

How to set up a Sobek-RE model adapter in FEWS?

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General

Sobek-RE models can be used in FEWS with a SobekRE model adapter. The adapter works with the NEFIS files which are created in the SOBEK user interface. The adapter updates the timeseries and the simulation period in the NEFIS files only. Of course also the simulation results are converted back to FEWS PI format.

Setup of the model configuration

A typical setup of the model configuration is:

directory	contains
FEWS_Region\Modules\SobekRE\bin	Sobek binaries
FEWS_Region\Modules\SobekRE\MyModel\Config	adapter configuration
FEWS_Region\Modules\SobekRE\MyModel\Input	FEWS PI input files (updated boundaries etc)
FEWS_Region\Modules\SobekRE\MyModel\Output	FEWS PI output files (simulation results)
FEWS_Region\Modules\SobekRE\MyModel\Model	NEFIS files
FEWS_Region\Modules\SobekRE\MyModel\diagnostics	logfiles
FEWS_Region\Modules\SobekRE\MyModel\States	state files
FEWS_Region\Modules\SobekRE\MyModel\Work	working directory for simulation

General Adapter configuration

A typical GA file looks like:

```
<general>
  <rootDir>$REGION_HOME$/Modules/SobekRE/MyModel</rootDir>
  <workDir>%ROOT_DIR%/work</workDir>
  <exportDir>%ROOT_DIR%/input</exportDir>
  <exportDataSetDir>%ROOT_DIR%</exportDataSetDir>
  <exportIdMap>IdSobekRE</exportIdMap>
  <importDir>%ROOT_DIR%/output</importDir>
  <importIdMap>IdSobekRE</importIdMap>
  <dumpFileDir>%REGION_HOME%/Dump</dumpFileDir>
  <dumpDir>%ROOT_DIR%</dumpDir>
  <diagnosticFile>%ROOT_DIR%/Output/diagnostics.xml</diagnosticFile>
  <missVal>NaN</missVal>
  <convertDatum>true</convertDatum>
</general>
<burnInProfile>
  <length unit="hour" multiplier="6"/>
  <timeSeries>
    <parameterId>H.merged</parameterId>
    <locationSetId>H_Boundaries</locationSetId>
    <initialValue>-0.42</initialValue>
  </timeSeries>
</burnInProfile>
<activities>
  <startUpActivities>
    <purgeActivity>
      <filter>%ROOT_DIR%/work/*.*</filter>
    </purgeActivity>
  </startUpActivities>
</activities>
```

```

    <filter>%ROOT_DIR%/input/*.*/</filter>
</purgeActivity>
<purgeActivity>
    <filter>%ROOT_DIR%/output/*.*/</filter>
</purgeActivity>
<purgeActivity>
    <filter>%ROOT_DIR%/states/*.*/</filter>
</purgeActivity>
</startUpActivities>
<exportActivities>
    <exportStateActivity>
        <moduleInstanceId>MySobekREModel</moduleInstanceId>
        <stateExportDir>%ROOT_DIR%/States</stateExportDir>
        <stateConfigFile>%ROOT_DIR%/States/states.xml</stateConfigFile>
        <stateLocations type="file">
            <stateLocation>
                <readLocation>sobekrst.rda</readLocation>
                <writeLocation>sobekrst.nda</writeLocation>
            </stateLocation>
            <stateLocation>
                <readLocation>sobekrst.rdf</readLocation>
                <writeLocation>sobekrst.ndf</writeLocation>
            </stateLocation>
        </stateLocations>
        <stateSelection>
            <warmState>
                <stateSearchPeriod unit="hour" start="-96" end="0"/>
            </warmState>
        </stateSelection>
    </exportStateActivity>
    <exportTimeSeriesActivity>
        <exportFile>input.xml</exportFile>
        <exportBinFile>false</exportBinFile>
        <timeSeriesSets>
            <timeSeriesSet>
                <moduleInstanceId>MySobekREModel</moduleInstanceId>
                <valueType>scalar</valueType>
                <parameterId>H.merged</parameterId>
                <locationSetId>model_Hbnd</locationSetId>
                <timeSeriesType>simulated forecasting</timeSeriesType>
                <timeStep unit="hour"/>
                <relativeViewPeriod unit="hour" end="120" startOverrutable="true" endOverrutable="true"/>
                <readWriteMode>read only</readWriteMode>
            </timeSeriesSet>
            <timeSeriesSet>
                <moduleInstanceId>MySobekREModel</moduleInstanceId>
                <valueType>scalar</valueType>
                <parameterId>Q.merged</parameterId>
                <locationSetId>model_Qbnd</locationSetId>
                <timeSeriesType>simulated forecasting</timeSeriesType>
                <timeStep unit="hour"/>
                <relativeViewPeriod unit="hour" end="120" startOverrutable="true" endOverrutable="true"/>
                <readWriteMode>read only</readWriteMode>
            </timeSeriesSet>
            <timeSeriesSet>
                <moduleInstanceId>MySobekREModel</moduleInstanceId>
                <valueType>scalar</valueType>
                <parameterId>H.setpoint</parameterId>
                <locationSetId>model_setpoint</locationSetId>
                <timeSeriesType>simulated forecasting</timeSeriesType>
                <timeStep unit="hour"/>
                <relativeViewPeriod unit="hour" end="120" startOverrutable="true" endOverrutable="true"/>
                <readWriteMode>read only</readWriteMode>
            </timeSeriesSet>
            <timeSeriesSet>
                <moduleInstanceId>MySobekREModel</moduleInstanceId>
                <valueType>scalar</valueType>
                <parameterId>Gate</parameterId>
                <locationSetId>model_gateheight</locationSetId>
                <timeSeriesType>simulated forecasting</timeSeriesType>
                <timeStep unit="hour"/>

