

Memo

To
CHPS

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Subject
Required and Optional Configuration updates CHPS in FEWS release 2014.02

1 Introduction

This FEWS release contains of

- a FEWS stable 2014.02 build
- install notes
- release notes general
- release notes CHPS
- **configuration update document**

This document will provide configuration update instructions for those features that are most interesting to NWS and BPA, either requested by NWS and BPA or by other customers. Chapter 4 lists general checks that may force the configurator to update the configuration.

Content of this document:

1	Introduction.....	1
2	Allow mods to be made to a single ensemble member	2
3	Differences in PeakFlow module.....	2
4	General Checks (from release notes)	6

2 Allow mods to be made to a single ensemble member

To create the ability to modify single ensemble member timeseries, add the option "**<perEnsembleMember>true</perEnsembleMember>**" to the relevant modifier in the modifierTypes:

```
<timeSeriesModifier id="tschng" name="TSCHNG">  
  <defaultStartTime>start run</defaultStartTime>  
  <defaultEndTime>end run</defaultEndTime>  
  <defaultValidTime/>  
  <resolveInWorkflow>false</resolveInWorkflow>  
  <resolveInPlots>true</resolveInPlots>  
  <perEnsembleMember>true</perEnsembleMember>  
</timeSeriesModifier>
```

3 Differences in PeakFlow module

The peakflow algorithms in FEWS are updated and moved to the Transformation module, to better reflect the functionality in the NWSRFS Peakflow operation.

The new function 'maximumAroundPeak' finds for each peak time from the inputPeaksVariable a maximum value from the inputVariable. The maximum value is searched in a period configured with a time window. This period can be configured with a time span, or with a number of whole days. If a time span is used, the maximum will be searched in this period :

time of the peak - time span <--> time of the peak + time span

If a number of whole days is use, the maximum will be searched in this period :

peak midnight - number of days + 1 timestep <--> peak midnight + number of days - 1 timestep

An example:

the timestep of the series the maximum should be search in is 1 hour

peak time is 01-01-2013 12:00 , then

peak midnight is 01-01-2013 00:00

and the maximum will be searched in this period 30-12-2012 01:00 <--> 02-01-2013 23:00

The function 'maximumAroundPeak' creates always one output series with maximum values, and 3 optional output series with maximum, value and time difference, all stored at peak time. With existing other functions, the statistics like RSME can be derived.

The procedure in the transformation module is as follows:

- Observed peaks can be imported or computed with existing peak transformation. Make sure that the existing peak transformation provides the peaks as required, i.e. one peak a day.

```
<transformation id="selectionPeaks">
  <selection>
    <peaks>
      <inputVariable>
        <variableId>Q.m</variableId>
      </inputVariable>
      <totalNumber>10</totalNumber>
      <outputVariable>
        <variableId>Q.peak</variableId>
      </outputVariable>
    </peaks>
  </selection>
</transformation>
```

- Use new transformation <maximumAroundPeak> to find for each observed peak an associated maximum in the (simulated) series. This transformation creates the (optional) output series that can be used by existing transformation statistical functions. The search window can be specified in two ways:
 - timeWindow: The maximum will be searched in this period : 'time of the peak - timeWindow' up to and including 'time of the peak + timeWindow'
 - timeWindowInWholeDays: The maximum will be searched in this period : 'day of the peak - timeWindowInWholeDays' up to and including 'day of the peak + timeWindowInWholeDays'

The output variables are:

- Output of the function: maximumAtActualTime (obligatory) : nonequidistant series with maximum found in the inputVariable, stored at actual time of the maximum value
- maximumAtPeakTime (optional) : nonequidistant series with maximum found in the inputVariable, stored at peak time
- valueDifference (optional): differences between the (observed) peak values and maximum value. Stored at peak time.
- timeDifference (optional): time differences between the (observed) peak time and the time of the found maximum. Stored at peak time. timeDifference is in millis if the option 'timeWindow' is configured. timeDifference is in whole days if the option

