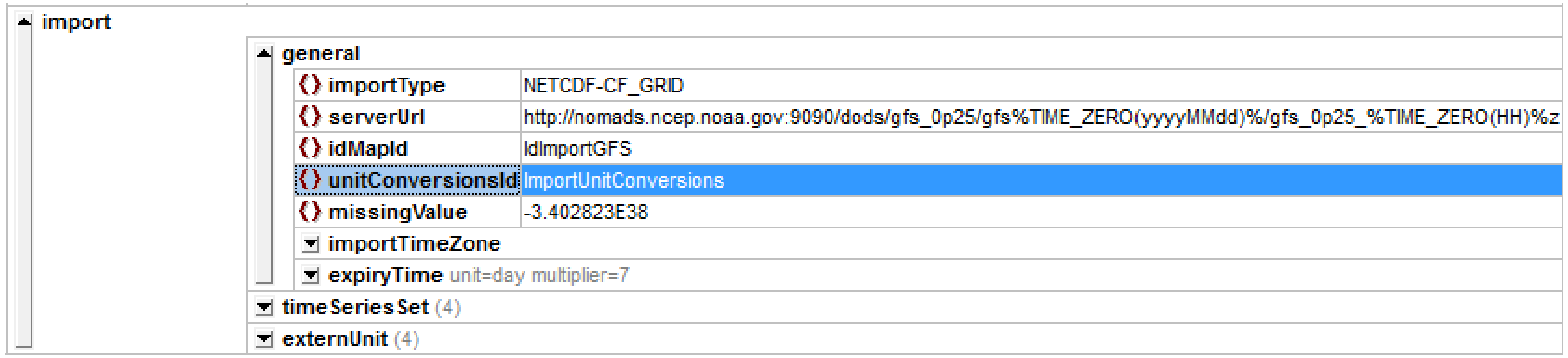
Convert datum from Ordnance level during Import.
Convert datum to Ordnance level during Export.

- Units are a property of a parameter group
- While importing or exporting time series, units can be converted

- Unit conversion files are stored in the folder: *\Config\UnitConversionsFiles\*
- One Delft-FEWS application can have multiple unit conversion files
- A module instance configuration file can reference a UnitConversion file

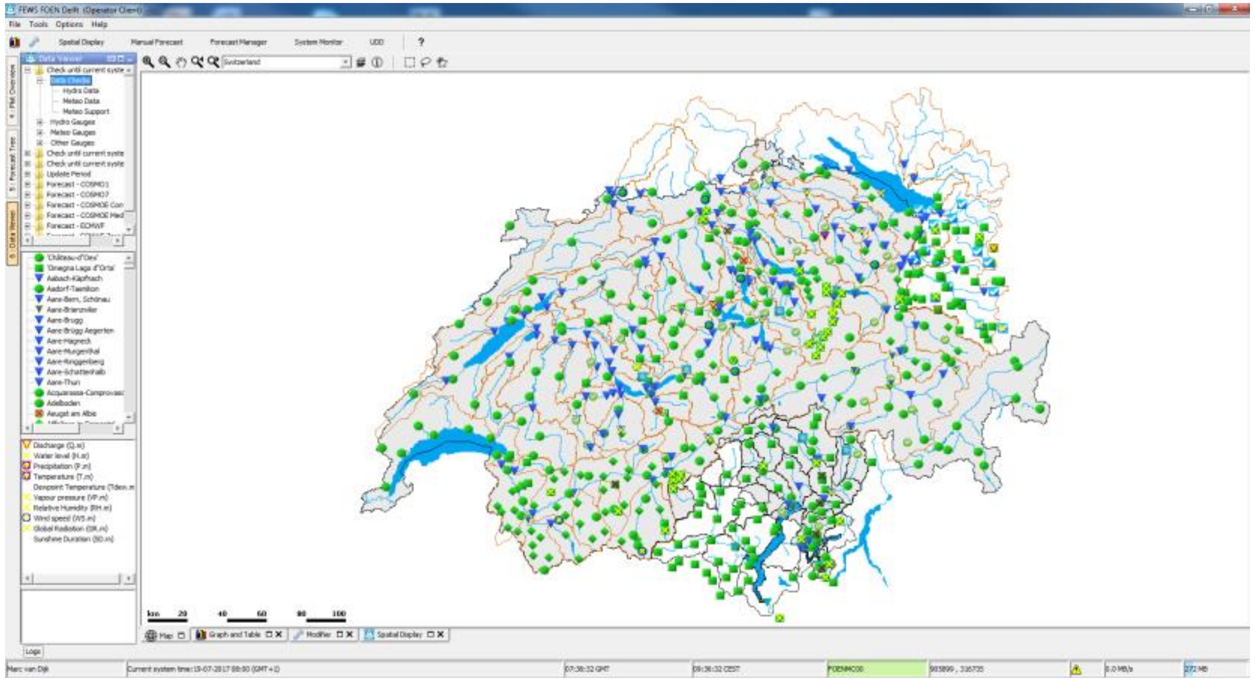


	{} inputUnitType	{} outputUnitType	{} multiplier	{} incrementer	{} convertDatum
1	mAOD	m	1	0	true
2	deg C	oC	1	0	
3	deg F	oC	0.5556	-17.7778	
4	K	oC	1	-273.15	
5	in	m	0.0254	0	

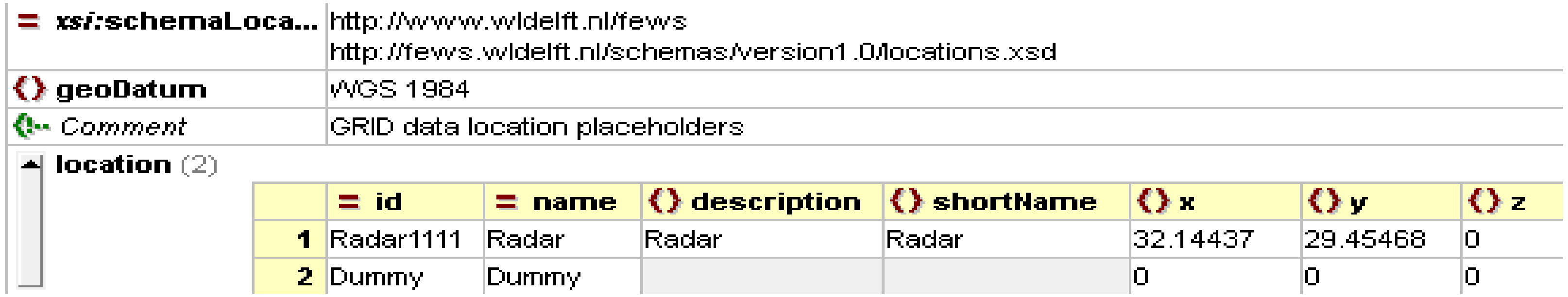


import
general
{} importType NETCDF-CF_GRID
{} serverUrl http://nomads.ncep.noaa.gov:9090/dods/gfs_0p25/gfs%TIME_ZERO(yyyyMMdd)%/gfs_0p25_%TIME_ZERO(HH)%z
{} idMapId IdImportGFS
{} unitConversionsId ImportUnitConversions
{} missingValue -3.402823E38
importTimeZone
expiryTime unit=day multiplier=7
timeSeriesSet (4)
externUnit (4)

Locations in Delft-FEWS



- All time series are associated with a location
- Locations can be plotted on the map
- Locations have a geo-datum
- Locations have at least:
  - Identifier (primary key in time series)
  - X-coordinate
  - Y-coordinate
- Locations configuration file: \RegionConfigFiles\Locations.xml

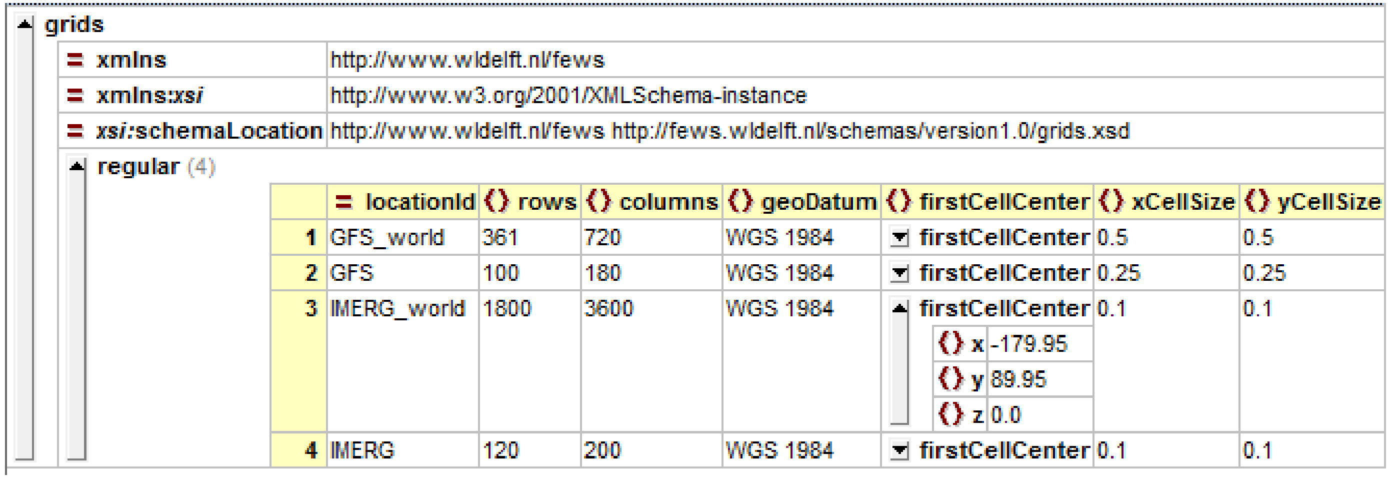


= **xsi:schemaLoca...**	http://www.wldelft.nl/fews http://fews.wldelft.nl/schemas/version1.0/locations.xsd
{} **geoDatum**	WGS 1984
Comment	GRID data location placeholders
location (2)	

	= **id**	= **name**	{} **description**	{} **shortName**	{} **x**	{} **y**	{} **z**
1	Radar1111	Radar	Radar	Radar	32.14437	29.45468	0
2	Dummy	Dummy			0	0	0

Grids are locations in Delft-FEWS

- Grid time series are 2D
- A grid location should be listed in *Locations.xml* and in *Grids.xml*
- The *Grids.xml* configuration file includes meta-information of a grid
- Gridded time series can be processed by most of the Delft-FEWS modules
- The Spatial Display can visualize gridded time series

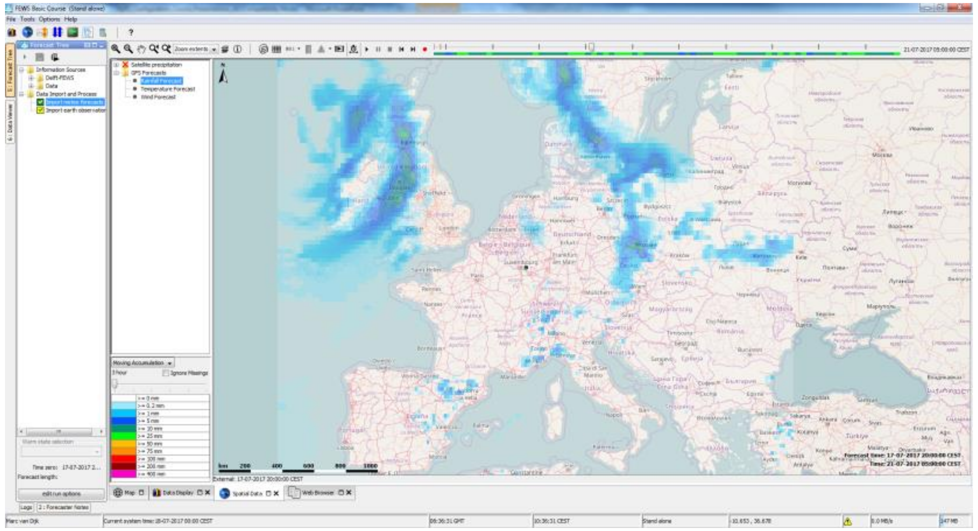


grids

= 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/grids.xsd

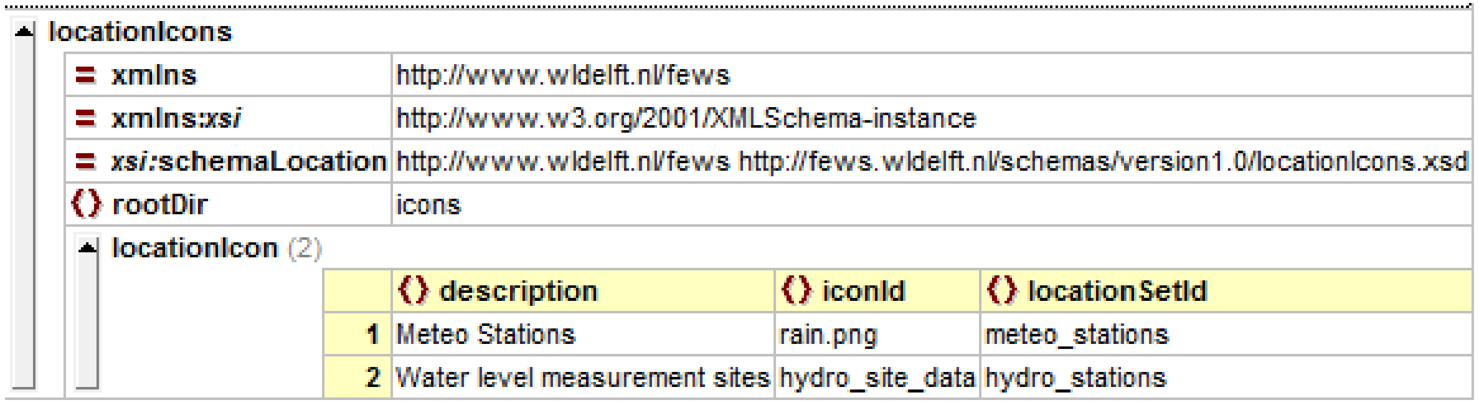
regular (4)

	= locationId	() rows	() columns	() geoDatum	() firstCellCenter	() xCellSize	() yCellSize
1	GFS_world	361	720	WGS 1984	firstCellCenter	0.5	0.5
2	GFS	100	180	WGS 1984	firstCellCenter	0.25	0.25
3	IMERG_world	1800	3600	WGS 1984	firstCellCenter () x -179.95 () y 89.95 () z 0.0	0.1	0.1
4	IMERG	120	200	WGS 1984	firstCellCenter	0.1	0.1



Location data – Location Icons

- Icons express location purpose on the map or in the list-boxes
- Location icons are configured for locationSets: \SystemConfigFiles\LocationIcons.xml
- Delft-FEWS comes with a pre-defined set of icons: \IconFiles\\

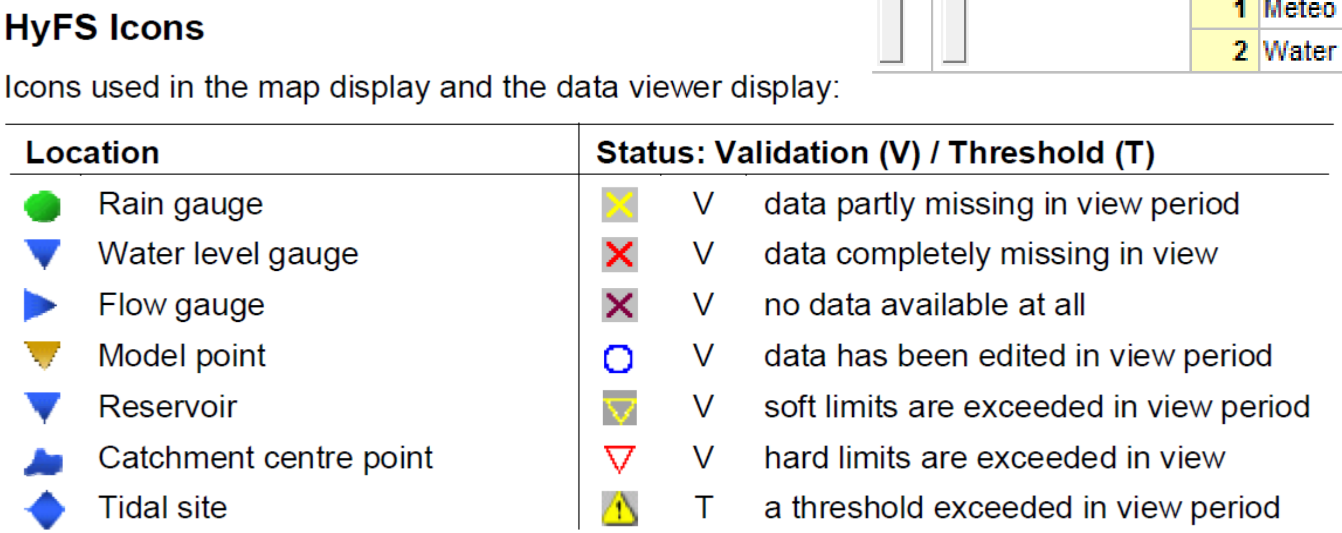


locationIcons

= 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/locationIcons.xsd
{} rootDir	icons

locationIcon (2)

