



**Delft-FEWS
Basic Configuration Course
(continued)**



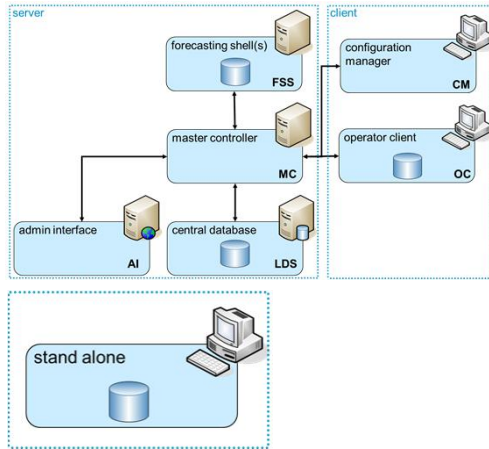
Live systems

Delft-FEWS Configuration

Stand alone vs Operational environment

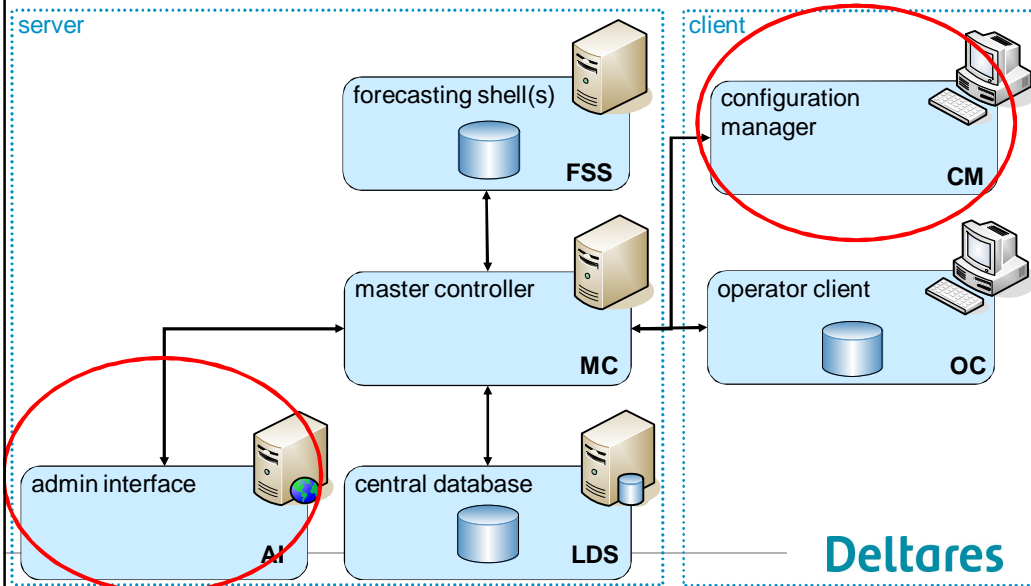
Configuration

- Database
 - Stored in different tables
 - in operational environment
- OR
- File System (+ directory structure)
 - Stored in different files
 - Ordered in subdirectories
 - during development/testing



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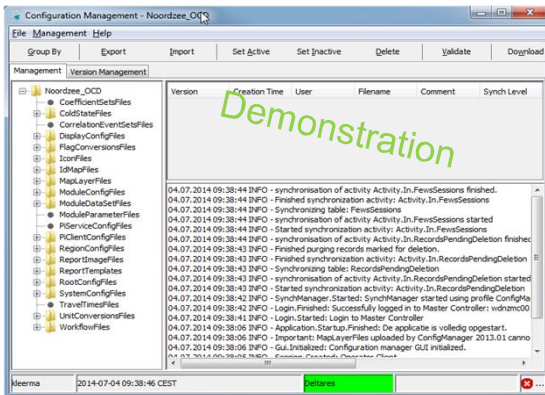
Delft-FEWS system overview



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Tools operational system

- Configuration Manager
- Administrator Interface (AI)



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Enabling Delta Life Delt Hydraulics **Demonstration**

Delft FEWS - FEWS Noordzee

Main menu

- System Status
- Live System Status
- Active Services
- View Logs
- Log Manager
- Collect System LogFiles
- Files
- Forecast Tasks
- Workflows and FSSs
- User Administration
- System Control
- Database Analysis

Running on wdznmc00
Logged on as ADMIN
Log Off

System Status

Live System Status

Refresh

Currently Queued Task Runs:	0
Currently Executing Task Runs:	1
Overall MC Status:	OK
Status of FSSs:	
FSS: FSS00	1
FSS: FSS01	0
FSS: FSS02	0
FSS: FSS03	0
Status of Remote MCs:	
Health of MC modules:	
FSL Listener	OK
OCL Listener	OK
Synch Listener	OK
Synch Runner	OK
Synch TaskListener	OK
System Heartbeat	OK
System Monitor	OK
System Monitor	OK
TM Chaser	OK
TM Launcher	OK
TM Listener	OK
TM LogListener	OK
Active OC Sessions:	1
Log Table Size:	38599
MC Version:	MasterController 2013.01 (41017)
Database:	OK
JMS:	OK

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Tools – Configuration Manager

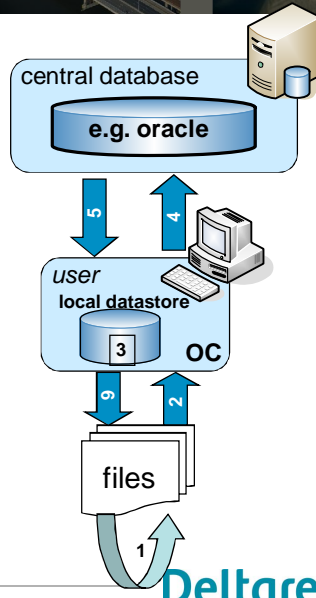
Management of the configuration files

To the central database

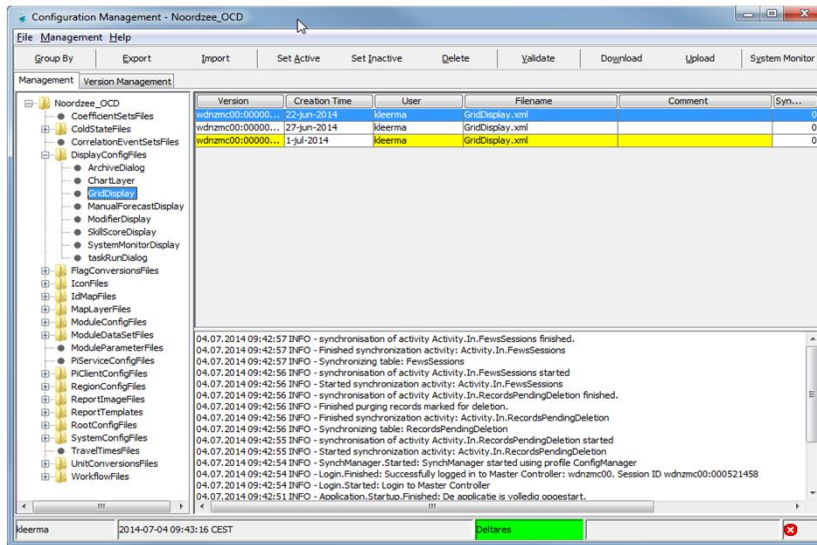
1. update XML-files
2. import to OC
3. set files (in-)active
validate changes
4. upload config change to MC