'timeWindowInWholeDays' is configured. This 'timeDifference' can be positive or negative. Showing all time differences as positive values should be settled in the reporting modules

```
<transformation id="maximumAroundPeak">
  <selection>
    <maximumAroundPeak>
      <inputVariable>
        <variableId>Q.sim</variableId>
      </inputVariable>
      <inputPeaksVariable>
        <variableId>Q.peak</variableId>
      </inputPeaksVariable>
      <timeWindowInWholeDays>2</timeWindowInWholeDays>
      <maximumAtActualTime>
        <variableId>Q.max</variableId>
      </maximumAtActualTime>
      <!-- 3 output variables below are optional -->
      <maximumAtPeakTime>
        <variableId>Q.max.atPeakTime</variableId>
      </maximumAtPeakTime>
      <valueDifference>
        <variableId>Q.diff.atPeakTime</variableId>
      </valueDifference>
      <timeDifference>
        <variableId>Time.diff.atPeakTime</variableId>
      </timeDifference>
    </maximumAroundPeak>
  </selection>
</transformation>
```

- The users can also use <user> <simple> transformation to produce statistics, or they can write their own class for <custom> <userDefined> transformation.

```
<transformation id="RMSE">
  <statisticsSummary>
    <rootMeanSquareError>
      <inputVariable>
        <variableId> Q.diff.atPeakTime </variableId>
      </inputVariable>
      <outputVariable>
        <variableId>Q.rmse</variableId>
      </outputVariable>
```

```
</rootMeanSquareError>  
</statisticsSummary>  
</transformation>
```

Also the reports module has some statistic functions. The report template (reportTemplate.html) may look like:

Observed peaks

Location: $\$LOCATIONNAME(Q.peak)\$$
 $\$TABLE(QpeakTable)\$$

Simulated peaks

Location: $\$LOCATIONNAME(Q.sim.peak)\$$
 $\$TABLE(QsimpeakTable)\$$

Q.peakdiff

Location: $\$LOCATIONNAME(Q.peakdiff)\$$
 $\$TABLE(Q.peakdiff)\$$

Observed peaks mean: $\$STATISTICS(MEAN;Q.peak;numberFormat1)\$$

Simulated peaks mean: $\$STATISTICS(MEAN;Q.sim.peak;numberFormat1)\$$

Discharge error mean: $\$STATISTICS(MEAN;Q.peakdiff;numberFormat1)\$$

Discharge ratio mean: $\$STATISTICSEXPRESSION(MEAN; (Q.peakdiff+Q.peak) /Q.peak;numberFormat1)\$$

Rms error : $\$STATISTICSEXPRESSION(RMSQ;Q.peakdiff;numberFormat1)\$$

4 General Checks (from release notes)

4.1 Stricter Configuration Check

Again, even stricter as in previous versions, Config.WARN messages have been 'upgraded' to Config.ERROR messages. When they appear at start up of Delft-FEWS they have to be resolved before the workflows run properly. Reason for stricter design is to prevent undesired related issues, which are often difficult to debug.

An example is the error when having duplicate accelerators short cuts in your Explorer.xml. If you get those errors, open your Explorer.xml and change the duplicate accelerator in the explorerTask to an unique one.

Another error is about duplicate moduleInstanceld's in one workflow. If you get those errors, search the referenced workflow in the Config/WorkflowFiles directory and check if there are duplicate moduleInstances listed. In the cases we have seen so far, those duplicates were invalid and had to be removed from the workflow.

4.2 Running ensembles in a loop

If your application runs ensembles in a loop, you have to verify your global.properties have the following option:

```
runInLoopParallelProcessorCount > 1
```

If this is the case, messages of the following type may appear while running these ensemble workflows.

Config.Error: An ensemble loop can only write ensemble time series. Time series sets with configured main are read-only within an ensemble loop.

An additional check has been added:

Config.Error: Every item in a workflow.xml file should write to different time series.

If these messages occur, you have to improve your configuration accordingly.