	{} description	{} iconId	{} locationSetId
1	Meteo Stations	rain.png	meteo_stations
2	Water level measurement sites	hydro_site_data	hydro_stations



HyFS Icons

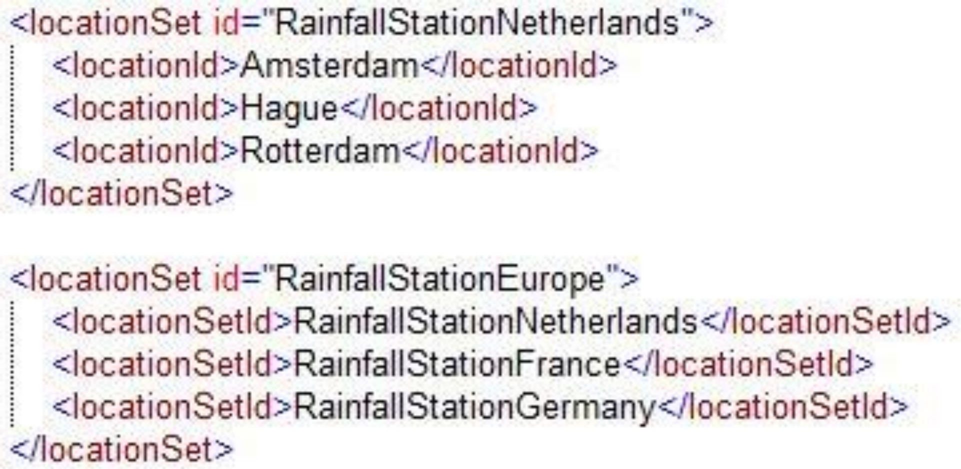
Icons used in the map display and the data viewer display:

Location		Status: Validation (V) / Threshold (T)		
●	Rain gauge	✕	V	data partly missing in view period
▼	Water level gauge	✕	V	data completely missing in view
▶	Flow gauge	✕	V	no data available at all
▼	Model point	○	V	data has been edited in view period
▼	Reservoir	▽	V	soft limits are exceeded in view period
●	Catchment centre point	▽	V	hard limits are exceeded in view
◆	Tidal site	⚠	T	a threshold exceeded in view period

Deltares

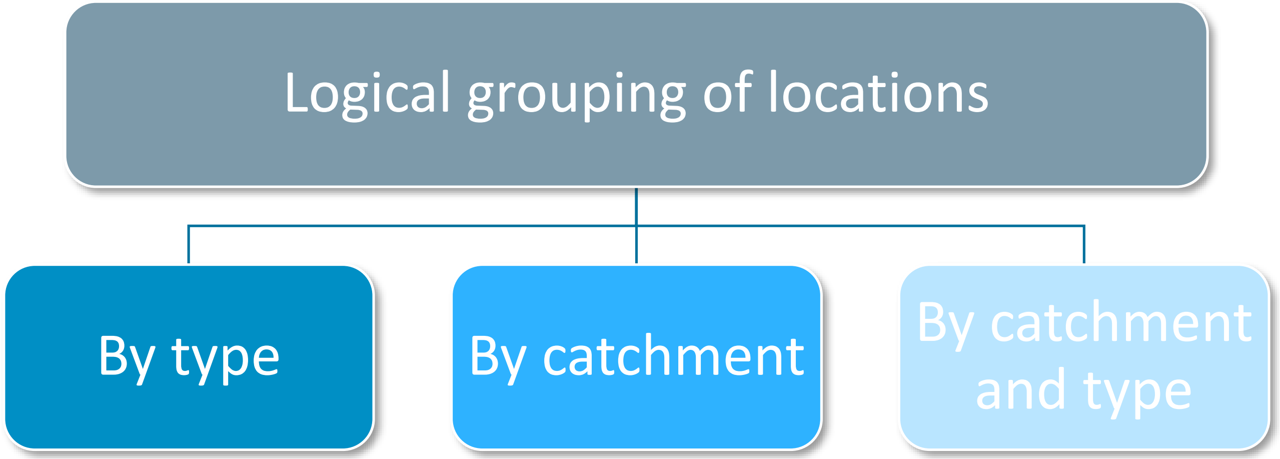
LocationSets

- A locationSet may include either locations or locationSets or both
- LocationSets can be nested
- Configuration file: \RegionConfigFiles\LocationSets.xml



```
<locationSet id="RainfallStationNetherlands">
    <locationId>Amsterdam</locationId>
    <locationId>Hague</locationId>
    <locationId>Rotterdam</locationId>
</locationSet>

<locationSet id="RainfallStationEurope">
    <locationSetId>RainfallStationNetherlands</locationSetId>
    <locationSetId>RainfallStationFrance</locationSetId>
    <locationSetId>RainfallStationGermany</locationSetId>
</locationSet>
```



Logical grouping of locations

By type

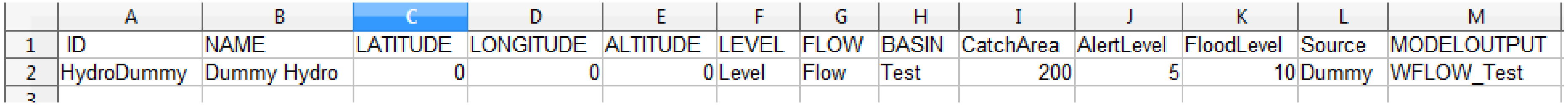
By catchment

By catchment and type

LocationSets – XML and CSV approach

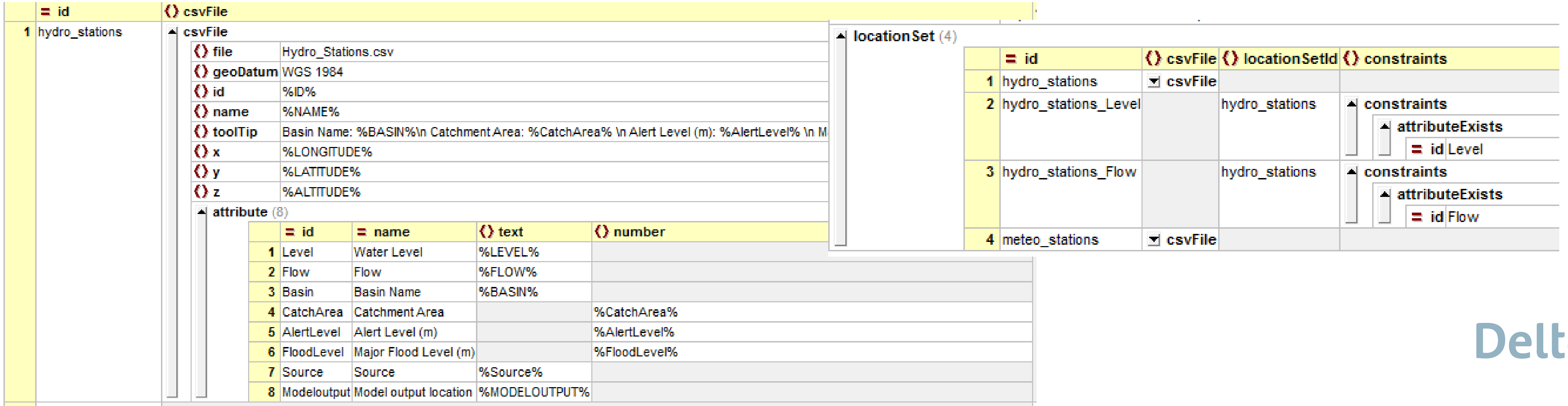
3 steps for configuring locations/locationsets with CSV files

1. Make a CSV file with locations organised in rows and attributes in columns



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	ID	NAME	LATITUDE	LONGITUDE	ALTITUDE	LEVEL	FLOW	BASIN	CatchArea	AlertLevel	FloodLevel	Source	MODELOUTPUT
2	HydroDummy	Dummy Hydro	0	0	0	Level	Flow	Test	200	5	10	Dummy	WFLOW_Test
3													

2. In *LocationSets.xml* read the CSV file with location attributes (‘%column_name%’)
3. Define location(sub)set by filtering on attribute values



	= id	{} csvFile
1	hydro_stations	csvFile

csvFile	
{} file	Hydro_Stations.csv
{} geoDatum	WGS 1984
{} id	%ID%
{} name	%NAME%
{} toolTip	Basin Name: %BASIN%\n Catchment Area: %CatchArea% \n Alert Level (m): %AlertLevel% \n M
{} x	%LONGITUDE%
{} y	%LATITUDE%
{} z	%ALTITUDE%

attribute (8)

	= id	= name	{} text	{} number
1	Level	Water Level	%LEVEL%	
2	Flow	Flow	%FLOW%	
3	Basin	Basin Name	%BASIN%	
4	CatchArea	Catchment Area		%CatchArea%
5	AlertLevel	Alert Level (m)		%AlertLevel%
6	FloodLevel	Major Flood Level (m)		%FloodLevel%
7	Source	Source	%Source%	
8	Modeloutput	Model output location	%MODELOUTPUT%	

locationSet (4)

	= id	{} csvFile	{} locationSetId	{} constraints
1	hydro_stations	csvFile		
2	hydro_stations_Level		hydro_stations	constraints attributeExists = id Level
3	hydro_stations_Flow		hydro_stations	constraints attributeExists = id Flow
4	meteo_stations	csvFile		

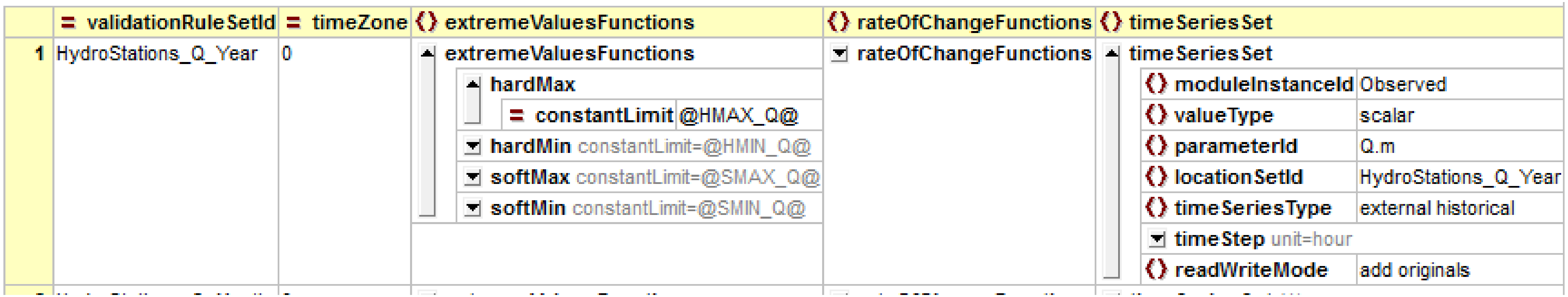
Deltares

Validating Data

- Allow quality checking of all scalar time series data
- Difference in hard limit and soft limit checks
  - Hard limit check marks data as unreliable
  - Soft limit check marks data as doubtful
  - Option to enter monthly limits
- Specify rule for one time series or a complete set

Different types of rules

- Upper/ Lower limits
- Rate of change
- Temporary shift
- Same readings



	= validationRuleSetId	= timeZone	{} extremeValuesFunctions	{} rateOfChangeFunctions	{} timeSeriesSet
1	HydroStations_Q_Year	0	extremeValuesFunctions hardMax = constantLimit @HMAX_Q@ hardMin constantLimit=@HMIN_Q@ softMax constantLimit=@SMAX_Q@ softMin constantLimit=@SMIN_Q@	rateOfChangeFunctions	timeSeriesSet {} moduleInstanceId Observed {} valueType scalar {} parameterId Q.m {} locationSetId HydroStations_Q_Year {} timeSeriesType external historical timeStep unit=hour {} readWriteMode add originals

Deltares

Exercise 5: Add Hydro Locations

- See Exercises.ppt

Exercise 6: Add Meteo Locations

- See Exercises.ppt

Exercise 7: Import

- Import additional parameter of NOAA GFS
- Check available parameter list at: https://nomads.ncep.noaa.gov/dods/gfs_0p25/gfs20221025/gfs_0p25_00z.info
- See Exercises.ppt

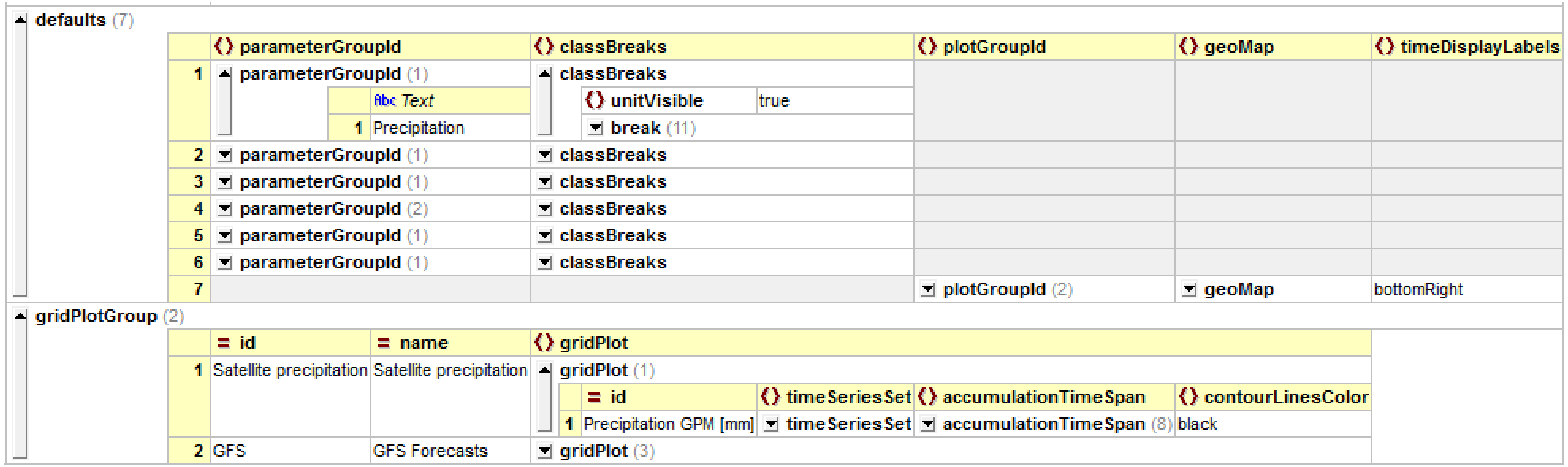
Exercise 8: Delft-FEWS Explorer Tasks

- See Exercises.ppt

Delft-FEWS: Spatial Display

The Spatial Display configuration file contains two type of elements:

- **defaults**: Properties that will be used when displaying the spatial time series (grids). Can be organized per parameter group, gridPlotGroup, etc. In the FEWS Basic application, parameter groups are used.
- **gridPlotGroup**: Contains the folder structure and time series to display.



defaults (7)

	parameterGroupId	classBreaks	plotGroupId	geoMap	timeDisplayLabels
1	parameterGroupId (1) Text 1 Precipitation	classBreaks unitVisible true break (11)			
2	parameterGroupId (1)	classBreaks			
3	parameterGroupId (1)	classBreaks			
4	parameterGroupId (2)	classBreaks			
5	parameterGroupId (1)	classBreaks			
6	parameterGroupId (1)	classBreaks			
7			plotGroupId (2)	geoMap	bottomRight

gridPlotGroup (2)

	id	name	gridPlot
1	Satellite precipitation	Satellite precipitation	gridPlot (1)
2	GFS	GFS Forecasts	gridPlot (3)

gridPlot (1)

	id	timeSeriesSet	accumulationTimeSpan	contourLinesColor
1	Precipitation GPM [mm]	timeSeriesSet	accumulationTimeSpan (8)	black