To the file system

5. download configuration to OC
6. export from OC to file system
7. go to 1



Tools – FEWS Configuration Manager



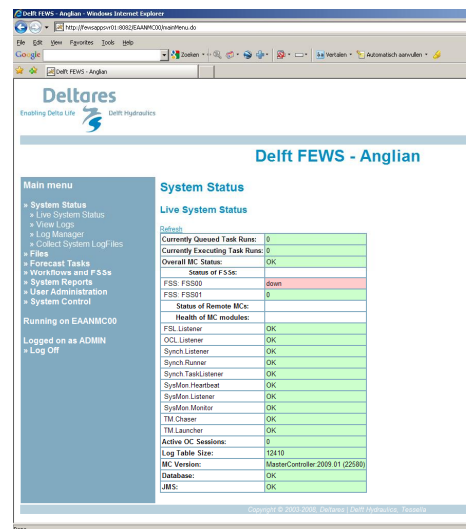
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Tools – Admin Interface

Administration tool for live system
Direct access to Central Database

Main tasks

- Monitoring (health) of live system components
- Scheduling of tasks (*current!*)
- Monitoring of task queues
- Management of Forecasting Shell Servers
- Setting enhanced forecasting etc.



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Tools – Admin interface

The screenshot shows the Delft FEWS - Anglian admin interface. The page title is "Delft FEWS - Anglian". The interface includes a main menu on the left and a "Forecast Tasks" section. The "Forecast Tasks" section contains a "Scheduled Tasks" table with the following data:

Task ID	Description	Workflow ID	Variant Scenarios	TAB	Resource MC ID	Priority	Interval	Next Run Time	Task Status	Actions
EAANNMCO0 0010724	MC System Alert messages	MC_SystemAlerter	None			Normal	1 day	22/09/2009 09:00 GMT	Pending	Cancel, Suspend, Details, Log, Task, Run
EAANNMCO0 0010836	MC Market Record Manager	MC_MarketRecordManager	None			Normal	10 minutes	21/09/2009 13:00 GMT	Pending	Cancel, Suspend, Details, Log, Task, Run
EAANNMCO0 0010929	MC Rolling Barrel	MC_RollingBarrel	None			Normal	10 minutes	21/09/2009 14:15 GMT	Pending	Cancel, Suspend, Details, Log, Task, Run
EAANNMCO0 0003887	FSS RollingBarrel	RollingBarrel_FSS00	None			Normal	300 minutes	21/09/2009 18:00 GMT	Pending	Cancel, Suspend, Details, Log, Task, Run
EAANNMCO0 0001131	Coastal_Forecast	Coastal_Forecast	None			Normal	6 hours	21/09/2009 16:00 GMT	Pending	Cancel, Suspend, Details, Log, Task, Run
EAANNMCO0 0000796	Performance Monitoring	PerformanceMonitoring	None			Normal	1 day	22/09/2009 12:00 GMT	Pending	Cancel, Suspend, Details, Log, Task, Run

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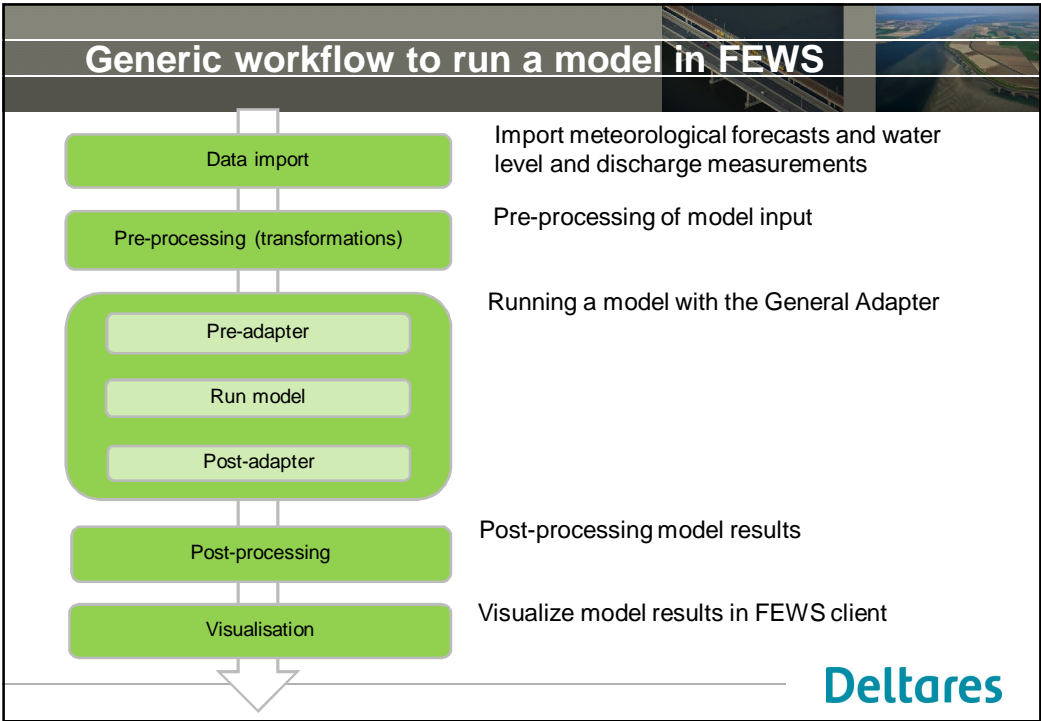
How to run a model in FEWS

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FEWS Modules and Workflows

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Modules and Module Instances

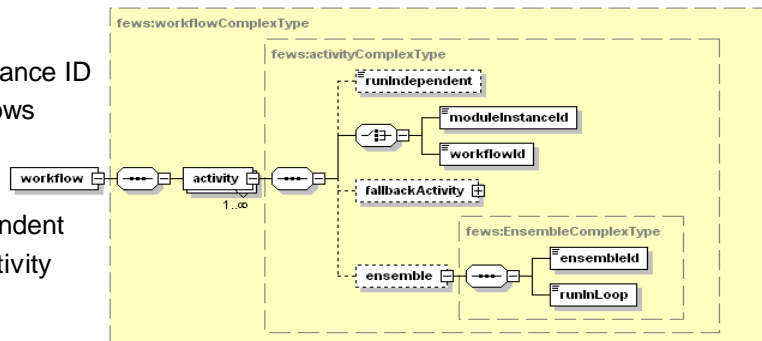
- Modules are
 - FEWS plug-ins that can be used in a workflow
 - registered in ModuleDescriptor file as Java Classes
 - part of the system configuration
- Module Instances are
 - configured modules of a particular module
 - registered in ModuleInstanceDescriptors file
 - part of the regional configuration

Module	ModuleInstance
Import	<ul style="list-style-type: none"> ■ HIRLAM data ■ CSV data ■ NetCDF...
Transformation	<ul style="list-style-type: none"> ■ Temporal Interpolation ■ Spatial Interpolation ■ Aggregation ■ User Defined Transformation...
General Adapter	<ul style="list-style-type: none"> ■ Running a model, e.g. SOBEK, MIKE, HBV... ■ Running a script, e.g. R, Python ...
Export	<ul style="list-style-type: none"> ■ To HTML ■ To XML...