```

```

        <relativeViewPeriod unit="hour" end="120" startOverrulable="true" endOverrulable="true"/>
        <readWriteMode>read only</readWriteMode>
    </timeSeriesSet>
</timeSeriesSets>
    <omitEmptyTimeSeries>false</omitEmptyTimeSeries>
</exportTimeSeriesActivity>
</exportActivities>
<executeActivities>
    <executeActivity>
        <command>
            <className>nl.wldelft.fews.adapter.sobek.PreSobekModelAdapter</className>
        </command>
        <arguments>
            <argument>%ROOT_DIR%</argument>
            <argument>Config/sobekConfig.xml</argument>
        </arguments>
        <timeOut>60000</timeOut><!--1 min.-->
        <overrulingDiagnosticFile>%ROOT_DIR%/diagnostics/presobekmodeladapter.xml</overrulingDiagnosticFile>
    </executeActivity>
    <executeActivity>
        <command>
            <executable>%ROOT_DIR%/bin/sobeksim.exe</executable>
        </command>
        <arguments>
            <argument>%ROOT_DIR%/bin/sobeksim.fnm</argument>
        </arguments>
        <timeOut>600000</timeOut><!--10 min.-->
        <ignoreDiagnostics>true</ignoreDiagnostics>
    </executeActivity>
    <executeActivity>
        <command>
            <className>nl.wldelft.fews.adapter.sobek.PostSobekModelAdapter</className>
        </command>
        <arguments>
            <argument>%ROOT_DIR%</argument>
            <argument>Config/sobekConfig.xml</argument>
        </arguments>
        <timeOut>60000</timeOut><!--1 min.-->
        <overrulingDiagnosticFile>%ROOT_DIR%/diagnostics/postsobekmodeladapter.xml</overrulingDiagnosticFile>
    </executeActivity>
</executeActivities>

<importActivities>
    <!-- Import results-->
    <importTimeSeriesActivity>
        <importFile>flowmap.xml</importFile>
        <timeSeriesSets>
            <timeSeriesSet>
                <moduleInstanceId>MySobekREModel</moduleInstanceId>
                <valueType>scalar</valueType>
                <parameterId>H.sim</parameterId>
                <locationSetId>SobekREModel</locationSetId>
                <timeSeriesType>simulated forecasting</timeSeriesType>
                <timeStep unit="hour"/>
                <readWriteMode>add originals</readWriteMode>
            </timeSeriesSet>
            <timeSeriesSet>
                <moduleInstanceId>MySobekREModel</moduleInstanceId>
                <valueType>scalar</valueType>
                <parameterId>Q.sim</parameterId>
                <locationSetId>SobekREModel</locationSetId>
                <timeSeriesType>simulated forecasting</timeSeriesType>
                <timeStep unit="hour"/>
                <readWriteMode>add originals</readWriteMode>
            </timeSeriesSet>
        </timeSeriesSets>
    </importTimeSeriesActivity>
    <importTimeSeriesActivity>
        <importFile>struchis.xml</importFile>
        <timeSeriesSets>
            <timeSeriesSet>