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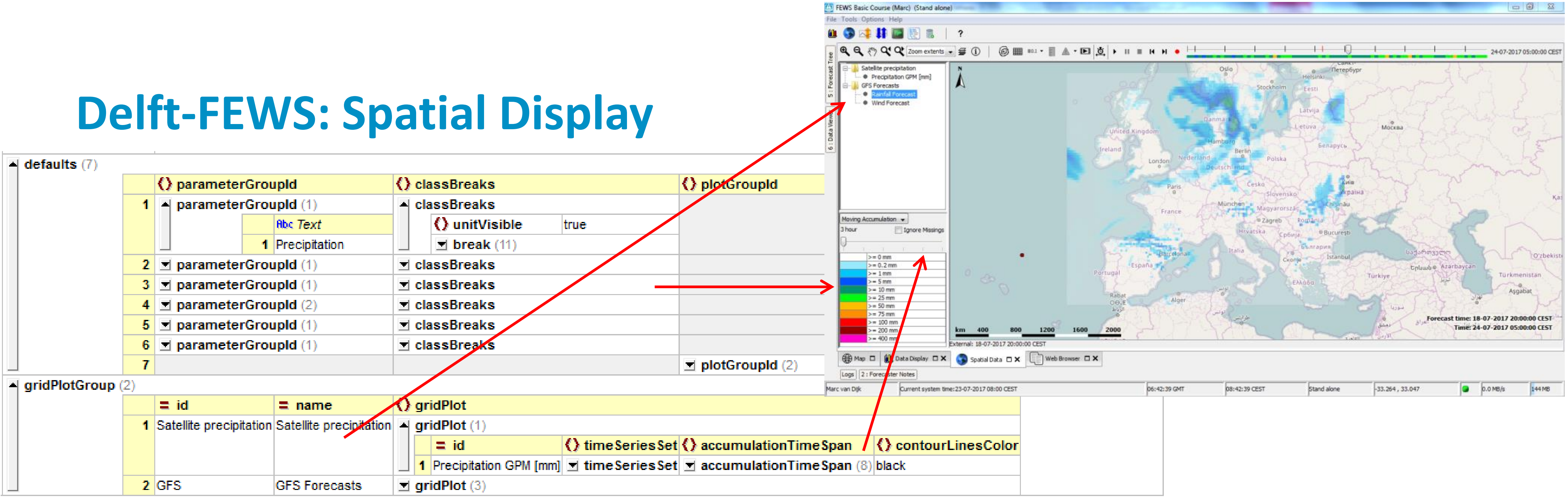
Delft-FEWS: Spatial Display



defaults (7)

	parameterGroupId	classBreaks	plotGroupId
1	parameterGroupId (1) Text 1 Precipitation	classBreaks unitVisible true break (11)	
2	parameterGroupId (1)	classBreaks	
3	parameterGroupId (1)	classBreaks	
4	parameterGroupId (2)	classBreaks	
5	parameterGroupId (1)	classBreaks	
6	parameterGroupId (1)	classBreaks	
7			plotGroupId (2)

gridPlotGroup (2)

	id	name	gridPlot
1	Satellite precipitation	Satellite precipitation	gridPlot (1)
2	GFS	GFS Forecasts	gridPlot (3)

gridPlot (1)

	id	timeSeriesSet	accumulationTimeSpan	contourLinesColor
1	Precipitation GPM [mm]	timeSeriesSet	accumulationTimeSpan (8)	black

- defaults
  - Class Breaks (legend)
  - Map layers
- gridPlotGroup
  - Folder structure
  - Time Series Sets

Exercise 9: Spatial Display

- See Exercises.ppt

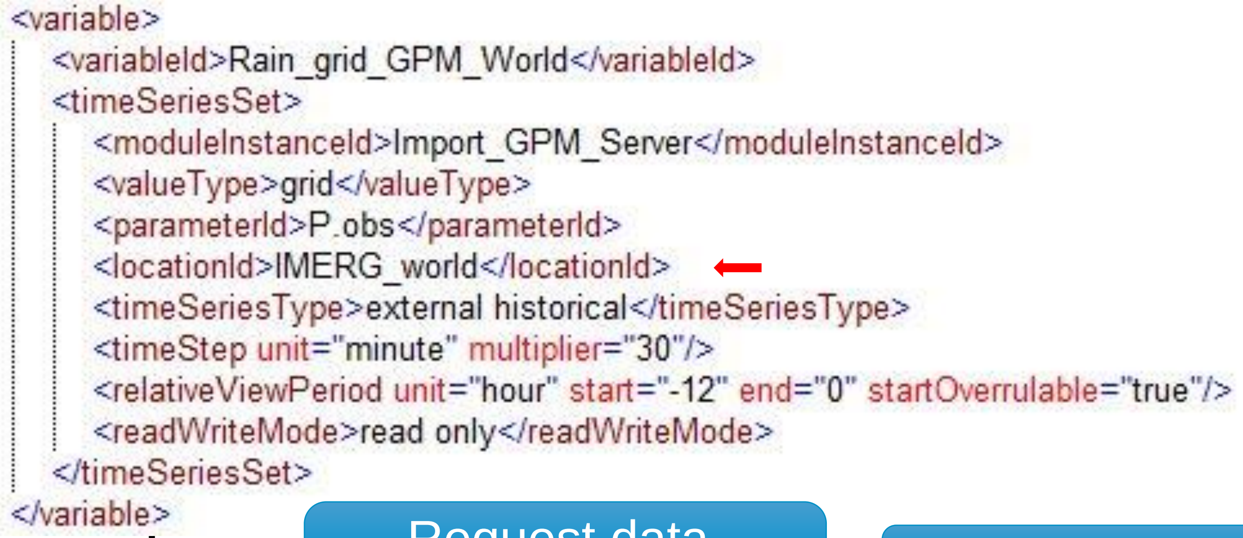
Module 8
Data Processing

Data Processing: Transformation Module

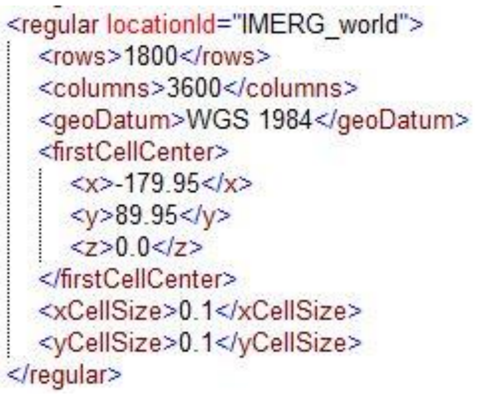
- Data transformation module: workhorse of Delft-FEWS
- Input and outputs are always time series
- One configuration file can define multiple transformations
- Processing can be made conditional based on e.g.:
  - Value range
  - Date (before, in-between, after)
- There are many predefined transformation modules (for example)

- Accumulation: sum,...
- Aggregation: accumulative, ...
- Disaggregation : accumulative, ...
- DischargeStage/ StageDischarge: table, ...
- InterpolationSerial: block, default, extrapolate, linear
- Interpolation Spatial: closest Distance,
- Lookup: 2D, ...
- Merge: select Location, ..
- Profile: timeseries,...
- Sample: equidistant, nonequidistant, ...
- Statistics: max, mean,
- User-defined: simple expression

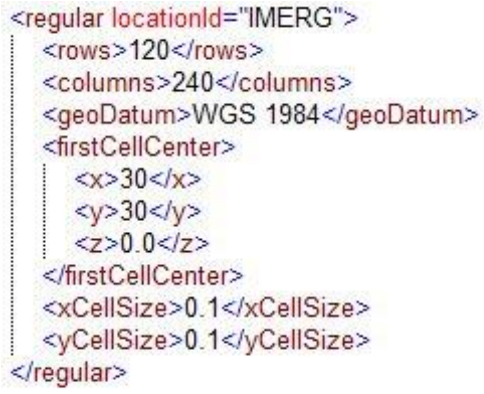
Transformation – Input/Output



```
<variable>
    <variableId>Rain_grid_GPM_World</variableId>
    <timeSeriesSet>
        <moduleInstanceId>Import_GPM_Server</moduleInstanceId>
        <valueType>grid</valueType>
        <parameterId>P.obs</parameterId>
        <locationId>IMERG_world</locationId>
        <timeSeriesType>external historical</timeSeriesType>
        <timeStep unit="minute" multiplier="30"/>
        <relativeViewPeriod unit="hour" start="-12" end="0" startOverrulable="true"/>
        <readWriteMode>read only</readWriteMode>
    </timeSeriesSet>
</variable>
```



```
<regular locationId="IMERG_world">
    <rows>1800</rows>
    <columns>3600</columns>
    <geoDatum>WGS 1984</geoDatum>
    <firstCellCenter>
        <x>-179.95</x>
        <y>89.95</y>
        <z>0.0</z>
    </firstCellCenter>
    <xCellSize>0.1</xCellSize>
    <yCellSize>0.1</yCellSize>
</regular>
```

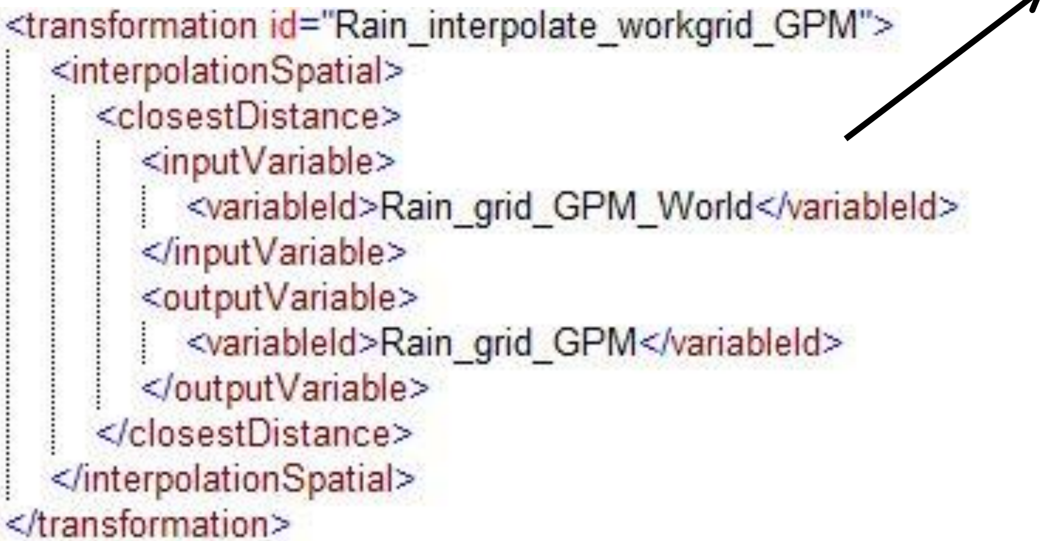


```
<regular locationId="IMERG">
    <rows>120</rows>
    <columns>240</columns>
    <geoDatum>WGS 1984</geoDatum>
    <firstCellCenter>
        <x>30</x>
        <y>30</y>
        <z>0.0</z>
    </firstCellCenter>
    <xCellSize>0.1</xCellSize>
    <yCellSize>0.1</yCellSize>
</regular>
```

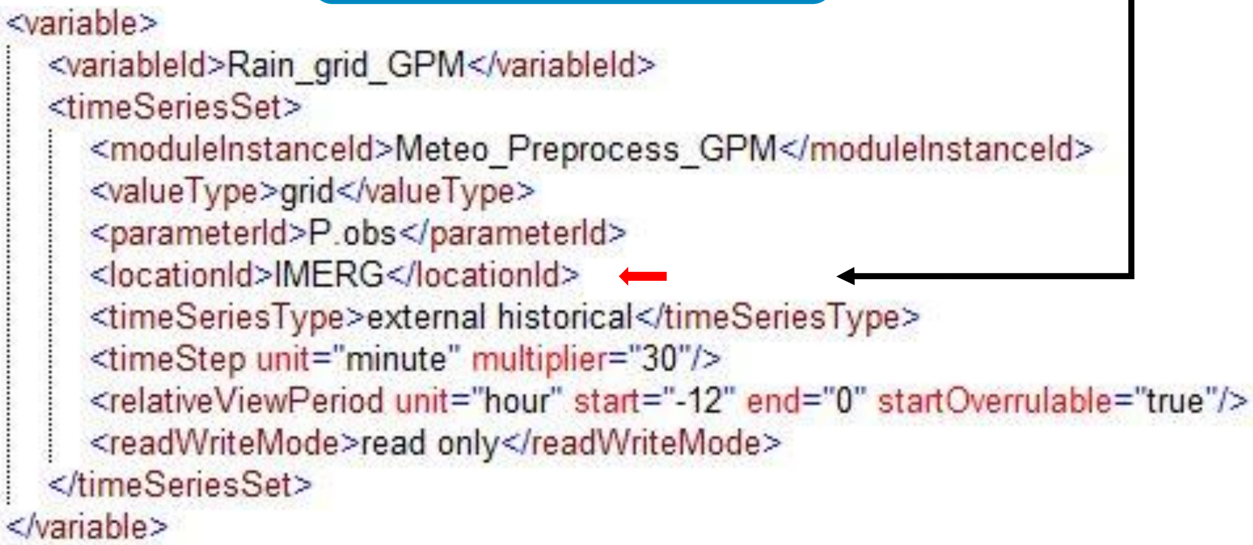
Request data from datastore

Do something…

Write data to datastore



```
<transformation id="Rain_interpolate_workgrid_GPM">
    <interpolationSpatial>
        <closestDistance>
            <inputVariable>
                <variableId>Rain_grid_GPM_World</variableId>
            </inputVariable>
            <outputVariable>
                <variableId>Rain_grid_GPM</variableId>
            </outputVariable>
        </closestDistance>
    </interpolationSpatial>
</transformation>
```



```
<variable>
    <variableId>Rain_grid_GPM</variableId>
    <timeSeriesSet>
        <moduleInstanceId>Meteo_Preprocess_GPM</moduleInstanceId>
        <valueType>grid</valueType>
        <parameterId>P.obs</parameterId>
        <locationId>IMERG</locationId>
        <timeSeriesType>external historical</timeSeriesType>
        <timeStep unit="minute" multiplier="30"/>
        <relativeViewPeriod unit="hour" start="-12" end="0" startOverrulable="true"/>
        <readWriteMode>read only</readWriteMode>
    </timeSeriesSet>
</variable>
```

Typical Transformation Module Instance

- “User” transformation with a user-defined function

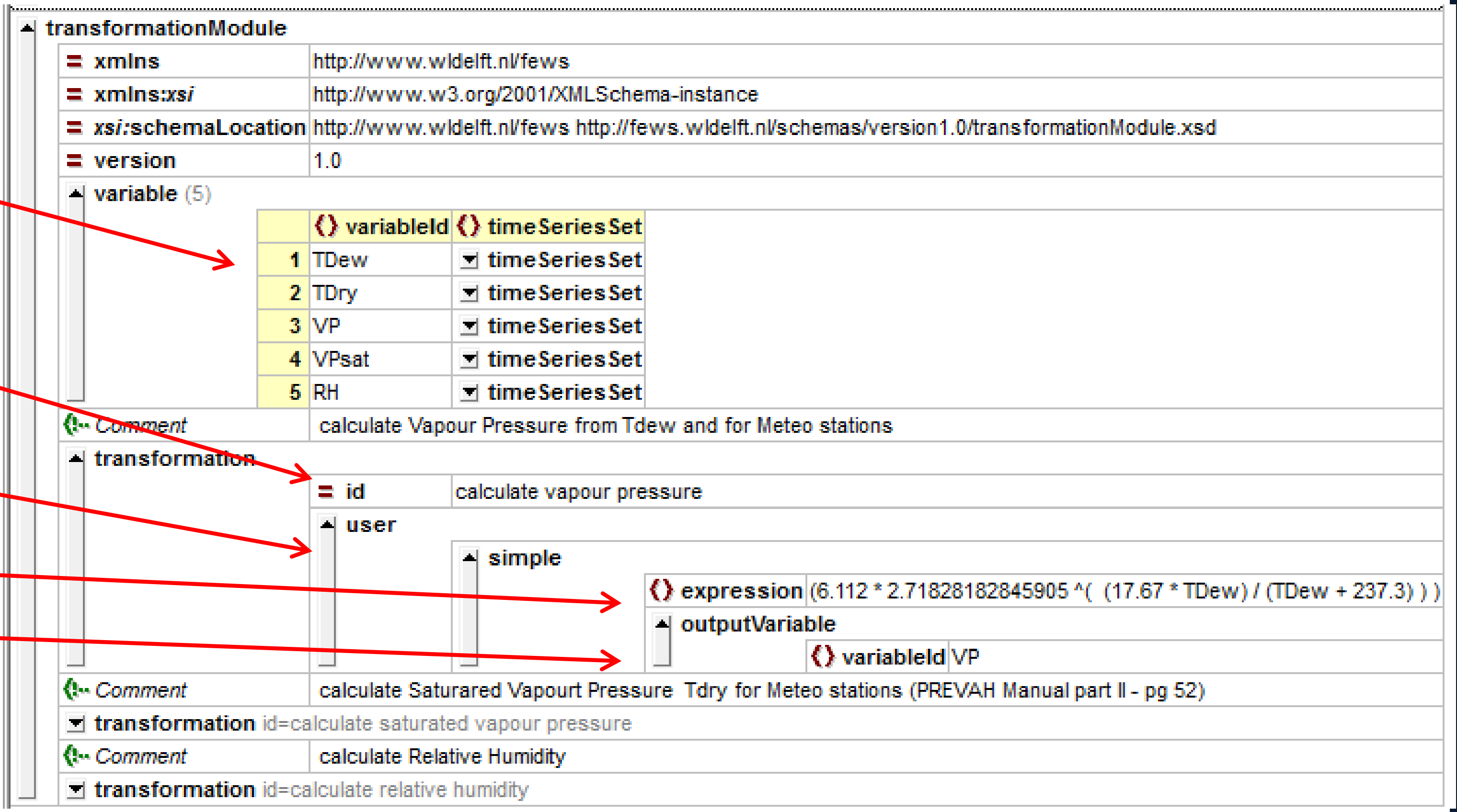
- Variables (timeSeriesSets)

- Transformation Id

- Function Type

- expression

- outputVariable



```
transformationModule
    = 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/transformationModule.xsd
    = version              1.0
    variable (5)
                    () variableId   () timeSeriesSet
                1   TDew            timeSeriesSet
                2   TDry            timeSeriesSet
                3   VP              timeSeriesSet
                4   VPsat           timeSeriesSet
                5   RH              timeSeriesSet
    Comment                calculate Vapour Pressure from Tdew and for Meteo stations
    transformation
            = id           calculate vapour pressure
            user
                    simple
                            () expression   (6.112 * 2.71828182845905 ^(  (17.67 * TDew) / (TDew + 237.3) ) )
                            outputVariable
                                    () variableId VP
    Comment                calculate Saturared Vapourt Pressure  Tdry for Meteo stations (PREVAH Manual part II - pg 52)
    transformation id=calculate saturated vapour pressure
    Comment                calculate Relative Humidity
    transformation id=calculate relative humidity
```