Workflows

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

- Module Instance ID
- Sub-workflows
- Run independent
- Fallback activity
- Ensemble



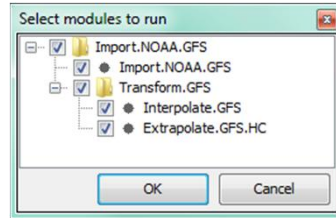
Workflows and sub workflows

Workflows can be nested:

- Workflow “Import.NOAA.GFS”
 - (sub)Workflow “Transform.GFS”

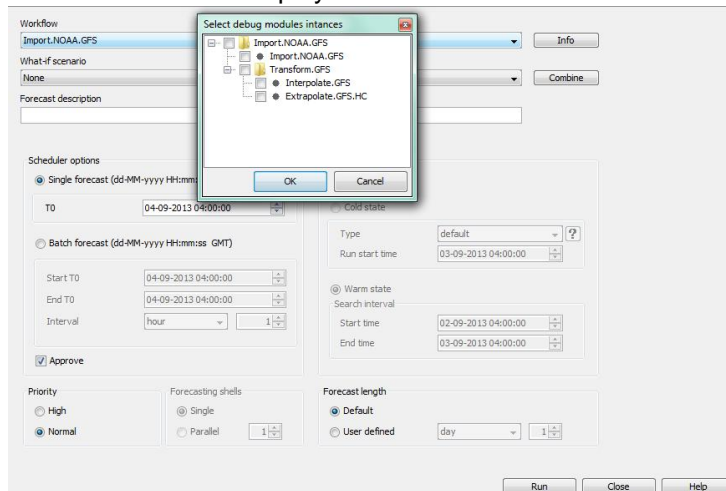
Where:

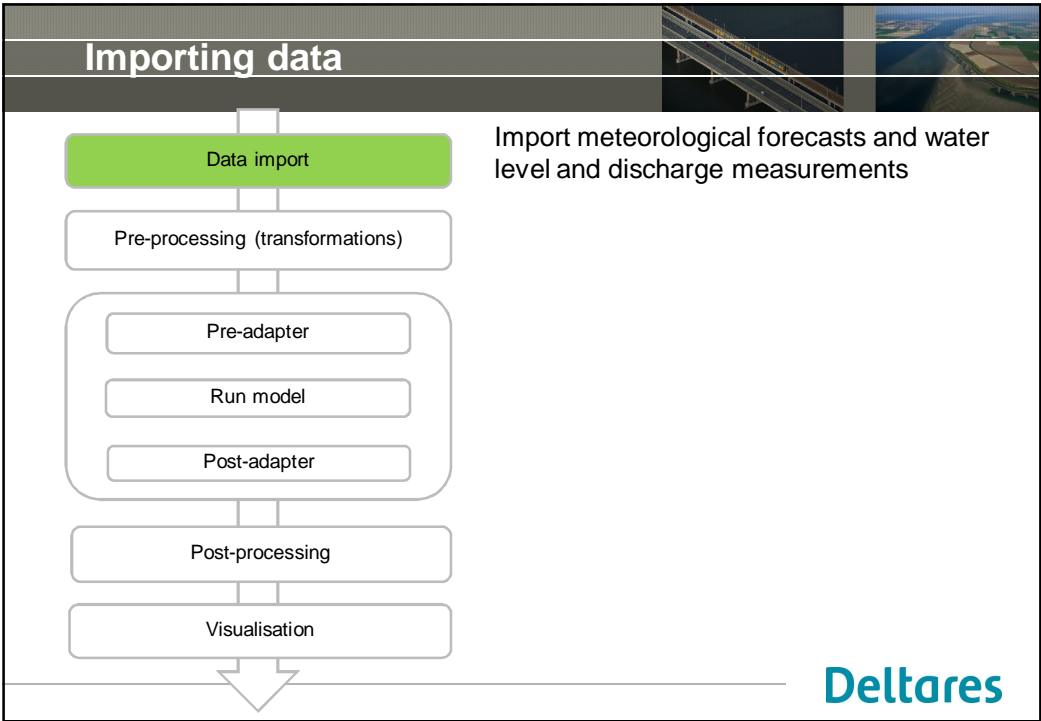
- (sub)Workflow “Transform.GFS”
 - ModuleInstance “Interpolate.GFS”
 - ModuleInstance “Interpolate.GFS.HC”



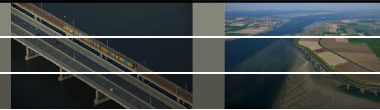
Workflows

Workflows can be run (and debugged) on module basis (ctrl-r or d) in Manual Forecast display





Importing time series data



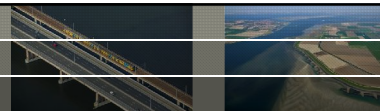
In general terms, the following is relevant when importing data:

- To import data in FEWS, a timeSeriesImportRun module needs to be configured, and needs to be added to a workflow
- From the timeSeriesImportRun module, a wide range of data formats are supported
- When importing (or exporting) data, mapping of location and parameter names between FEWS and external applications can be done using IdMaps
- To import data for specific locations (scalar or gridded) and parameters, these need to be configured in FEWS

See <http://publicwiki.deltares.nl/display/FEWSDOC/03+Import+Module>

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Importing gridded data



In order to use apply gridded data in Delft-FEWS:

- A grid definition needs to be included in RegionConfigFiles\Grids.xml
- A dummy location needs to be included in the RegionConfigFiles\Locations.xml file

For more details, see <http://publicwiki.deltares.nl/display/FEWSDOC/06+Grids>

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OpenDAP

Delft-FEWS can import data directly from OpenDAP databases. OpenDAP is a database type commonly used in the world of coastal and oceanographic forecasting.

See <http://publicwiki.deltares.nl/display/FEWSDOC/Import+data+using+OPeNDAP>

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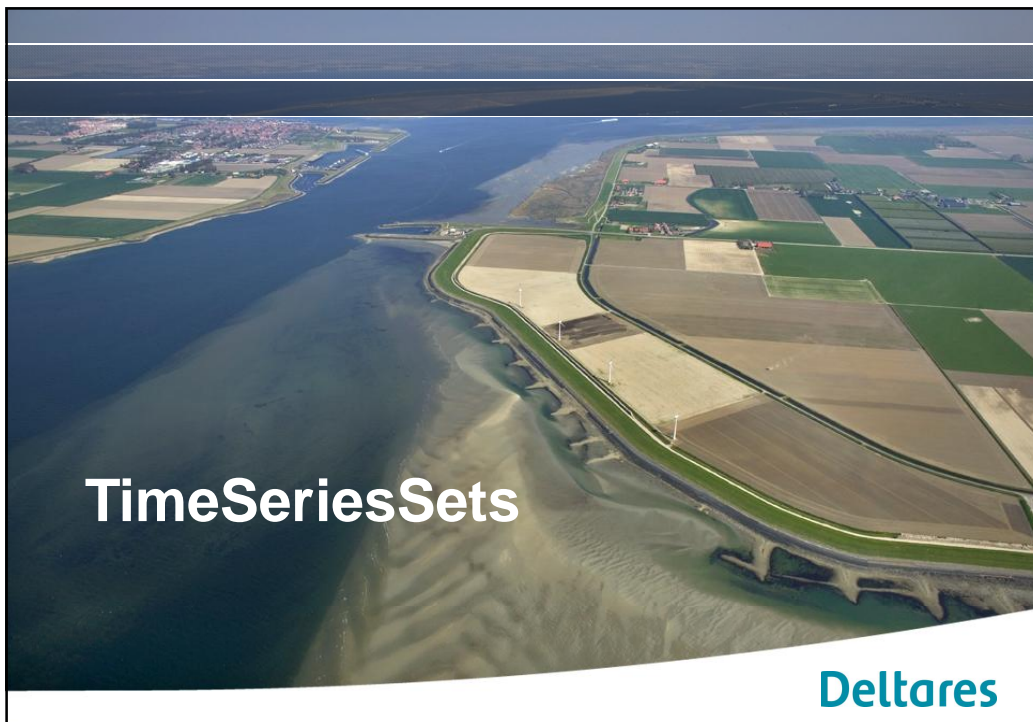
Visualization