```

```

<moduleInstanceId>MySobekREModel</moduleInstanceId>
<valueType>scalar</valueType>
<parameterId>Q.sim</parameterId>
<locationSetId>structures</locationSetId>
<timeSeriesType>simulated forecasting</timeSeriesType>
<timeStep unit="hour"/>
<readWriteMode>add originals</readWriteMode>
</timeSeriesSet>
</timeSeriesSets>
</importTimeSeriesActivity>
</importActivities>
</activities>

```

IdMapping

The idMapping from FEWS to SobekRE should be:

FEWS parameter	Sobek ParameterID
Water level boundary	H
Discharge boundary	Q
Salt concentration	S
Lateral flow	L
Gate height	GATE HEIGHT
Crest Level	CREST LEVEL
Crest Width	CREST WIDTH
Wind velocity	WIND VELOCITY
Wind direction	WIND DIRECTION
Trigger	TRIGGER
Setpoint	SETPOINT

The output parameters from SobekRE are:

file	parameter
flowmap. his	Water level
flowmap. his	Discharge Total
flowstruc. his	Discharge
flowstruc. his	Crest level
flowstruc. his	Gate height



Note that wind direction should be defined as the direction where the wind goes to. This is because we insert the time series directly into the numerical core, where the hydraulic equations use the wind as a positive force.
To convert the usual wind directions (where north=0 and defined as where the wind comes from) simply add 180 to the values:

```
direction = direction + 180
```

Note also that the wind can only be defined as a global series. Although Sobek allows for local definitions, the adapter does not handle that.

Adapter Configuration file

```
<?xml version="1.0" encoding="UTF-8"?>
<sobekModel 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/sobekModel.xsd" version="
1.1">
  <description>String</description>
  <directories>
    <configDir>config</configDir>
    <workDir>work</workDir>
    <moduleDir>model</moduleDir>
    <importDir>input</importDir>
    <exportDir>output</exportDir>
  </directories>
  <adapterfiles>
    <stateFile>..\States\states.xml</stateFile>
    <diagnosticFile>diagnostic.xml</diagnosticFile>
  </adapterfiles>
  <modelFiles>
    <mdaFile>sobek.mda</mdaFile>
    <dataFile>sobekrst.rda</dataFile>
    <definitionFile>sobekrst.rdf</definitionFile>
    <mapFile>flowmap.his</mapFile>
    <returnFile>sobekhd.rtn</returnFile>
  </modelFiles>
</sobekModel>
```

Sobek Binaries

This directory should contain the next files:

- DFORRT.DLL
- Sobeksim.exe
- sobeksim.fnm
- stkkrd.dll

Sobeksim.fnm should be changed to:

```
[Restart Files]
NrOfFiles=4
rda=..\states\sobekrst.rda
rdf=..\states\sobekrst.rdf
nda=..\states\sobekrst.nda
ndf=..\states\sobekrst.ndf
```