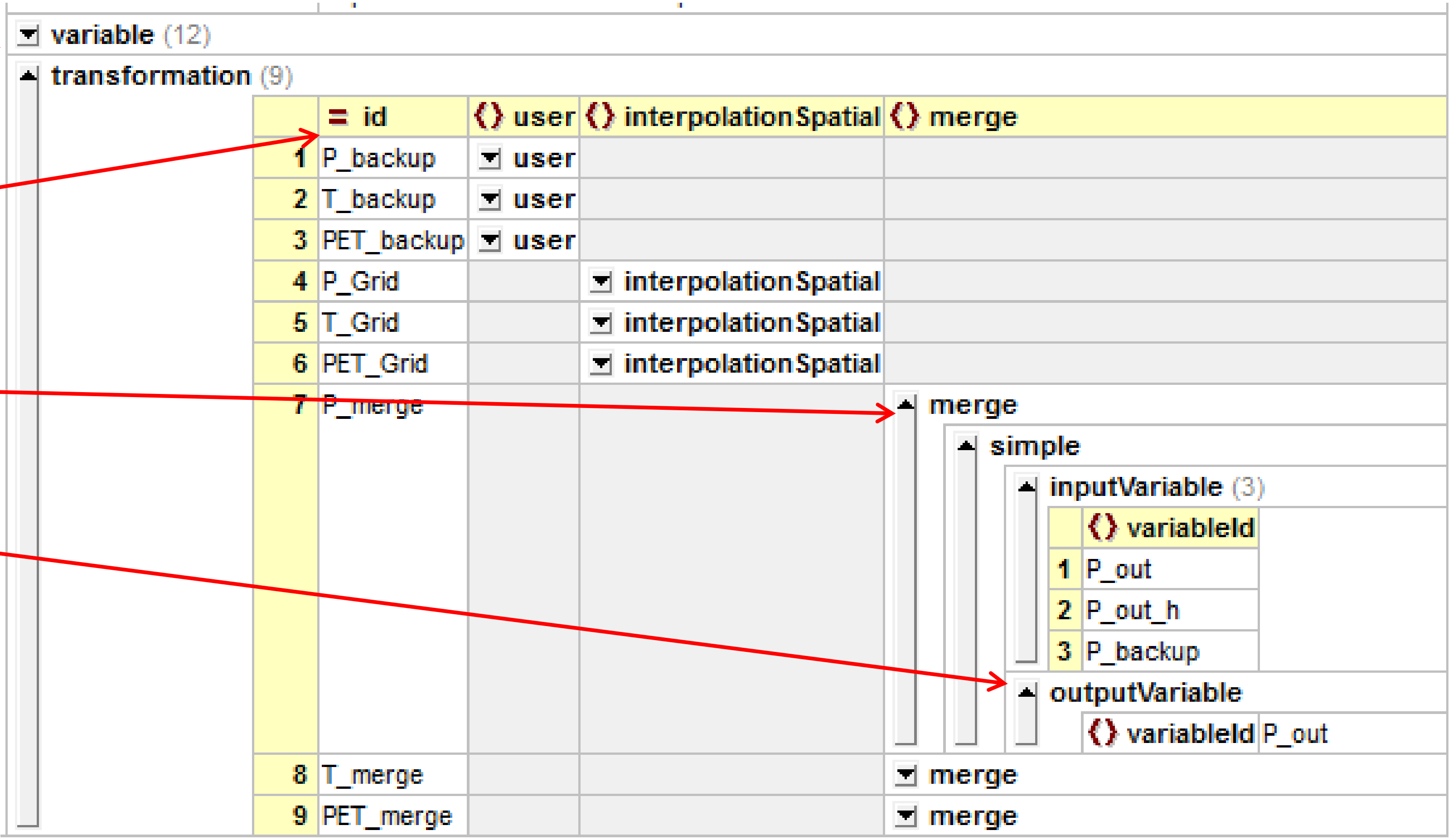
- One transformation module instance can contain multiple functions

Deltares

Typical Transformation Module Instance

Pre-defined functions (e.g. Merge or Data Hierarchy)

- Variables (timeSeriesSets)
- Transformation Id
- Function Type
- outputVariable



variable (12)

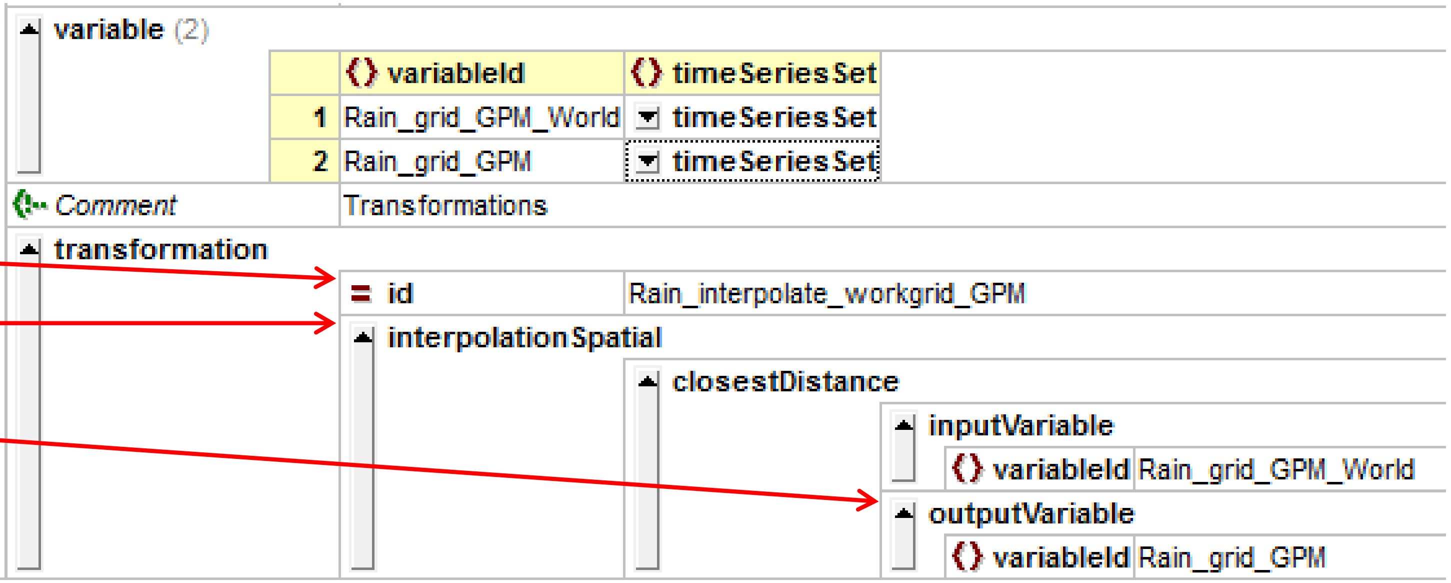
transformation (9)

	= id	{} user	{} interpolationSpatial	{} merge
1	P_backup	user		
2	T_backup	user		
3	PET_backup	user		
4	P_Grid		interpolationSpatial	
5	T_Grid		interpolationSpatial	
6	PET_Grid		interpolationSpatial	
7	P_merge			merge simple inputVariable (3) {} variableId 1 P_out 2 P_out_h 3 P_backup outputVariable {} variableId P_out
8	T_merge			merge
9	PET_merge			merge

Typical Transformation Module Instance

Spatial Interpolations

- Variables (timeSeriesSets)
- Transformation Id
- Function Type
- outputVariable



variable (2)

	variableId	timeSeriesSet
1	Rain_grid_GPM_World	timeSeriesSet
2	Rain_grid_GPM	timeSeriesSet

Comment: Transformations

transformation
- id: Rain_interpolate_workgrid_GPM
- interpolationSpatial
  - closestDistance
    - inputVariable
      - variableId: Rain_grid_GPM_World
    - outputVariable
      - variableId: Rain_grid_GPM

Other Spatial Interpolation functions:

- Bilinear Interpolation
- Containing Polygon
- Inverse Distance
- Kriging
- Thiessen

Functions can be used for interpolations of

- Points to Grid and Point to Polygon
- Grid to Grid and Grid to Polygon
- Point to Longitudinal Profile
- Longitudinal Profile to Longitudinal Profile

Exercise 10: Spatial Interpolation

- Add spatial interpolation of new NOAA GFS parameter (in Exercise 7) to scalar time series.

Appendixes

- Appendix 1: More on Displays
- Appendix 2: More on Workflows
- Appendix 3: Miscellaneous

Appendix 1
More on Displays

More Display configuration in Delft FEWS

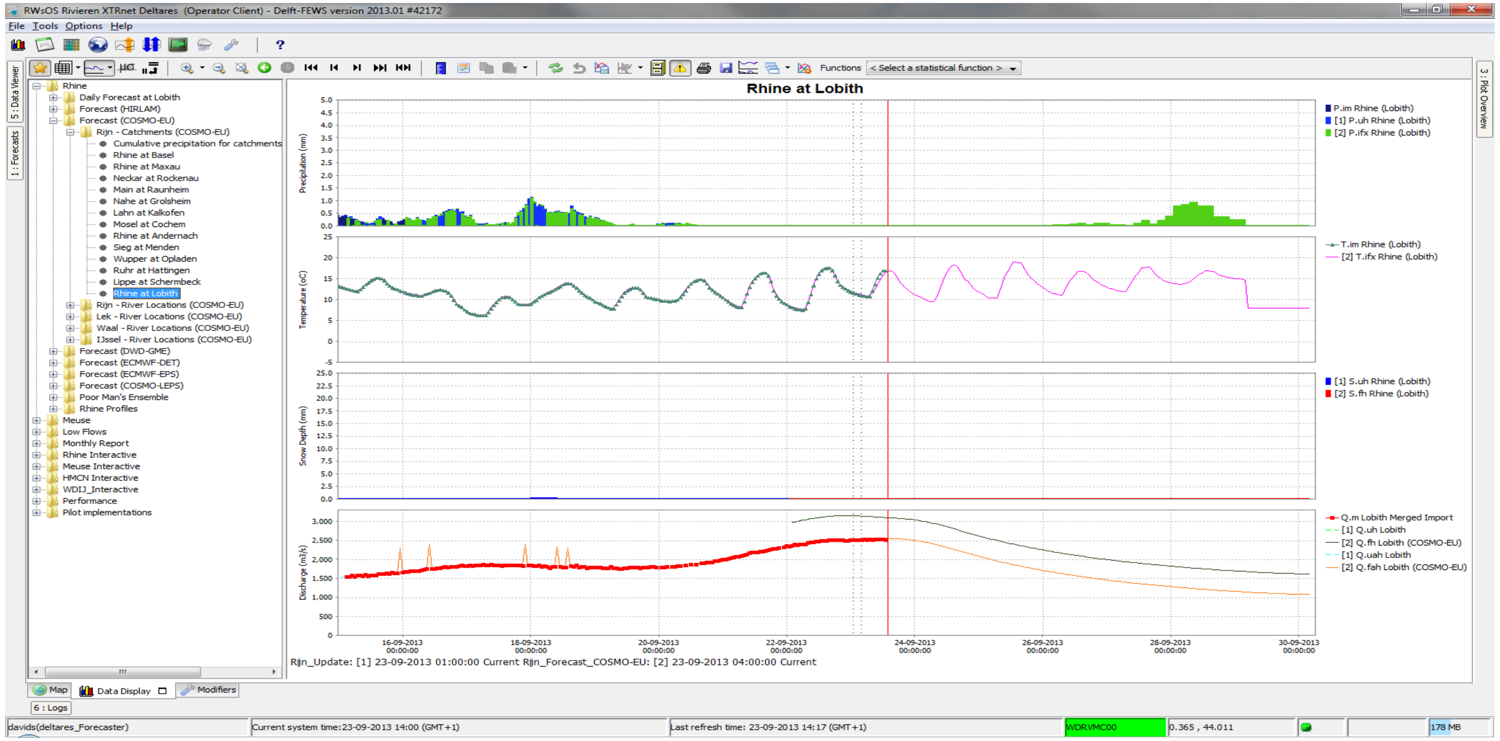
There are many more displays and display configuration files in Delft-FEWS. The following slides give a short overview.

- Time Series Display (\SystemConfigFiles\TimeSeriesDisplayConfig.xml)
  - Longitudinal profiles
  - Statistics
- Schematic Status Display
- Data Viewer (\RegionConfigFiles\Filters.xml)
- Forecast Tree (\RegionConfigFiles\Topology.xml)

Delft-FEWS: Time Series Display

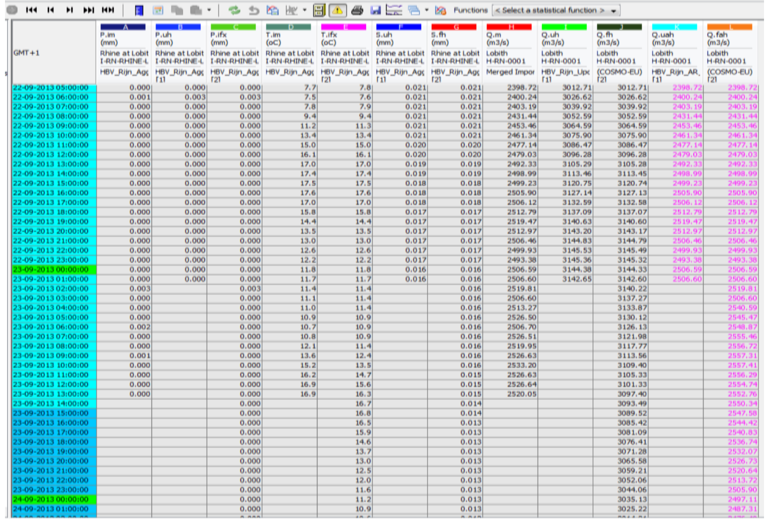
Time Series Display is used to show data in a graph and in a table

- Editing and viewing data
- Pre-configured displays
- Thresholds
- Historic Events



Rijn_Update: [1] 23-09-2013 01:00:00 Current Rijn_Forecast_COSMO-EU: [2] 23-09-2013 04:00:00 Current

davids(deltares_Forecaster) | Current system time:23-09-2013 14:00 (GMT+1) | Last refresh time: 23-09-2013 14:17 (GMT+1) | WDRVMC00 | 0.365 , 44.011 | 178 MB