Once available in Delft-FEWS, data can be visualized in various ways:

- Gridded data can be shown in de grid display
- Scalar data can be shown in the filters, predefined plots and grid display
- The layout of plots can be modified in various ways

See <http://publicwiki.deltares.nl/display/FEWSDOC/07+Display+Configuration>

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Time Series

Time series are available from two source:

- external
- simulated

Time series are in two categories in relation to time:

- historical (continuous in time)
- forecasting (characterised by its start time)

Time series can be in four formats:

- 0D – scalar
- 1D – vector or longitudinal profile
- 2D – grid
- 2D – polygon

Time Series are handled in the form of Time Series Sets

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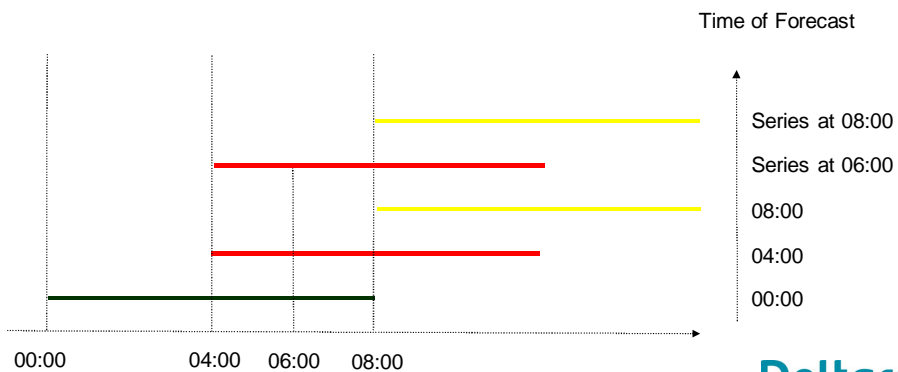
Time Series – external historical

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



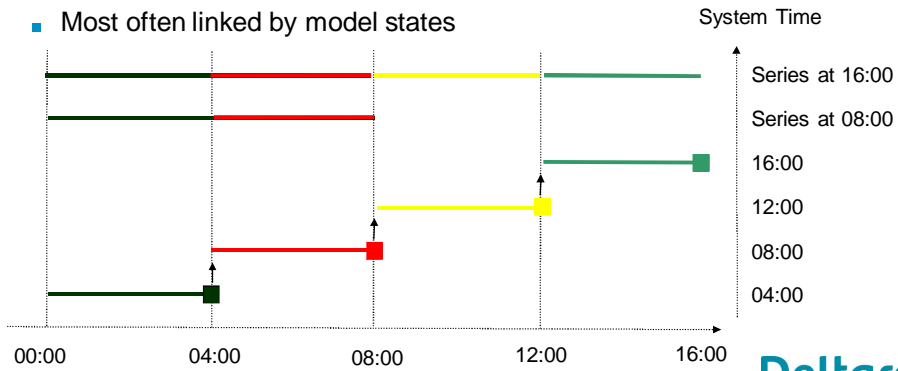
Time Series – external forecasting

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



Time Series – simulated historical

- Continuous in time
- Referenced by the forecast model that produced them
- Approved series shown automatically (including history)
- Most often linked by model states



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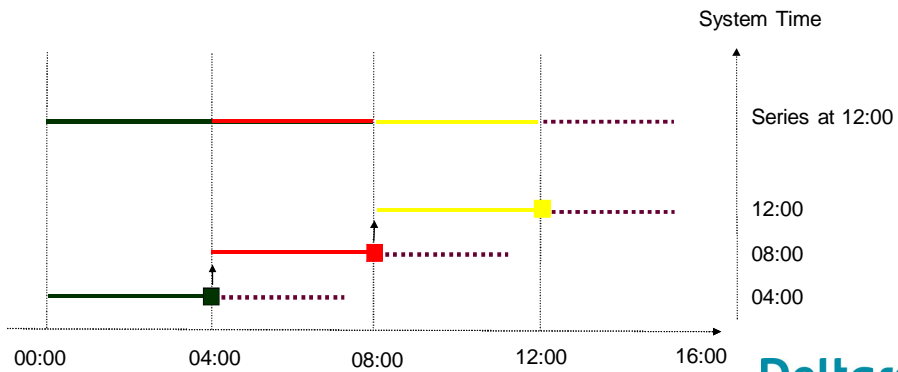
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Time Series – simulated forecasting

- Continuous in time (in combination with simulated historical)
- Referenced by the forecast model that produced them
- Approved and selected series can be viewed



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Time Series – temporary

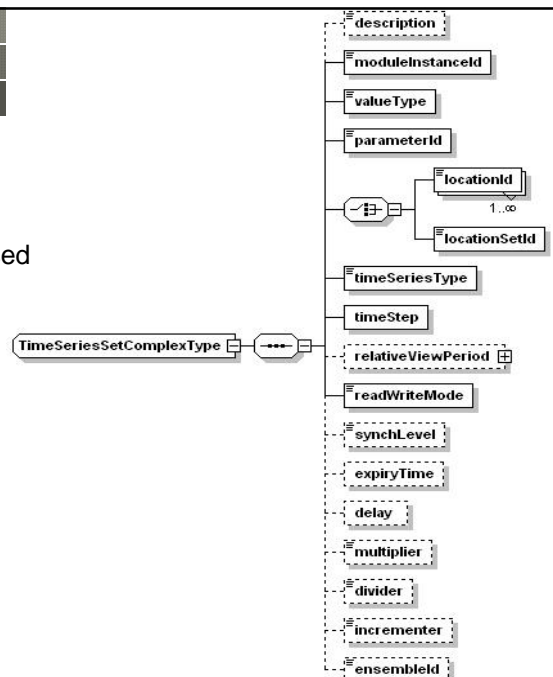
Temporary time series

- time series used in pre- / post-processing
- not stored in database

Time Series Sets

- Properties of a timeSeriesSet
 - Some elements are only used when retrieving time series, other elements only when storing data

All data handling is done through Time Series Sets



Time Series Sets - Examples

Import Run

timeSeriesSet	
moduleInstanceld	ImportAstronomical
valueType	scalar
parameterId	H.astronomical
locationSetId	Astronomical
timeSeriesType	external historical
timeStep	
unit	minute
divider	1
multiplier	15
readWriteMode	add originals
synchLevel	4
expiryTime	
unit	day
multiplier	750

General Adapter Run

timeSeriesSet	
moduleInstanceld	KWV_Historical
valueType	scalar
parameterId	Q.simulated.historical
locationId	CHELSLS1
timeSeriesType	simulated historical
timeStep	
unit	minute
multiplier	15
readWriteMode	add originals

Importing data

Import Modules allows data from external sources to be imported

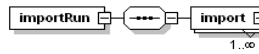
- Various Scalars – e.g. PI XML and Wiski
- ASCII grid time series
- Binary GRIB (grid) and BIL time series
- Currently around 50 data import types

FEWS imports files from directories specified in the global.properties file

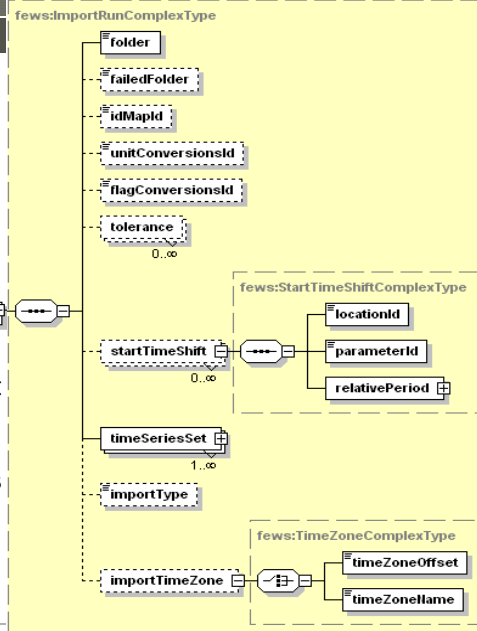
Import Module

Key Features:

- ID mapping > idMap.xml
- Units mapping > unitConversion.xml
- Flag mapping > flagConversions.xml



- Tolerance: when imported data is not exactly observed at the cardinal time step
- Time zone mapping: database stores all data in GMT, specify time zone when importing
- Validate: Imported files can be validated against their own schema



Import Module & Id mapping

- Matching 'outside world' to the 'FEWS world'
 - locations (ids)
 - parameter (ids)

- Three levels

- **direct mapping** → location names AND parameter names differ

	internalLocation	internalParameter	externalLocation	externalParame...
1	NBBC1LLF	FMAT	NBBC1LW	MAT
2	NBBC1LLF	FMAP	NBBC1LWL	MAP

- **indirect** → either location names or parameter names differ

parameter (2)		location (25)	
	external	internal	
1	MAT	FMAT	1 IFC1LV
2	MAP	FMAP	2 IFC1LW
			3 MFTC1LW

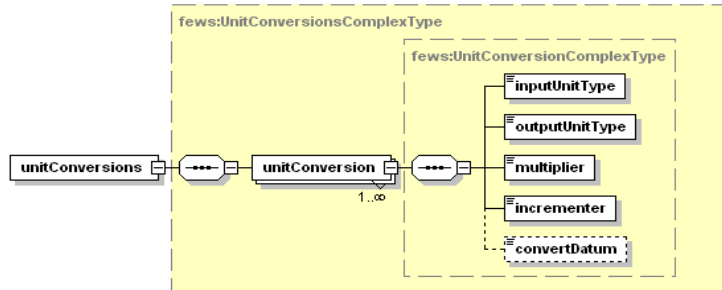
- **1:1** → location and parameter names do NOT differ

enableOneToOneMapping

- Used when importing and exporting time series

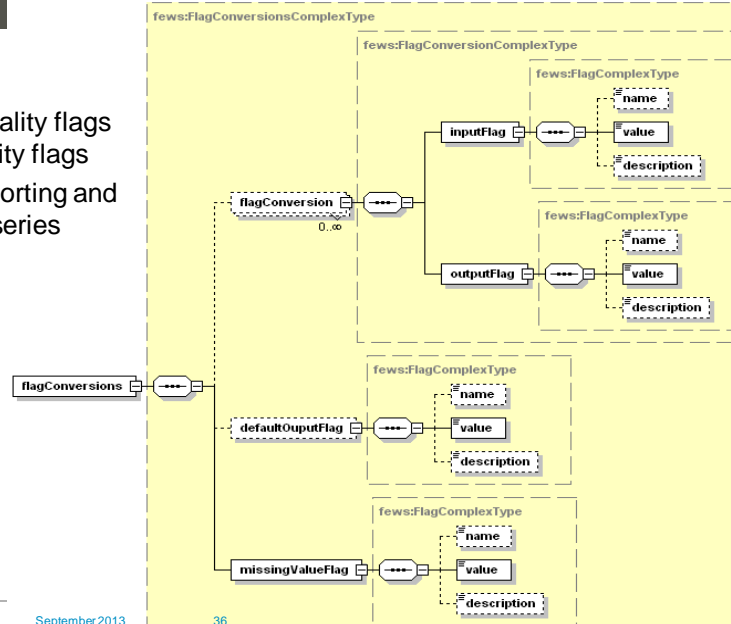
Import Module & Unit conversion

- Map internal units to external units
- Used when importing and exporting time series
- Extra option to convert datum of level recordings (external unit mAOD)



Import Module & Flag conversion

- Map internal quality flags to external quality flags
- Used when importing and exporting time series



Exercise

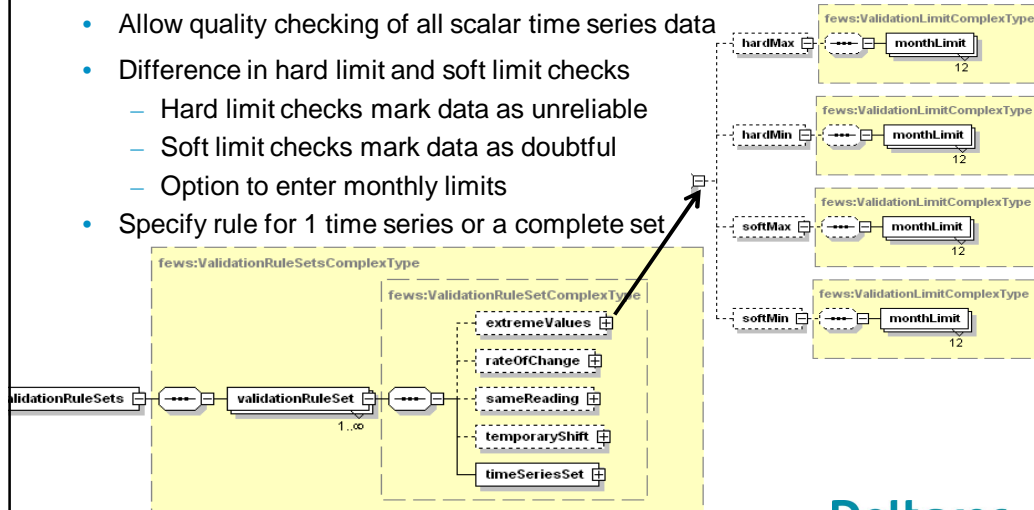
Exercise 5: Import time series

Import Time series from EA-XML format (specific Environment Agency format)

- Analyse the 5 time series
 - 2 * Observed_waterlevel for Hydro1 and Hydro2
 - 2 * Rainfall for Raingauge and Meteostation
 - 1 * Temperature for Meteostation
- Add elements to ID mapping table
- Run import workflow
- Analyse data with the Time Series Display

Validating Data

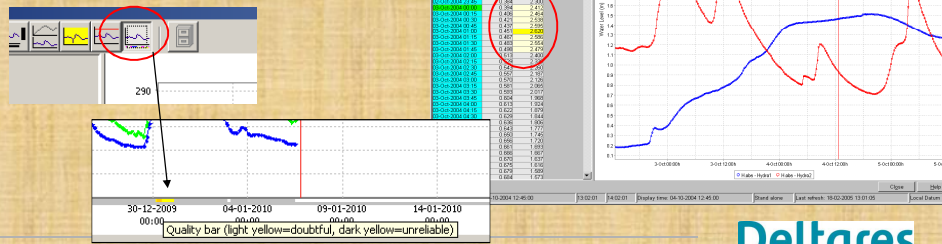
- Allow quality checking of all scalar time series data
- Difference in hard limit and soft limit checks
 - Hard limit checks mark data as unreliable
 - Soft limit checks mark data as doubtful
 - Option to enter monthly limits
- Specify rule for 1 time series or a complete set



Exercise

Exercise 6: Add validation rules for imported data

- Check the data just imported
- Define validation rules
- Enter the rules in the ValidationRuleSets XML file
- Delete the data store
- Run import workflow
- View data
- Check the difference!