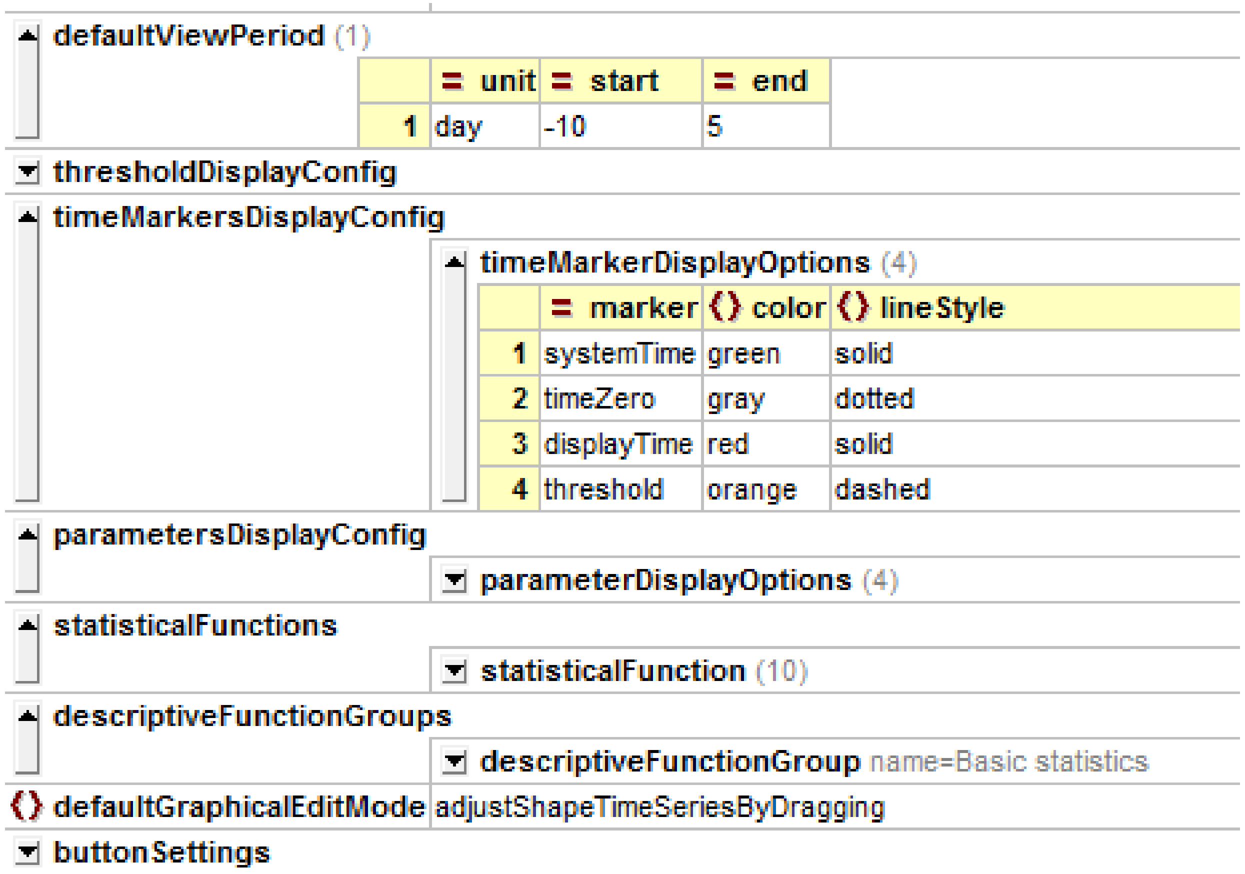
GMT+1	A	B	C	D	E	F	G	H	I	J	K	L
	P.im (mm)	P.uh (mm)	P.ifx (mm)	T.im (oC)	T.ifx (oC)	S.uh (mm)	S.fh (mm)	Q.m (m3/s)	Q.uh (m3/s)	Q.fh (m3/s)	Q.uah (m3/s)	Q.fah (m3/s)
	Rhine at Lobit I-RN-RHINE-L	Rhine at Lobit I-RN-RHINE-L	Rhine at Lobit I-RN-RHINE-L	Rhine at Lobit I-RN-RHINE-L	Rhine at Lobit I-RN-RHINE-L	Rhine at Lobit I-RN-RHINE-L	Rhine at Lobit I-RN-RHINE-L	Lobith H-RN-0001	Lobith H-RN-0001	Lobith H-RN-0001	Lobith H-RN-0001	Lobith H-RN-0001
	HBV_Rijn_Agg	HBV_Rijn_Agg [1]	HBV_Rijn_Agg [2]	HBV_Rijn_Agg	HBV_Rijn_Agg [2]	HBV_Rijn_Agg [1]	HBV_Rijn_Agg [2]	Merged Impor	HBV_Rijn_Upc [1]	(COSMO-EU) [2]	HBV_Rijn_AR_ [1]	(COSMO-EU) [2]
22-09-2013 05:00:00	0.000	0.000	0.000	7.7	7.8	0.021	0.021	2398.72	3012.71	3012.71	2398.72	2398.72
22-09-2013 06:00:00	0.001	0.003	0.003	7.5	7.6	0.021	0.021	2400.24	3026.62	3026.62	2400.24	2400.24
22-09-2013 07:00:00	0.000	0.000	0.000	7.8	7.9	0.021	0.021	2403.19	3039.92	3039.92	2403.19	2403.19
22-09-2013 08:00:00	0.000	0.000	0.000	9.4	9.4	0.021	0.021	2431.44	3052.59	3052.59	2431.44	2431.44
22-09-2013 09:00:00	0.000	0.000	0.000	11.2	11.3	0.021	0.021	2453.46	3064.59	3064.59	2453.46	2453.46
22-09-2013 10:00:00	0.000	0.000	0.000	13.4	13.4	0.021	0.021	2461.34	3075.90	3075.90	2461.34	2461.34
22-09-2013 11:00:00	0.000	0.000	0.000	15.0	15.0	0.020	0.020	2477.14	3086.47	3086.47	2477.14	2477.14
22-09-2013 12:00:00	0.000	0.000	0.000	16.1	16.1	0.020	0.020	2479.03	3096.28	3096.28	2479.03	2479.03
22-09-2013 13:00:00	0.000	0.000	0.000	17.0	17.0	0.019	0.019	2492.33	3105.29	3105.28	2492.33	2492.33
22-09-2013 14:00:00	0.000	0.000	0.000	17.4	17.4	0.019	0.019	2498.99	3113.46	3113.45	2498.99	2498.99
22-09-2013 15:00:00	0.000	0.000	0.000	17.5	17.5	0.018	0.018	2499.23	3120.75	3120.74	2499.23	2499.23
22-09-2013 16:00:00	0.000	0.000	0.000	17.6	17.6	0.018	0.018	2505.90	3127.14	3127.13	2505.90	2505.90
22-09-2013 17:00:00	0.000	0.000	0.000	17.0	17.0	0.018	0.018	2506.12	3132.59	3132.58	2506.12	2506.12
22-09-2013 18:00:00	0.000	0.000	0.000	15.8	15.8	0.017	0.017	2512.79	3137.09	3137.07	2512.79	2512.79
22-09-2013 19:00:00	0.000	0.000	0.000	14.4	14.4	0.017	0.017	2519.47	3140.63	3140.60	2519.47	2519.47
22-09-2013 20:00:00	0.000	0.000	0.000	13.5	13.5	0.017	0.017	2512.97	3143.20	3143.17	2512.97	2512.97
22-09-2013 21:00:00	0.000	0.000	0.000	13.0	13.0	0.017	0.017	2506.46	3144.83	3144.79	2506.46	2506.46
22-09-2013 22:00:00	0.000	0.000	0.000	12.6	12.6	0.017	0.017	2499.93	3145.53	3145.49	2499.93	2499.93
22-09-2013 23:00:00	0.000	0.000	0.000	12.2	12.2	0.017	0.017	2493.38	3145.36	3145.32	2493.38	2493.38
23-09-2013 00:00:00	0.000	0.000	0.000	11.8	11.8	0.016	0.016	2506.59	3144.38	3144.33	2506.59	2506.59
23-09-2013 01:00:00	0.000	0.000	0.000	11.7	11.7	0.016	0.016	2506.60	3142.65	3142.60	2506.60	2506.60
23-09-2013 02:00:00	0.003		0.003	11.4	11.4		0.016	2519.81		3140.22		2519.81
23-09-2013 03:00:00	0.000		0.000	11.1	11.4		0.016	2506.60		3137.27		2506.60
23-09-2013 04:00:00	0.000		0.000	11.0	11.4		0.016	2513.27		3133.87		2540.59
23-09-2013 05:00:00	0.000		0.000	10.9	10.9		0.016	2526.50		3130.12		2545.47
23-09-2013 06:00:00	0.002		0.000	10.7	10.9		0.016	2506.70		3126.13		2548.87
23-09-2013 07:00:00	0.000		0.000	10.8	10.9		0.016	2526.51		3121.98		2555.46
23-09-2013 08:00:00	0.000		0.000	12.1	11.4		0.016	2519.95		3117.77		2556.72
23-09-2013 09:00:00	0.001		0.000	13.6	12.4		0.016	2526.63		3113.56		2557.31
23-09-2013 10:00:00	0.000		0.000	15.2	13.5		0.016	2533.20		3109.40		2557.41
23-09-2013 11:00:00	0.000		0.000	16.2	14.7		0.015	2526.63		3105.33		2556.29
23-09-2013 12:00:00	0.000		0.000	16.9	15.6		0.015	2526.64		3101.33		2554.74
23-09-2013 13:00:00	0.000		0.000	16.9	16.3		0.015	2520.05		3097.40		2552.76
23-09-2013 14:00:00			0.000		16.7		0.014			3093.49		2550.34
23-09-2013 15:00:00			0.000		16.8		0.014			3089.52		2547.58
23-09-2013 16:00:00			0.000		16.5		0.013			3085.42		2544.42
23-09-2013 17:00:00			0.000		15.9		0.013			3081.09		2540.83
23-09-2013 18:00:00			0.000		14.6		0.013			3076.41		2536.74
23-09-2013 19:00:00			0.000		13.7		0.013			3071.28		2532.07
23-09-2013 20:00:00			0.000		13.0		0.013			3065.58		2526.73
23-09-2013 21:00:00			0.000		12.5		0.013			3059.21		2520.64
23-09-2013 22:00:00			0.000		12.0		0.013			3052.06		2513.72
23-09-2013 23:00:00			0.000		11.6		0.013			3044.06		2505.90
24-09-2013 00:00:00			0.000		11.2		0.013			3035.13		2497.11
24-09-2013 01:00:00			0.000		10.9		0.013			3025.22		2487.31

Deltares

Delft-FEWS: Time Series Display

Elements of the Time Series Display

- Default View Period
- Thresholds display properties
- Colour of time markers
- Time Series properties (parameters)
- Statistical functions to show
- Buttons in Tools (enable/disable)



defaultViewPeriod (1)

	unit	start	end
1	day	-10	5

thresholdDisplayConfig

timeMarkersDisplayConfig

timeMarkerDisplayOptions (4)

	marker	color	lineStyle
1	systemTime	green	solid
2	timeZero	gray	dotted
3	displayTime	red	solid
4	threshold	orange	dashed

parametersDisplayConfig

parameterDisplayOptions (4)

statisticalFunctions

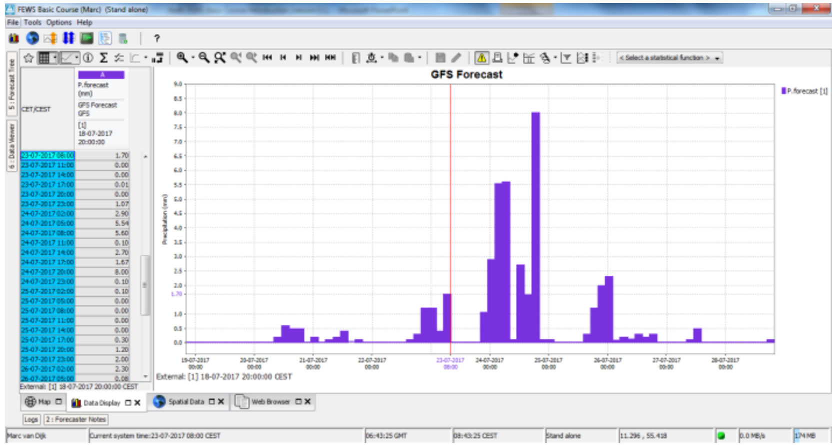
statisticalFunction (10)

descriptiveFunctionGroups

descriptiveFunctionGroup name=Basic statistics

defaultGraphicalEditMode adjustShapeTimeSeriesByDragging

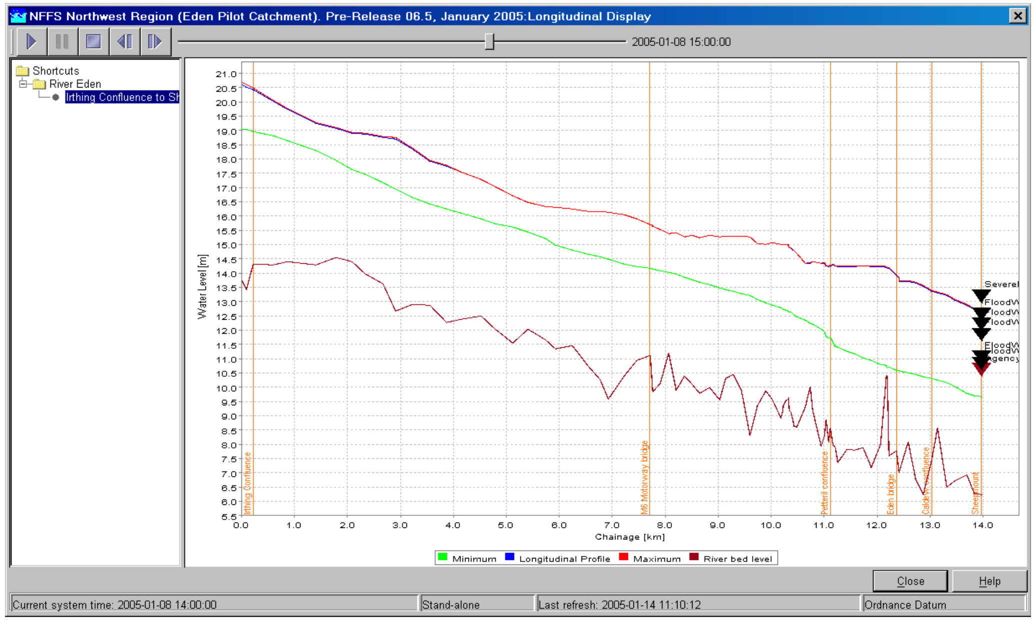
buttonSettings



Delft-FEWS: Time Series Display

Time series display can also show longitudinal profiles; most often used in combination with hydrodynamic models of rivers

- Profile time series are one dimensional time series
- A location is required in the locations XML file
- A Branch configuration contains the nodes on a river section



NFFS Northwest Region (Eden Pilot Catchment). Pre-Release 06.5, January 2005:Longitudinal Display

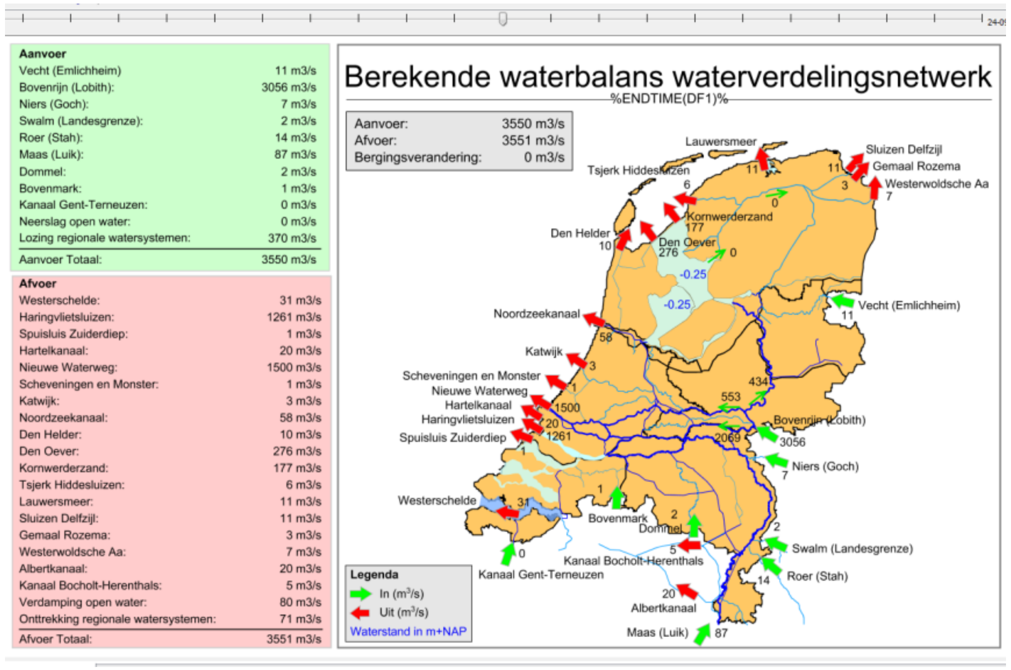
2005-01-08 15:00:00

Current system time: 2005-01-08 14:00:00 | Stand-alone | Last refresh: 2005-01-14 11:10:12 | Ordnance Datum

Deltares

Delft-FEWS: Schematic Status Display

- Special Schematic displays can be made in combination with time series
- Colours and shapes can change dynamically, based on time series values



Aanvoer	
Vecht (Emlichheim)	11 m3/s
Bovenrijn (Lobith):	3056 m3/s
Niers (Goch):	7 m3/s
Swalm (Landesgrenze):	2 m3/s
Roer (Stah):	14 m3/s
Maas (Luik):	87 m3/s
Dommel:	2 m3/s
Bovenmark:	1 m3/s
Kanaal Gent-Terneuzen:	0 m3/s
Neerslag open water:	0 m3/s
Lozing regionale watersystemen:	370 m3/s
Aanvoer Totaal:	3550 m3/s