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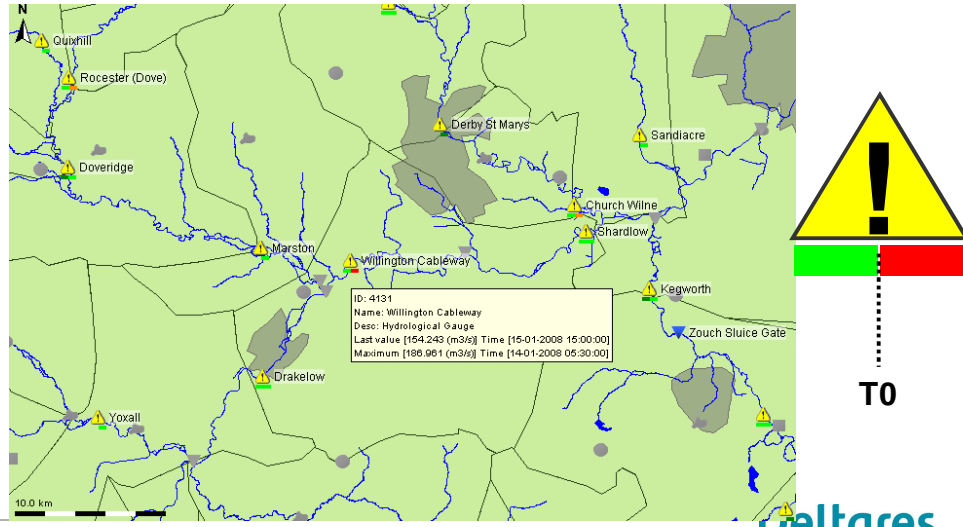
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Thresholds

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Example (Map)

Willington Cableway (Midlands, UK)



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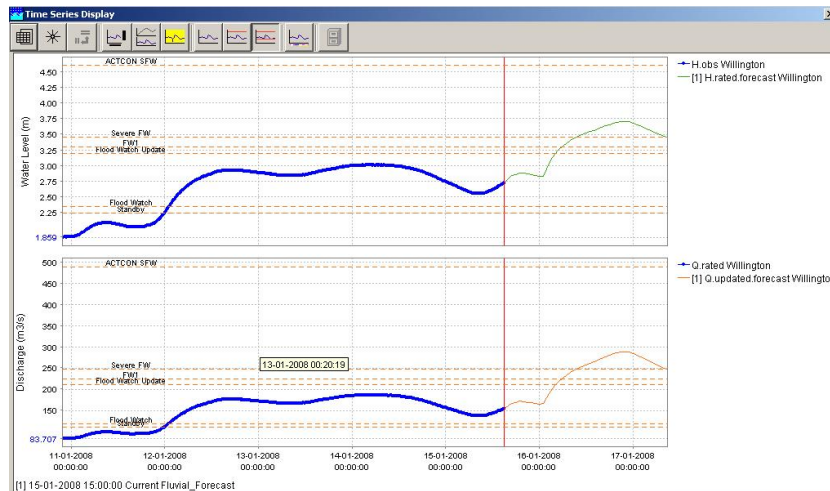
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Example (Graph)

Willington Cableway (Midlands, UK)



[1] 15-01-2008 15:00:00 Current Fluvial_Forecast

Close

Help

Current system time: 15-01-2008 15:00:00

18:59:49

19:59:49

Display time: 15-01-2008 15:00:00

Stand alone

Last refresh: 18:58:02

Local Datum

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Thresholds Utility

The thresholds utility checks when time series cross thresholds

- Observed and simulated time series
- Icons are shown on the map
- Graphs/lines cross threshold lines
- Events can be triggered (MC)
- Up events and down events

Three configuration files

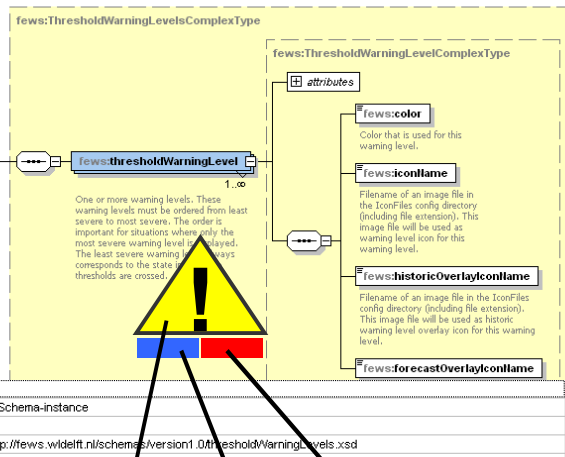
- `thresholdWarningLevels.xml` → definition of (unique) thresholds + details
- `thresholds.xml` → the grouping of the (selected) thresholds
- `thresholdValueSets.xml` → timeseries (loc/par.) and actual levels info

Thresholds - thresholdWarningLevels

- Unique threshold information
 - colors: displays, reports

- icons

- normal/warning
- historic colour
- forecast colour



id	name	color	iconName	historicOverlayIconName	forecastOverlayIconName
1 0	No threshold exceeded	green	default1.gif	default1.gif	default1.gif
2 1	Standby	blue	warninglevel.gif	historicwarninglevel_blue.gif	forecastwarninglevel_blue.gif
3 2	Flood Watch	yellow	warninglevel.gif	historicwarninglevel_yellow.gif	forecastwarninglevel_yellow.gif
4 3	Flood Warning	orange	warninglevel.gif	historicwarninglevel_orange.gif	forecastwarninglevel_orange.gif
5 4	Severe Flood Warning	red	warninglevel.gif	historicwarninglevel_red.gif	forecastwarninglevel_red.gif