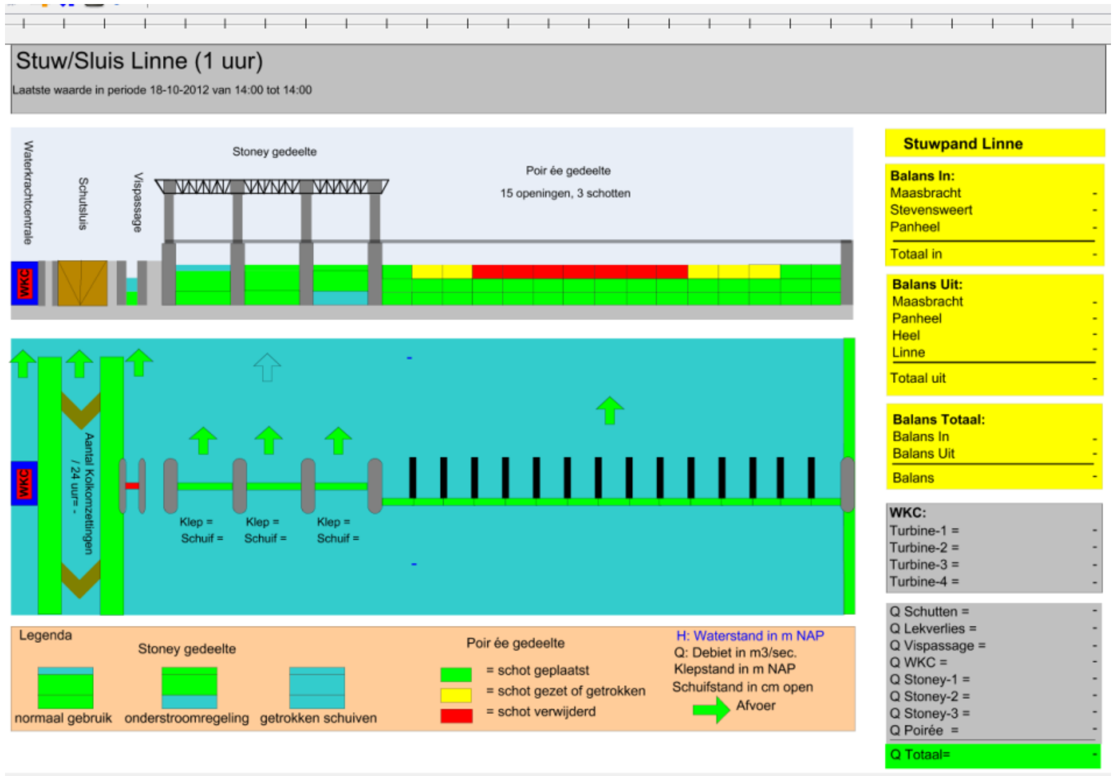
Afvoer	
Westerschelde:	31 m3/s
Haringvlietsluizen:	1261 m3/s
Spuisluis Zuiderdiep:	1 m3/s
Hartelkanaal:	20 m3/s
Nieuwe Waterweg:	1500 m3/s
Scheveningen en Monster:	1 m3/s
Katwijk:	3 m3/s
Noordzeekanaal:	58 m3/s
Den Helder:	10 m3/s
Den Oever:	276 m3/s
Kornwerderzand:	177 m3/s
Tjerk Hiddesluizen:	6 m3/s
Lauwersmeer:	11 m3/s
Sluizen Delfzijl:	11 m3/s
Gemaal Rozema:	3 m3/s
Westerwoldsche Aa:	7 m3/s
Albertkanaal:	20 m3/s
Kanaal Bocholt-Herenthals:	5 m3/s
Verdamping open water:	80 m3/s
Onttrekking regionale watersystemen:	71 m3/s
Afvoer Totaal:	3551 m3/s

Berekende waterbalans waterverdelingsnetwerk

%ENDTIME(DF1)%

Aanvoer:	3550 m3/s
Afvoer:	3551 m3/s
Bergingsverandering:	0 m3/s

Legenda
- In (m^3/s)
- Uit (m^3/s)
- Waterstand in m+NAP



Stuw/Sluis Linne (1 uur)

Laatste waarde in periode 18-10-2012 van 14:00 tot 14:00

Legenda

Stoney gedeelte
- normaal gebruik
- onderstroomregeling
- getrokken schuiven

Poir ée gedeelte
- 🟩 = schot geplaatst
- 🟨 = schot gezet of getrokken
- 🟥 = schot verwijderd

H: Waterstand in m NAP
Q: Debiet in m3/sec.
Klepstand in m NAP
Schuifstand in cm open
Afvoer

Stuwpand Linne

Balans In:	
Maasbracht	-
Stevensweert	-
Panheel	-
Totaal in	-

Balans Uit:	
Maasbracht	-
Panheel	-
Heel	-
Linne	-
Totaal uit	-

Balans Totaal:	
Balans In	-
Balans Uit	-
Balans	-

WKC:	
Turbine-1 =	-
Turbine-2 =	-
Turbine-3 =	-
Turbine-4 =	-

Q Schutten =	-
Q Lekverlies =	-
Q Vispassage =	-
Q WKC =	-
Q Stoney-1 =	-
Q Stoney-2 =	-
Q Stoney-3 =	-
Q Poirée =	-
Q Totaal=	-

Appendix 2
More on Workflows

Delft-FEWS: More on Workflows

- Manual run
- Initiated from an Operator Client (selected & run by an active user)

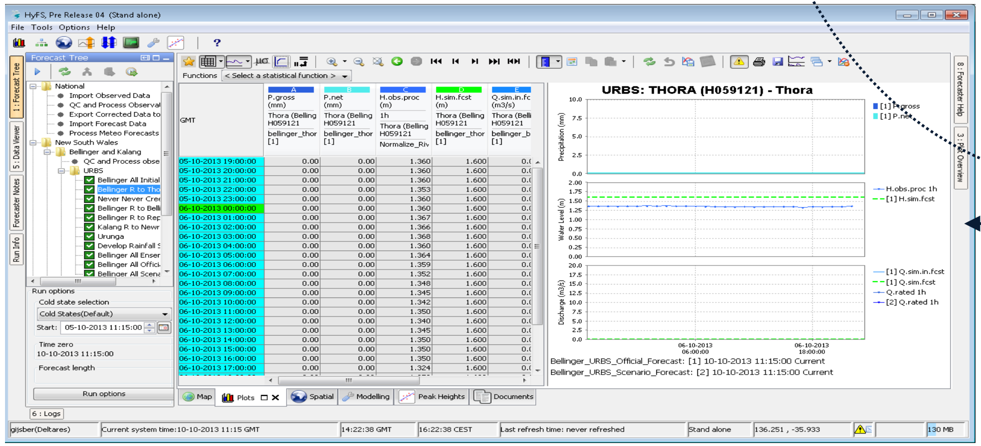
- Scheduled run
- Initiated from the Administrator Interface (Master Controller)
- Scheduled to run based on a regular interval

- Triggered run
- Initiated from the Administrator Interface (Master Controller)
- Triggered to run based on an ‘event’ (Event Log Message)
  - Existing run to change in frequency (e.g. more often)
  - Suspended run to run one-off.

Delft-FEWS: More on Workflows

- Workflow - Logical sequence of module instances
- Module instance – Configured module
- Task run - Actual execution of a workflow

- Time series connect the dataflow between the module instances



- National
  - Import Observed Data
  - QC and Process Observal
  - Export Corrected Data to
  - Import Forecast Data
  - Process Meteo Forecasts
- New South Wales
  - Bellinger and Kalang
    - QC and Process obse
    - URBS
      - ☑ Bellinger All Initial
      - ☑ Bellinger R to Tho
      - ☑ Never Never Cree
      - ☑ Bellinger R to Belli
      - ☑ Bellinger R to Rep
      - ☑ Kalang R to Newr
      - ☑ Urunga
      - ☑ Develop Rainfall S
      - ☑ Bellinger All Enser
      - ☑ Bellinger All Offici
      - ☑ Bellinger All Scena

Run options

Cold state selection

Cold States(Default)

Start: 05-10-2013 11:15:00

Time zero
10-10-2013 11:15:00

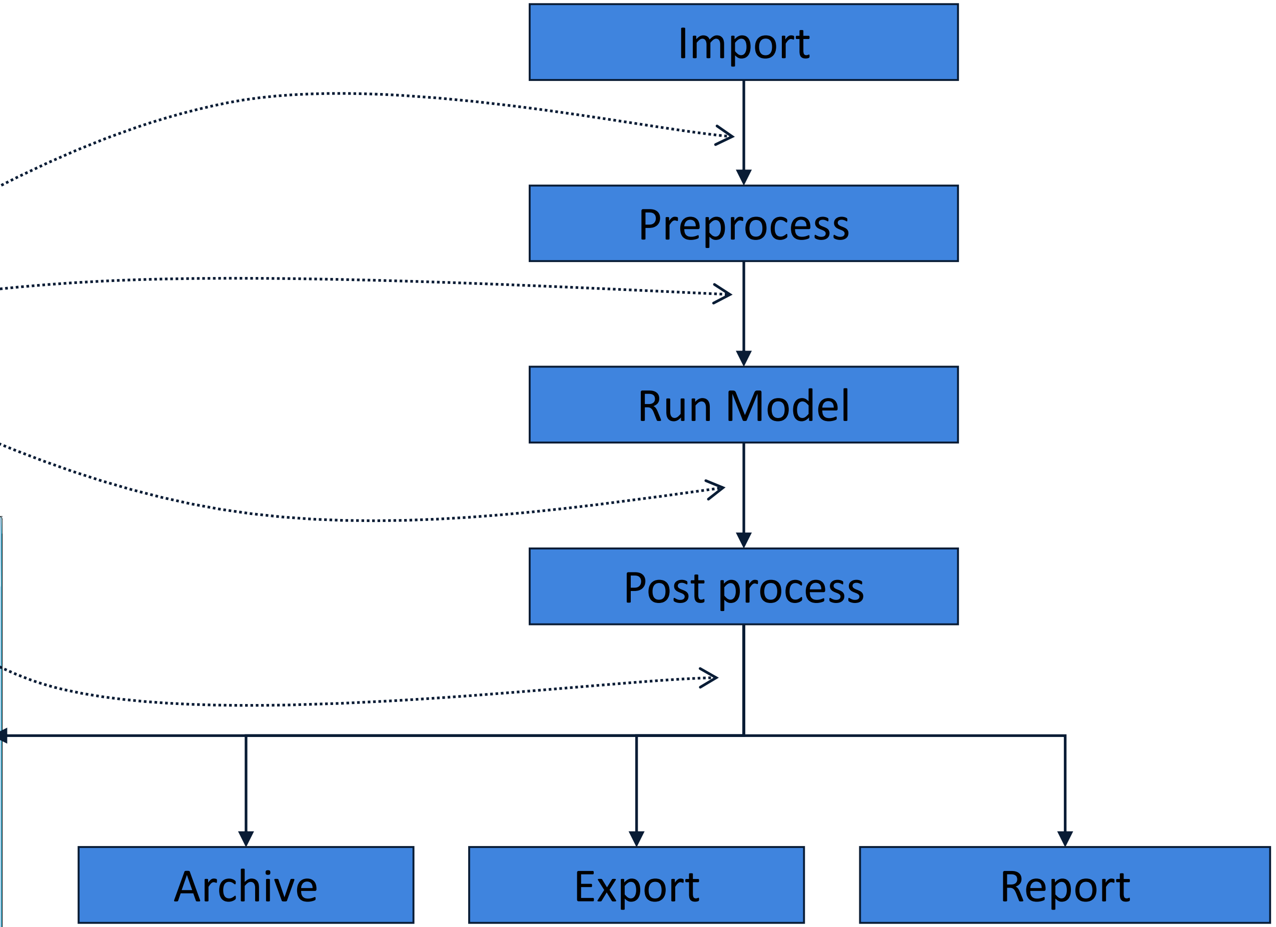
Forecast length

Run options

GMT	A P.gross (mm) Thora (Belling H059121 bellinger_thor [1]	B P.net (mm) Thora (Belling H059121 bellinger_thor [1]	C H.obs.proc (m) 1h Thora (Belling H059121 Normalize_Riv	D H.sim.fcst (m) Thora (Belling H059121 bellinger_thor [1]	E Q.sim.in.fc (m3/s) Thora (Belli H059121 bellinger_b [1]
05-10-2013 19:00:00	0.00	0.00	1.360	1.600	0.0
05-10-2013 20:00:00	0.00	0.00	1.360	1.600	0.0
05-10-2013 21:00:00	0.00	0.00	1.360	1.600	0.0
05-10-2013 22:00:00	0.00	0.00	1.353	1.600	0.0
05-10-2013 23:00:00	0.00	0.00	1.360	1.600	0.0
06-10-2013 00:00:00	0.00	0.00	1.360	1.600	0.0
06-10-2013 01:00:00	0.00	0.00	1.367	1.600	0.0
06-10-2013 02:00:00	0.00	0.00	1.366	1.600	0.0
06-10-2013 03:00:00	0.00	0.00	1.368	1.600	0.0
06-10-2013 04:00:00	0.00	0.00	1.360	1.600	0.0
06-10-2013 05:00:00	0.00	0.00	1.364	1.600	0.0
06-10-2013 06:00:00	0.00	0.00	1.359	1.600	0.0
06-10-2013 07:00:00	0.00	0.00	1.352	1.600	0.0
06-10-2013 08:00:00	0.00	0.00	1.348	1.600	0.0
06-10-2013 09:00:00	0.00	0.00	1.345	1.600	0.0
06-10-2013 10:00:00	0.00	0.00	1.342	1.600	0.0
06-10-2013 11:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 12:00:00	0.00	0.00	1.340	1.600	0.0
06-10-2013 13:00:00	0.00	0.00	1.345	1.600	0.0
06-10-2013 14:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 15:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 16:00:00	0.00	0.00	1.350	1.600	0.0
06-10-2013 17:00:00	0.00	0.00	1.324	1.600	0.0

Bellinger_URBS_Official_Forecast: [1] 10-10-2013 11:15:00 Current
Bellinger_URBS_Scenario_Forecast: [2] 10-10-2013 11:15:00 Current

gijsber(Deltares) | Current system time:10-10-2013 11:15 GMT | 14:22:38 GMT | 16:22:38 CEST | Last refresh time: never refreshed | Stand alone | 136.251 , -35.933 | 130 MB


Import

Preprocess

Run Model

Post process

Archive

Export

Report

Delft-FEWS: More on Workflows

Workflow Configuration

- Workflows are logical sequences of running forecast modules
- Workflows must be registered in the WorkflowDescriptors file

Sub-workflows

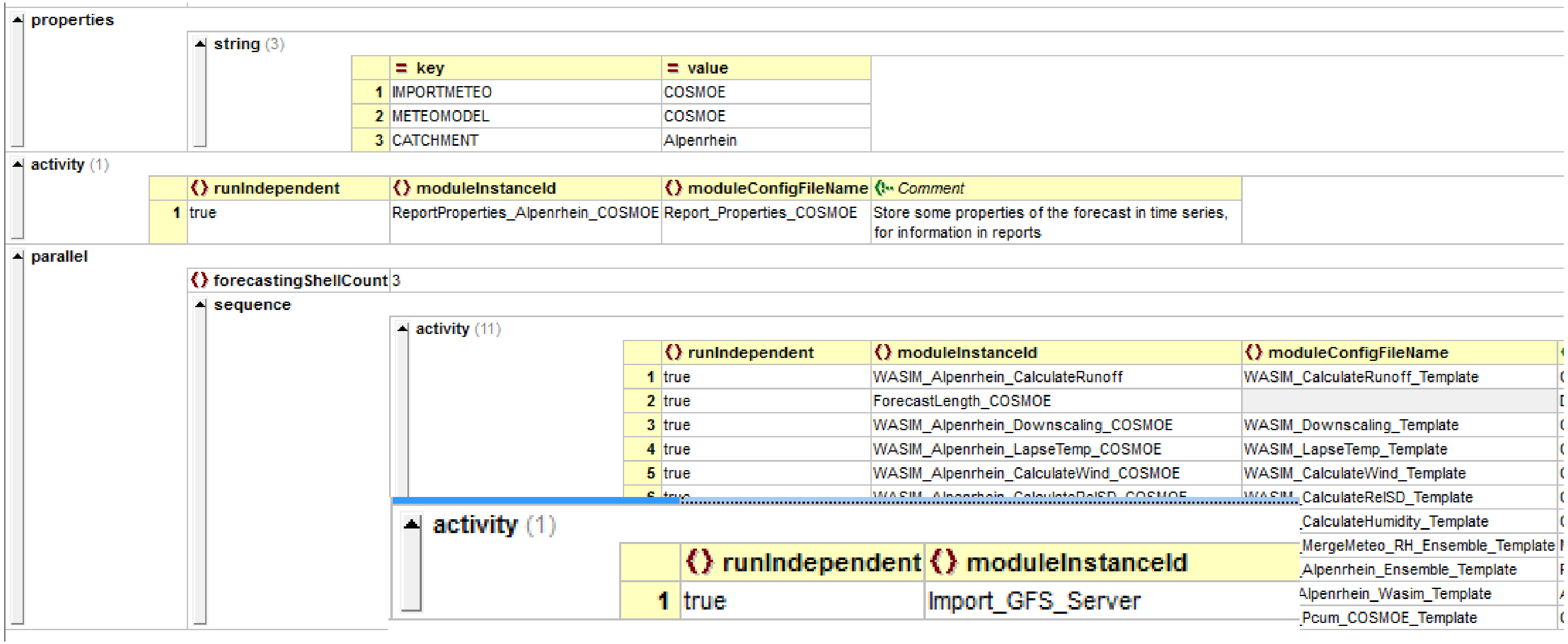
Module Instance ID

Run independent

Fall back activity

Ensemble

Parallel activity



properties

string (3)

	= key	= value
1	IMPORTMETEO	COSMOE
2	METEOMODEL	COSMOE
3	CATCHMENT	Alpenrhein

activity (1)

	() runIndependent	() moduleInstanceId	() moduleConfigFileName	Comment
1	true	ReportProperties_Alpenrhein_COSMOE	Report_Properties_COSMOE	Store some properties of the forecast in time series, for information in reports

parallel

() forecastingShellCount 3

sequence

activity (11)

	() runIndependent	() moduleInstanceId	() moduleConfigFileName
1	true	WASIM_Alpenrhein_CalculateRunoff	WASIM_CalculateRunoff_Template
2	true	ForecastLength_COSMOE	
3	true	WASIM_Alpenrhein_Downscaling_COSMOE	WASIM_Downscaling_Template
4	true	WASIM_Alpenrhein_LapseTemp_COSMOE	WASIM_LapseTemp_Template
5	true	WASIM_Alpenrhein_CalculateWind_COSMOE	WASIM_CalculateWind_Template
6	true	WASIM_Alpenrhein_CalculateRelSD_COSMOE	WASIM_CalculateRelSD_Template
			CalculateHumidity_Template
			MergeMeteo_RH_Ensemble_Template
			Alpenrhein_Ensemble_Template
			Alpenrhein_Wasim_Template
			Pcum_COSMOE_Template