Thresholds - thresholds

- Thresholds usage
 - groups
 - selection(s)

thresholdGroups

```

xmins http://www.wideit.nl/news
xmins:sv http://www.w3.org/2001/XMLSchema-instance
xs:schem... http://www.wideit.nl/news http://news.wideit.nl/schemas/version1.0/thresholds.xsd
    
```

thresholdGroup

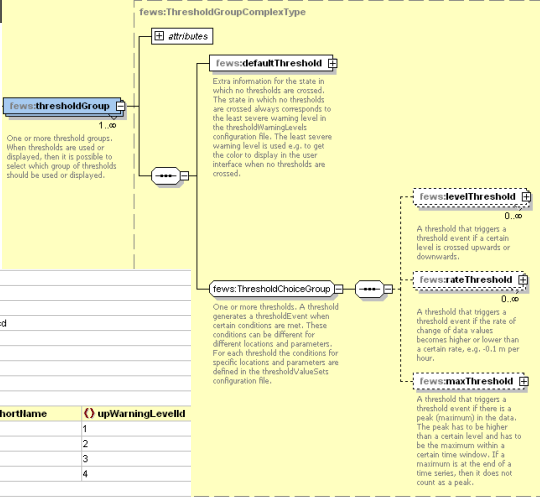
```

id Fluvial_Flood
name Fluvial Flood
defaultThreshold shortName=AC
    levelThreshold (4)
        id name shortname upWarningLevelId
        1 Standby Standby SB 1
        2 Flood Watch Flood Watch FW 2
        3 Flood Warning Flood Warning FW 3
        4 Severe FW Severe FW SFW 4
    
```

thresholdGroup

```

id Coastal_Flood
name Coastal Flood
defaultThreshold
    shortname AC
    levelThreshold (2)
        id name shortname upWarningLevelId
        1 Flood Warning Flood Warning FW 3
        2 Severe FW Severe FW SFW 4
    
```



Thresholds - thresholdsValuesSets

- Detailed threshold information
 - per location/parameter
 - actual values to be crossed for the different thresholds
 - ‘triggers’ (action events for up- or downcrossings)

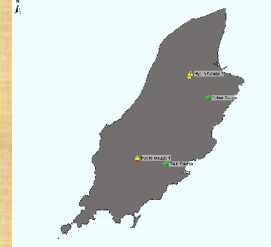
thresholdValueSet (3)

id	name	description	levelThresholdValue	timeSeriesSet
1	London	London thresholds	levelThresholdValue (2)	timeSeriesSet
2	Hydro1	Hydro1 thresholds	levelThresholdValue (3)	timeSeriesSet
			levelThresholdId value upActionLogEventTypeId	
			1 Standby 1	
			2 Flood Watch 1.1	
			3 Severe FW 1.4 Hydro_Alarm	
3	Hydro2	Hydro2 thresholds	levelThresholdValue (1)	timeSeriesSet
			levelThresholdId value	
			1 Flood Watch 1.9	



Exercise

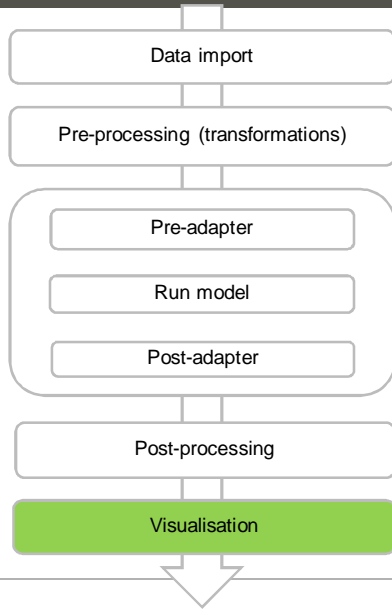
Exercise 7: Add thresholds for imported data
Add thresholds for the hydro locations



thresholdValueSet (3)			levelThresholdValue		timeSeriesSet
id	name	description	levelThresholdValue (2)		timeSeriesSet
1	London	London thresholds	levelThresholdValue (3)		timeSeriesSet
2	Hydro1	Hydro1 thresholds	levelThresholdId	value	timeSeriesSet
			1 Standby	1	moduleinstanc... ImportTelemetry
			2 Flood Watch	1.1	valueType scalar
			3 Severe FW	1.4	parameterId Hobs
					locationId Hydro1
					timeSeriesType external historical
					timeStep unit=minute multiplier=15
					relativeViewPeriod unit=hour start=-36 end=0
					readWriteMode read only
3	Hydro2	Hydro2 thresholds	levelThresholdValue (1)		timeSeriesSet
			levelThresholdId	value	
			1 Flood Watch	1.9	

Presentation of data in FEWS

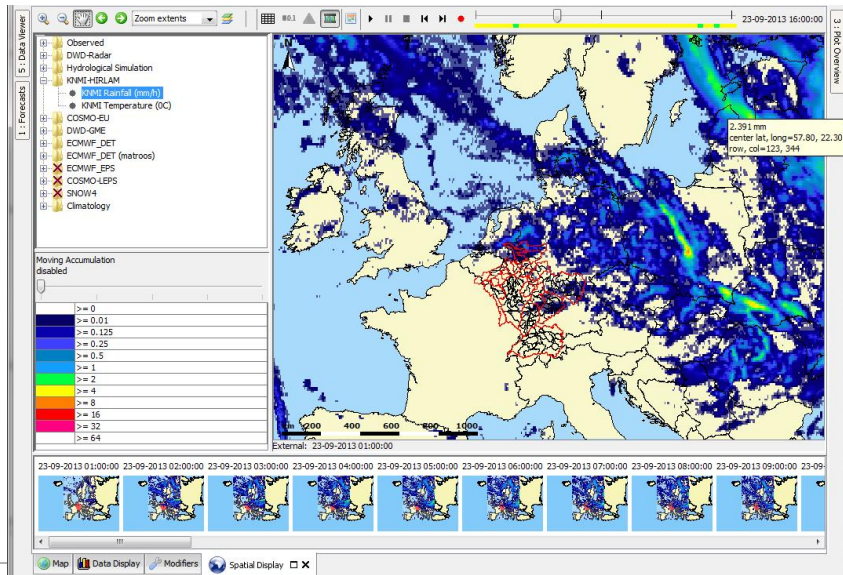
Visualisation



Visualisation of data in Delft-FEWS



Spatial / Grid Display



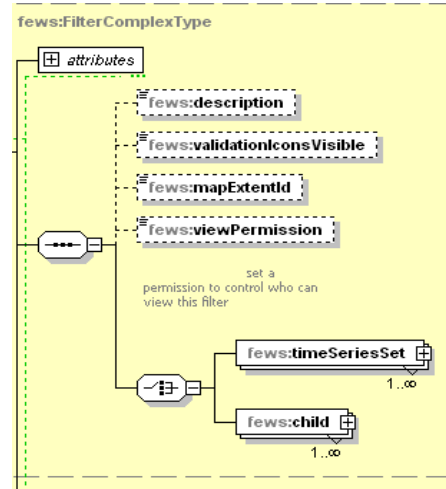
Display of data – Filter configuration

Filters are used to define the:

- locations displayed on the map
- locations displayed in the list box
- parameters displayed in the list box

Filter:

- organised in folders with child filters
- arrange time series sets in logical groups
- import elements in the time series set
 - extra options
 - view permissions
 - validation icons visible
 - link to map extent



Display of data – Filter Configuration

- [-] Gauges
- [-] Forecast Points
- [-] Catchments
- [-] COSMO2
- [-] COSMO7
- [-] COSMO7_Corr
- [-] ECMWF
- [-] COSMO-LEPS
- [-] Matrix limits

organised in sub-folders (childs)

child filter

id	Comment	child
1 Gauges	All hydrological gauges. Parameters: Q.obs, H.obs and Q.rated	child (5)
2 Forecast Points	All forecasting points	child (6)
3 Catchments	Observed and forecasted sub basin series	child (2)
4 COSMO2		child (3)
5 COSMO7		child (3)
6 COSMO7_Corr		child (3)
7 ECMWF		child (3)
8 COSMO-LEPS		child (3)

id	Comment	validationIconsVisible	timeSeriesSet
1 Hydrological Gauges	observed + rated WL + Q	true	timeSeriesSet (6)
2 Hydrological Alternative Gauges	observed + rated WL + Q	true	timeSeriesSet (2)
3 Hydrological Gauges thresholds	observed + rated WL + Q		timeSeriesSet (7)
4 Hydrological I Instate	Results from HRV models in the I Instate mode		timeSeriesSet (5)

Display of data - Filters - Extra options

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

Relative View Period for Icon on main map

Allow/Disallow editing

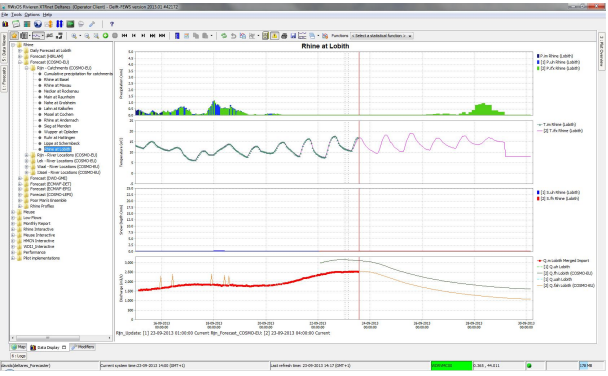
synchLevel – for live system (5 = edited data)

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

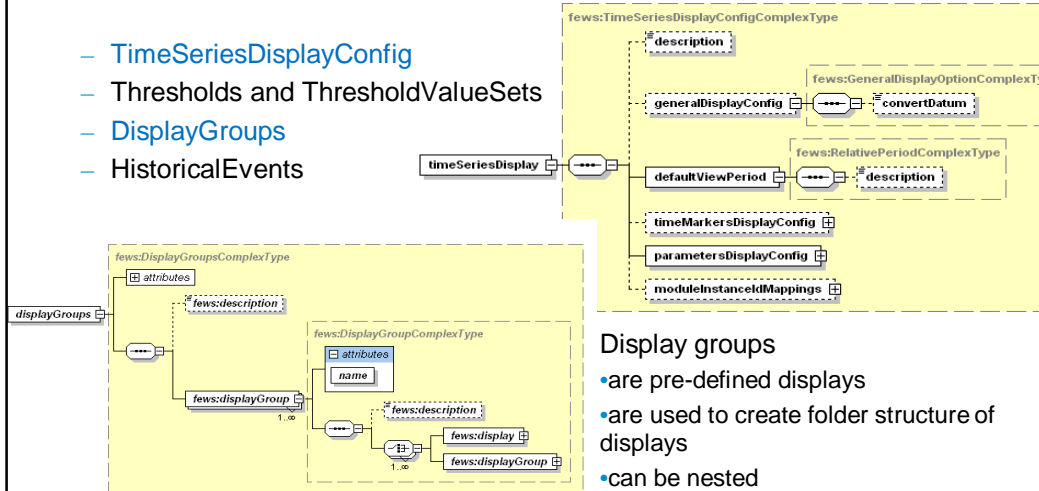
Time	Value	Unit
2013-09-01 00:00	1.2	m
2013-09-01 01:00	1.3	m
2013-09-01 02:00	1.4	m
2013-09-01 03:00	1.5	m
2013-09-01 04:00	1.6	m
2013-09-01 05:00	1.7	m
2013-09-01 06:00	1.8	m
2013-09-01 07:00	1.9	m
2013-09-01 08:00	2.0	m
2013-09-01 09:00	2.1	m
2013-09-01 10:00	2.2	m
2013-09-01 11:00	2.3	m
2013-09-01 12:00	2.4	m
2013-09-01 13:00	2.5	m
2013-09-01 14:00	2.6	m
2013-09-01 15:00	2.7	m
2013-09-01 16:00	2.8	m
2013-09-01 17:00	2.9	m
2013-09-01 18:00	3.0	m
2013-09-01 19:00	3.1	m
2013-09-01 20:00	3.2	m
2013-09-01 21:00	3.3	m
2013-09-01 22:00	3.4	m
2013-09-01 23:00	3.5	m
2013-09-02 00:00	3.6	m
2013-09-02 01:00	3.7	m
2013-09-02 02:00	3.8	m
2013-09-02 03:00	3.9	m
2013-09-02 04:00	4.0	m
2013-09-02 05:00	4.1	m
2013-09-02 06:00	4.2	m
2013-09-02 07:00	4.3	m
2013-09-02 08:00	4.4	m
2013-09-02 09:00	4.5	m
2013-09-02 10:00	4.6	m
2013-09-02 11:00	4.7	m
2013-09-02 12:00	4.8	m
2013-09-02 13:00	4.9	m
2013-09-02 14:00	5.0	m
2013-09-02 15:00	5.1	m
2013-09-02 16:00	5.2	m
2013-09-02 17:00	5.3	m
2013-09-02 18:00	5.4	m
2013-09-02 19:00	5.5	m
2013-09-02 20:00	5.6	m
2013-09-02 21:00	5.7	m
2013-09-02 22:00	5.8	m
2013-09-02 23:00	5.9	m
2013-09-03 00:00	6.0	m



Time Series Display - Configuration

Time Series Display uses 4 configuration files

- TimeSeriesDisplayConfig
- Thresholds and ThresholdValueSets
- DisplayGroups
- HistoricalEvents



Exercise

Exercise 8: Add pre-configured displays

Add pre-configured displays

- Add a new display group for the new locations
- Add a new display for the hydro locations
- Add a new display for the meteo locations



FEWS Gridded Data

Fews supports the display of both irregular and regular grids

Available (common) Import types

- ArcInfoAscii
- BIL
- BUFR
- CSV
- PI
- HDF5
- NetCDF

Deltares

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FEWS Gridded Data

Commonly used data types

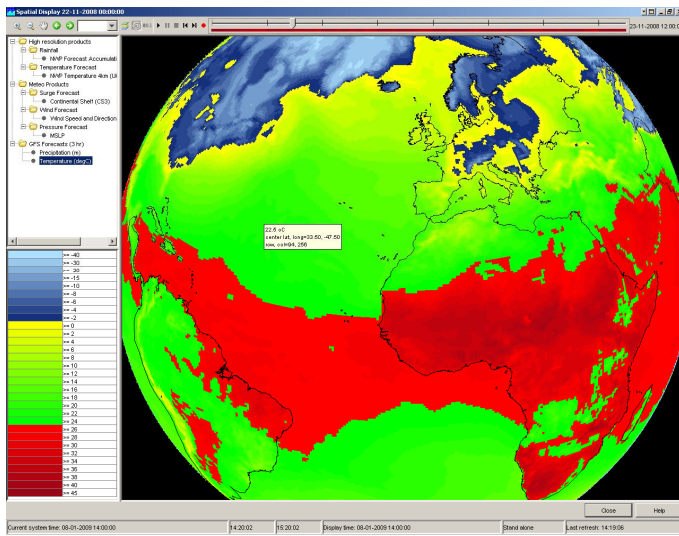
- Precipitation
- Soil Moisture
- Pressure
- Wind
- Temperature
- Water level
- Wave height
- Surge

FEWS Gridded Data

Data can be manipulated using transformation modules

- Cookie cutter
- Interpolation
- Transformation
- Data hierarchy

FEWS Gridded Data



Exercise

Exercise 13: Importing NWP grids