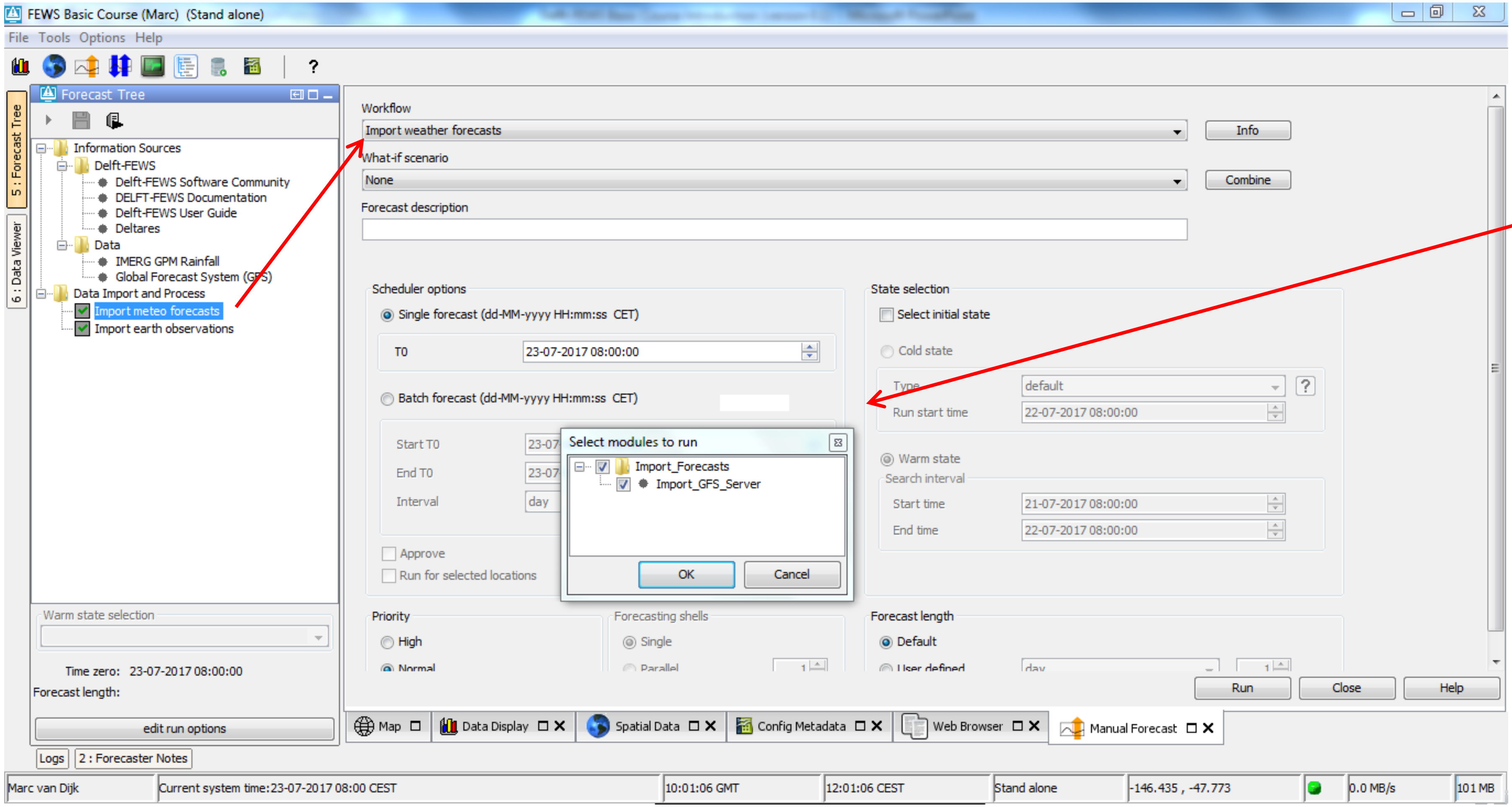
activity (1)

	() runIndependent	() moduleInstanceId
1	true	Import_GFS_Server

Deltares

Delft-FEWS: More on Workflows

- Workflows can be started from the Forecast Tree or the Manual Forecast Display



Information Sources
- Delft-FEWS
  - Delft-FEWS Software Community
  - DELFT-FEWS Documentation
  - Delft-FEWS User Guide
  - Deltares
- Data
  - IMERG GPM Rainfall
  - Global Forecast System (GFS)

Data Import and Process
- ☑ Import meteo forecasts
- ☑ Import earth observations

Warm state selection

Time zero: 23-07-2017 08:00:00

Forecast length:

edit run options

Workflow: Import weather forecasts [Info]

What-if scenario: None [Combine]

Forecast description:

Scheduler options
- ● Single forecast (dd-MM-yyyy HH:mm:ss CET)
  - T0: 23-07-2017 08:00:00
- ○ Batch forecast (dd-MM-yyyy HH:mm:ss CET)
  - Start T0: 23-07
  - End T0: 23-07
  - Interval: day
- □ Approve
- □ Run for selected locations

Select modules to run
- ☑ Import_Forecasts
  - ☑ Import_GFS_Server

[OK] [Cancel]

State selection
- □ Select initial state
- ○ Cold state
  - Type: default
  - Run start time: 22-07-2017 08:00:00
- ○ Warm state
  - Search interval
  - Start time: 21-07-2017 08:00:00
  - End time: 22-07-2017 08:00:00

Priority: ○ High ● Normal

Forecasting shells: ○ Single ○ Parallel 1

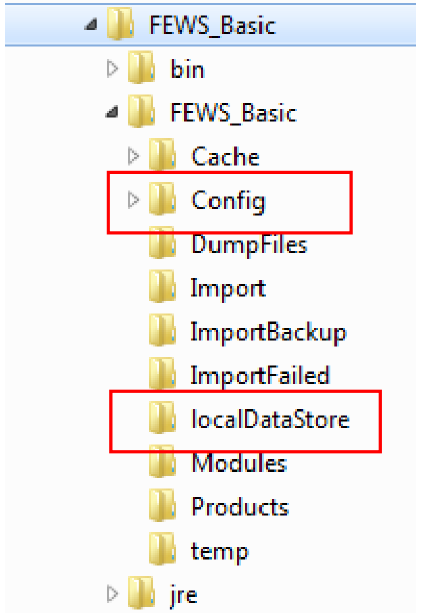
Forecast length: ● Default ○ User defined day 1

[Run] [Close] [Help]

Marc van Dijk | Current system time:23-07-2017 08:00 CEST | 10:01:06 GMT | 12:01:06 CEST | Stand alone | -146.435 , -47.773 | 0.0 MB/s | 101 MB

Use F12 for debug options

Delft-FEWS Application Configuration



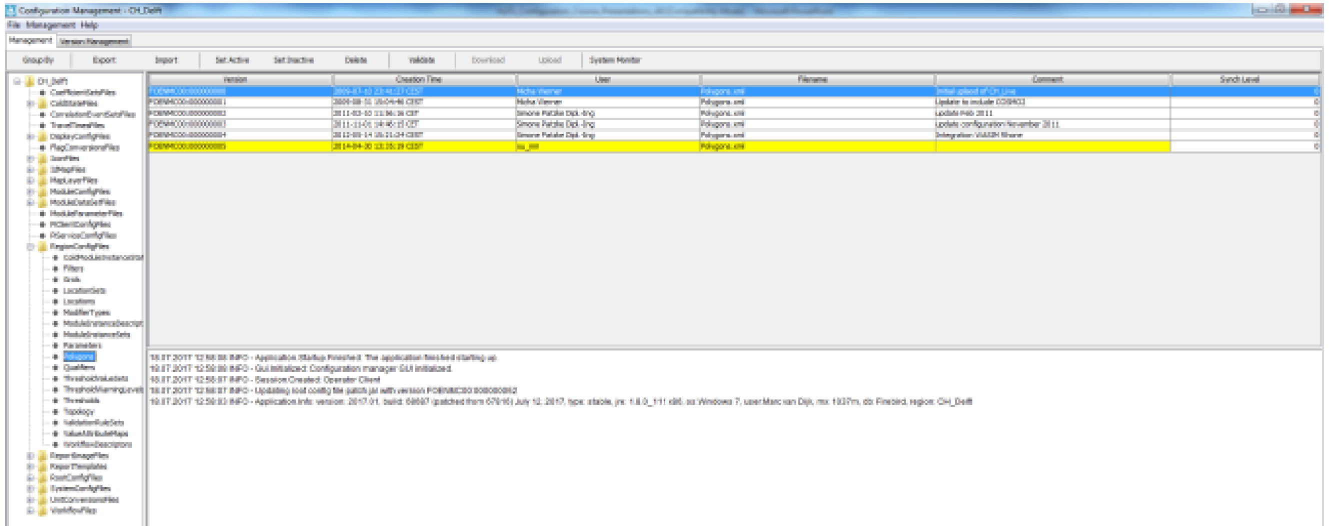
- FEWS_Basic
  - bin
  - FEWS_Basic
    - Cache
    - Config
    - DumpFiles
    - Import
    - ImportBackup
    - ImportFailed
    - localDataStore
    - Modules
    - Products
    - temp
  - jre

Where is the Delft-FEWS application configuration?

- Primary Location (checked first): Local Config folder
  - All files available as XML/CSV in config files
  - Naming convention described applies

- Secondary Location: database (localDataStore)
  - Corresponding table for each section of configuration (e.g. Regional, System, etc.)
  - Associated default version table to identify active version

- Delft-FEWS Configuration Manager Tool can be used to upload the configuration from the local file system to the database



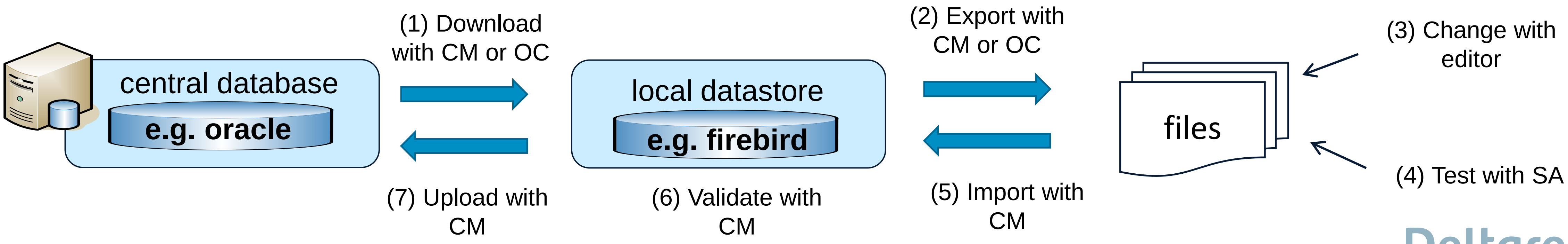
Version	Creation Time	User	Filename	Comment	Synch Level
FOENMC00:000000000	2009-07-10 23:41:17 CEST	Micha Werner	Polygons.xml	Initial upload of CH_Live	0
FOENMC00:000000001	2009-08-31 15:04:46 CEST	Micha Werner	Polygons.xml	Update to include COSMO2	0
FOENMC00:000000002	2011-03-10 11:56:36 CET	Simone Patzke Dipl.-Ing	Polygons.xml	Update Feb 2011	0
FOENMC00:000000003	2011-11-01 14:46:15 CET	Simone Patzke Dipl.-Ing	Polygons.xml	Update configuration November 2011	0
FOENMC00:000000004	2012-05-14 15:21:24 CEST	Simone Patzke Dipl.-Ing	Polygons.xml	Integration VAASM Rhone	0
FOENMC00:000000005	2014-04-30 13:35:19 CEST	sa_ml	Polygons.xml		0

```
19.07.2017 12:58:58 INFO - Application Startup Finished: The application finished starting up.
19.07.2017 12:59:09 INFO - Gui Initialized: Configuration manager GUI initialized.
19.07.2017 12:58:57 INFO - Session Created: Operator Client
19.07.2017 12:58:57 INFO - Updating local config file patch.jar with version FOENMC00:000000002
19.07.2017 12:59:03 INFO - Application Info: version: 2017.01, build: 68687 (patched from 67916) July 12, 2017, type: stable, jre: 1.8.0_111 x86, os:Windows 7, user:Marc van Dijk, mx: 1037m, db: Firebird, region: CH_Delft
```

Management of Delft-FEWS Configurations

When changing the configuration of an existing Delft-FEWS Application

1. Download the configuration from central database to local cache or datastore
2. Export the config files with Configuration Manager (CM) or Operator Client (OC) to file system
3. Make changes to the configuration files (file system)
4. Test the configuration with a Delft-FEWS Stand Alone (SA)
5. Import the configuration files from file system to datastore with CM
6. Validate the configuration files in the CM
7. Upload the configuration files to the central database with CM



Deltares

Appendix 3
Miscellaneous

Delft-FEWS: Import of External Time Series

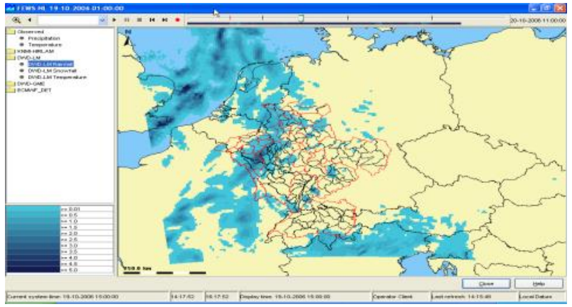
The Delft-FEWS software can import a large number of data sources

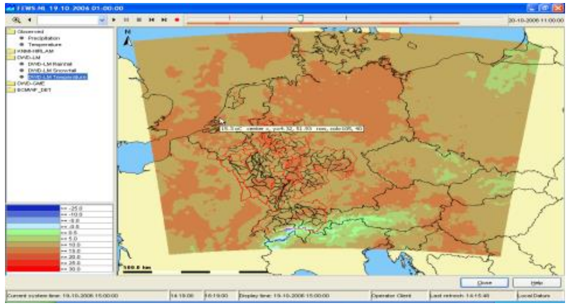
- Supports standards in data exchange formats: GRIB, NetCDF, etc.
- Data exchange with HIMS (e.g. WISKI, HYMOS)
- Plugin-technology to extend integration of data formats
- Emerging standards: WaterML – OpenGIS standard for exchange of hydrological data (USGS, NWS, CUAHSI), OpenDAP, ..

OGC® Making location count.

OGC® WaterML

Aquo





Pre-defined file name convention

File names should adhere to Delft-FEWS software requirements

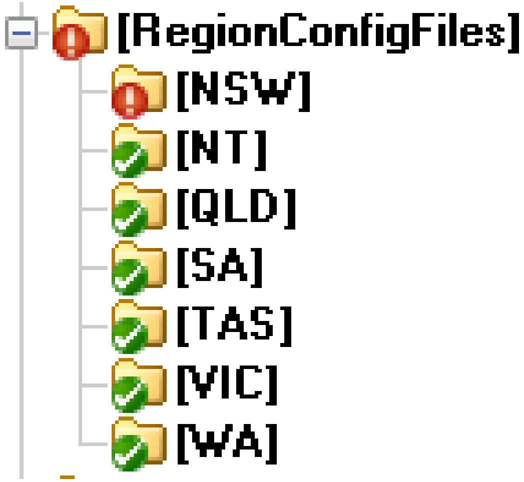
- RegionConfigFiles, SystemConfigFiles and RootConfigFiles folder

The following XML configuration may be split over multiple files:

- LocationSets_<postfix>.xml
- Filters_<postfix>.xml
- ModuleInstanceDescriptors_<postfix>.xml
- WorkflowDescriptors_<postfix>.xml
- DisplayGroups_<postfix>.xml

Special case:

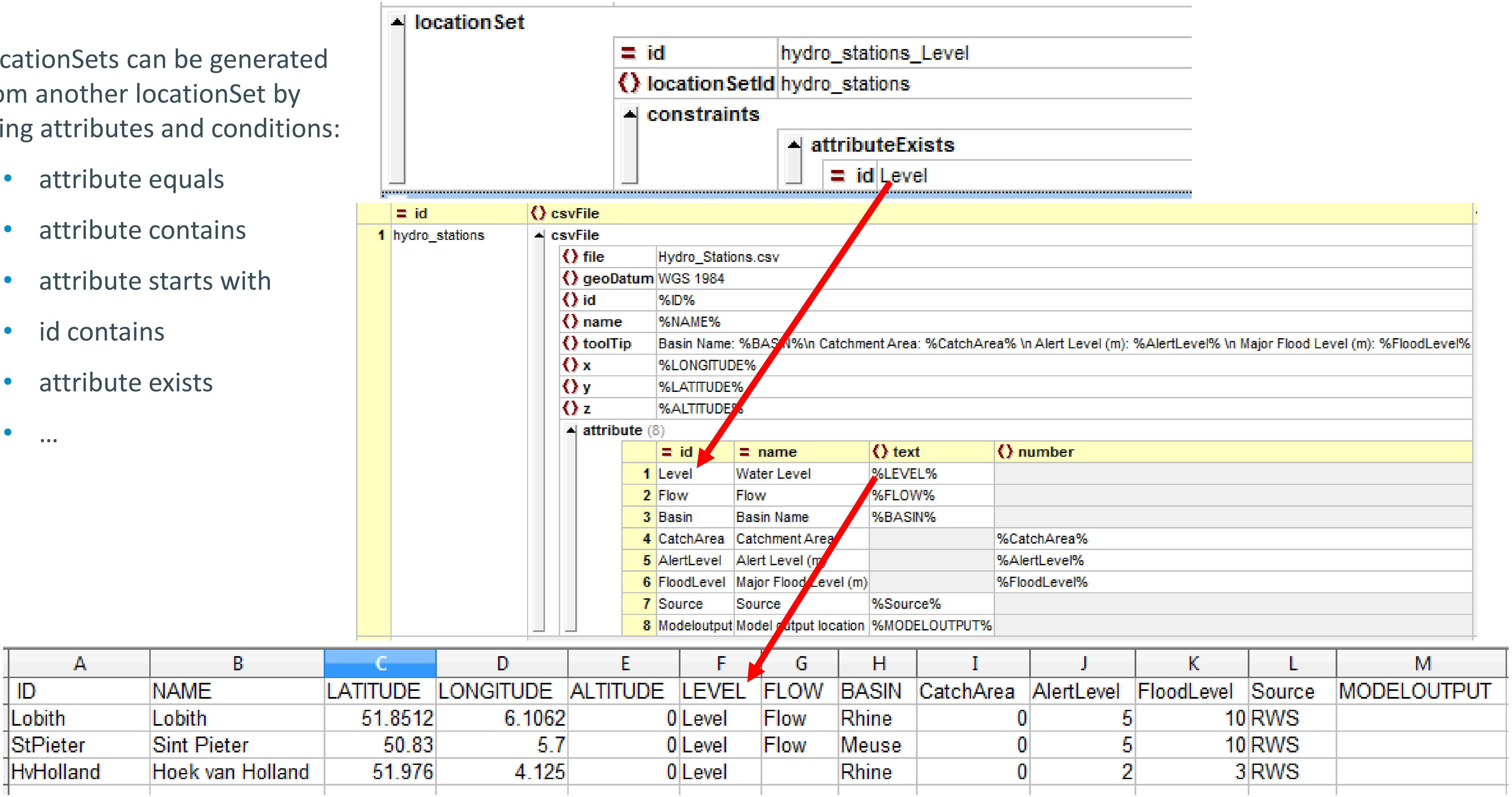
- Topology.xml can refer to TopologyGroup_<postfix>.xml
- In FEWS Basic course this feature is not used. Can be very useful for larger systems when multiple groups manage the same configuration



LocationSets – use of attribute filtering

LocationSets can be generated from another locationSet by using attributes and conditions:

- attribute equals
- attribute contains
- attribute starts with
- id contains
- attribute exists
- …



locationSet

= id	hydro_stations_Level
{} locationSetId	hydro_stations
constraints	attributeExists = id Level

	= id	{} csvFile
1	hydro_stations	csvFile

csvFile	
{} file	Hydro_Stations.csv
{} geoDatum	WGS 1984
{} id	%ID%
{} name	%NAME%
{} toolTip	Basin Name: %BASIN%\n Catchment Area: %CatchArea% \n Alert Level (m): %AlertLevel% \n Major Flood Level (m): %FloodLevel%
{} x	%LONGITUDE%
{} y	%LATITUDE%
{} z	%ALTITUDE%

attribute (8)

	= id	= name	{} text	{} number
1	Level	Water Level	%LEVEL%	
2	Flow	Flow	%FLOW%	
3	Basin	Basin Name	%BASIN%	
4	CatchArea	Catchment Area		%CatchArea%
5	AlertLevel	Alert Level (m)		%AlertLevel%
6	FloodLevel	Major Flood Level (m)		%FloodLevel%
7	Source	Source	%Source%	
8	Modeloutput	Model output location	%MODELOUTPUT%	

A	B	C	D	E	F	G	H	I	J	K	L	M
ID	NAME	LATITUDE	LONGITUDE	ALTITUDE	LEVEL	FLOW	BASIN	CatchArea	AlertLevel	FloodLevel	Source	MODELOUTPUT
Lobith	Lobith	51.8512	6.1062	0	Level	Flow	Rhine	0	5	10	RWS	
StPieter	Sint Pieter	50.83	5.7	0	Level	Flow	Meuse	0	5	10	RWS	
HvHolland	Hoek van Holland	51.976	4.125	0	Level		Rhine	0	2	3	RWS	

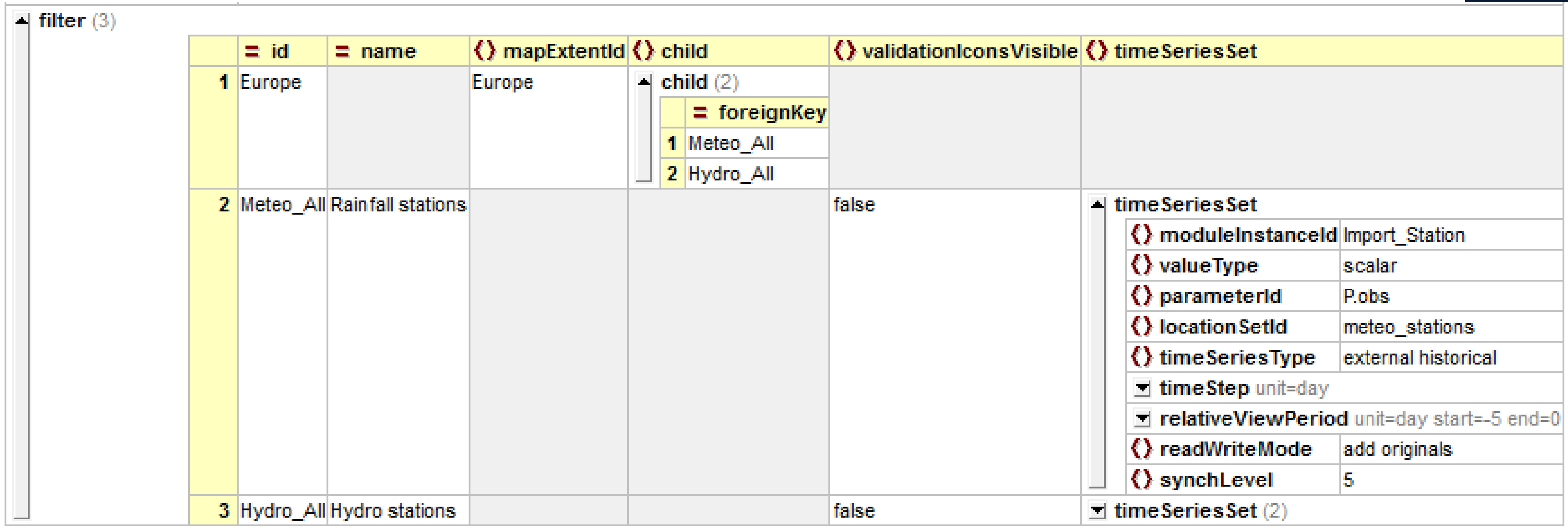
Delft-FEWS: Data Viewer (Filters)

Filters are used to define the:

- Locations displayed on the map
- Locations displayed in the list box
- Parameters displayed in the list box

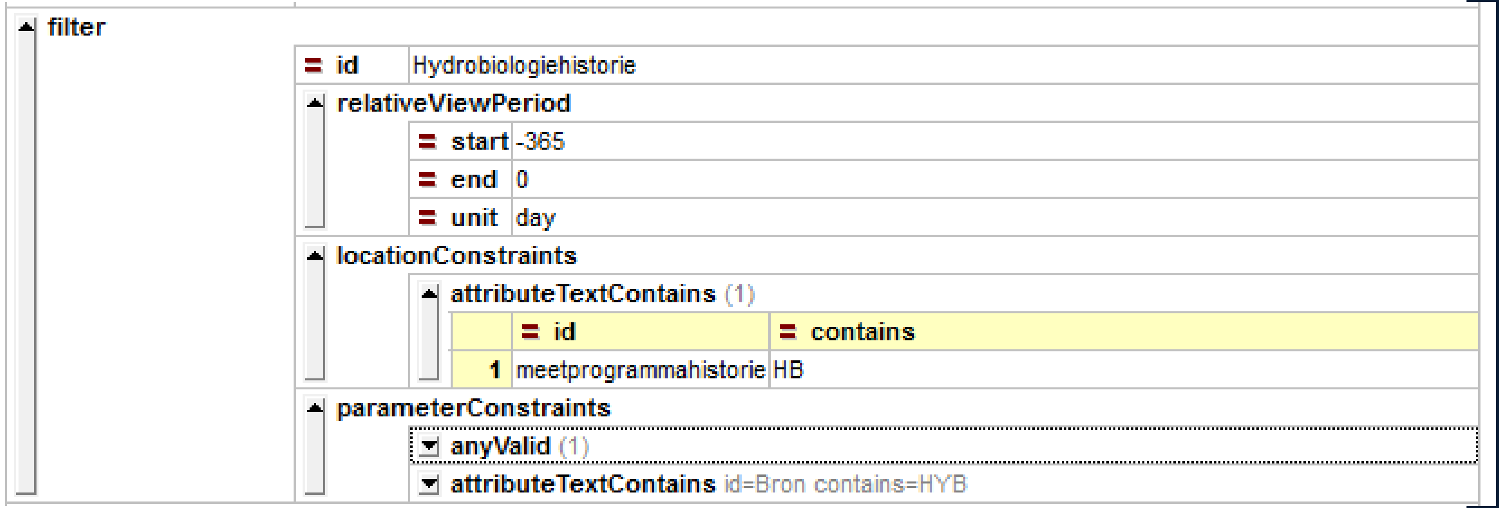
Filter:

- Organized in folders with child filters
- Arrange time series sets in logical groups
- View permissions
- Validation icons visible
- Link to map extent
- Can use location attributes to specify sub-sets



filter (3)

	id	name	mapExtentId	child	validationIconsVisible	timeSeriesSet
1	Europe		Europe	child (2) foreignKey 1 Meteo_All 2 Hydro_All		
2	Meteo_All	Rainfall stations			false	timeSeriesSet moduleInstanceId Import_Station valueType scalar parameterId P.obs locationSetId meteo_stations timeSeriesType external historical timeStep unit=day relativeViewPeriod unit=day start=-5 end=0 readWriteMode add originals synchLevel 5
3	Hydro_All	Hydro stations			false	timeSeriesSet (2)



filter

id	Hydrobiologiehistorie

relativeViewPeriod

start	-365
end	0
unit	day

locationConstraints

attributeTextContains (1)

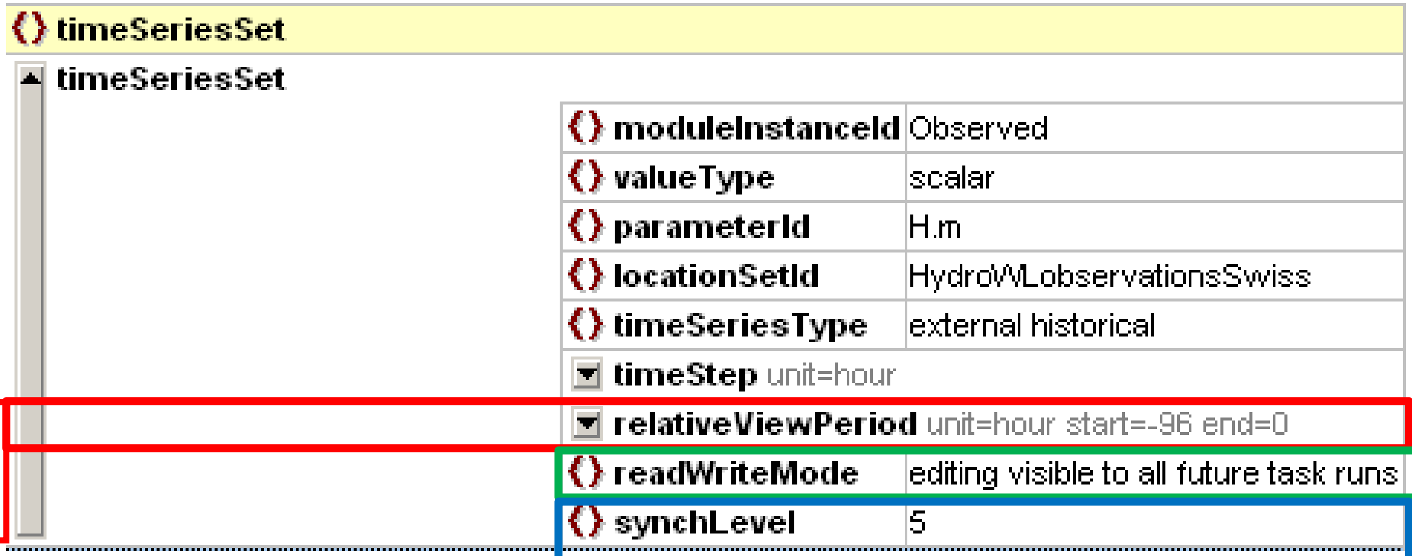
	id	contains
1	meetprogrammahistorie	HB

parameterConstraints

anyValid (1)

attributeTextContains id=Bron contains=HYB

Display of data - Filters - Extra options



timeSeriesSet

timeSeriesSet

moduleInstanceId	Observed
valueType	scalar
parameterId	H.m
locationSetId	HydroWLobservationsSwiss
timeSeriesType	external historical
timeStep unit=hour	
relativeViewPeriod unit=hour start=-96 end=0	
readWriteMode	editing visible to all future task runs
synchLevel	5

Relative View Period for Icon on main map

Allow/Disallow editing

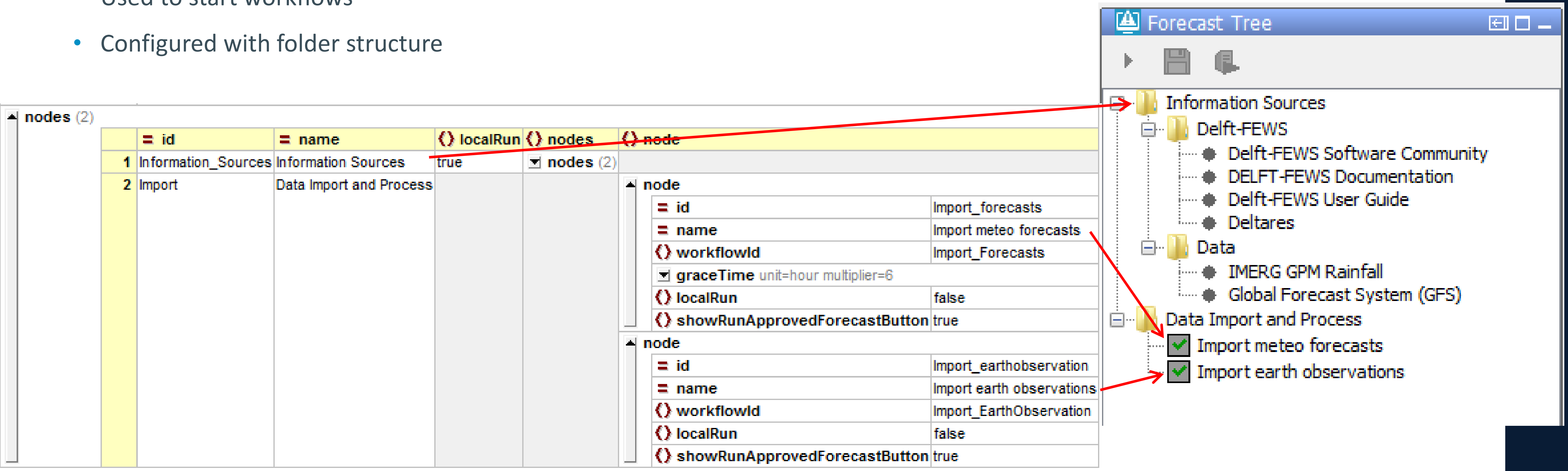
synchLevel – for live system (5 = edited data)

Deltares

Delft-FEWS: Forecast Tree (Topology)

Forecast Tree can be used to guide the forecaster in the forecast process

- Used to link with external websites
- Used to start workflows
- Configured with folder structure



nodes (2)

	id	name	localRun	nodes	node
1	Information_Sources	Information Sources	true	nodes (2)	
2	Import	Data Import and Process			node node

node

id	Import_forecasts
name	Import meteo forecasts
workflowId	Import_Forecasts
graceTime unit=hour multiplier=6	
localRun	false
showRunApprovedForecastButton	true

node

id	Import_earthobservation
name	Import earth observations
workflowId	Import_EarthObservation
localRun	false
showRunApprovedForecastButton	true

Forecast Tree

- Information Sources
  - Delft-FEWS
    - Delft-FEWS Software Community
    - DELFT-FEWS Documentation
    - Delft-FEWS User Guide
    - Deltares
  - Data
    - IMERG GPM Rainfall
    - Global Forecast System (GFS)
- Data Import and Process
  - ✓ Import meteo forecasts
  - ✓ Import earth observations

Deltares

WMS Service

User groups

Delft-FEWS Support

Deltares