Deltares

Delft-FEWS Stable 2022.01 New features

Delft-FEWS User Days Australia

Delft-FEWS Product Management

Marcel Ververs and Gerben Boot

August 2022

Introduction…

- Welcome
- What's new (in 2022.01)?
  - Benchmarks & some highlights from 2021.02
  - Delft-FEWS Ecosystem
  - Open Archive, Webservices, WebOC
- Documentation and software maintenance
- Outlook to 2022.02

As usual: Links for more info

Link to documentation

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But first…the **development** team!

- **Developments**: *new features, bugfixing, refactoring*
  - Java based (platform independent)
  - ± 9 full/part time developers
  - 2 stable releases/year (Spring/*.01 and Autumn/*.02)
- **Stand-ups**
  - 5x/week (physically / MS Teams / hybrid) – 15mins
  - Daily (Tue: a bit longer…)
- **Stuurgroep ('assessment board')**
  - Discussion & estimating new features
  - Gerben (FEWS-PM), Onno (main developer) + Hydrologist (Peter, Klaas-Jan or Marc)
  - Ad hoc additions: PLs, other developers
  - Every Monday at 13:00

	Name	Since	Expertise
	**Onno** vd Akker	2003	sr developer Main architect
	**Andre** Grijze	2008	sr developer Open Archive Modifiers
	**Jitka** Tacoma	2003	Displays NetCDF
	**Camiel** Van Breugel	2010	Databases Backend components and installations
	**Rudie** Ekkelenkamp	2014	FEWS webservices Cloud
	**Erik** Pelgrim	2012	Model Adapters Samples, Statistics
	**Bart** Adriaanse	2019	Model adapters, schematic status display (+webservice)
	**Orshi** Egressy-Molnar	2019	(server) imports, transformation, open archive
	**Mozhan** Soltani	2020	jr developer Dashboards, development process

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Let's not forget:
Support & Maintenance & Backend Experts

	Name	Department	Expertise
	**Andre** Speelmans	ZWS-OWM	LINUX
	**Gerrit** Niestijl	ZKS-HAF	WINDOWS

2nd line (config-experts)

	Name	Department	Role
	**Jan** Talsma	ZWS-OWM	Delft-FEWS Support Officer
	**Boyan** Domhof	ZWS-OWM	Delft-FEWS Support Officer
	**Bob** Van Rongen	ZKS-HAF	Delft-FEWS Support Officer
	**Olav** Van Duin	ZWS-OWM	Delft-FEWS Support Officer
	**Thies** Blokhuijsen	ZKS-HAF	Delft-FEWS Support Officer *(rookie)*
	**Klaudia** Horvath	ZWS-OWM	Delft-FEWS Support Officer
	**Pieter** Verdoorn	DSC-MDS	DSC Support Officer (1st line)
	**Sonny** De Wit	DSC-MDS	DSC Support Officer (1st line)

1st line (e-mail)

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Delft-FEWS 2021.02 Benchmarks

Delft-FEWS 2021.02

- **159** new features
- **444*** bugs reported (403 fixed)
- **13** new import modules
- **18** new features in FEWS-webservices
- **6** improvements to the admin interface
- **6** new features in timeseries display
- **6** new data transformations
- **9** new features in the FEWS Explorer
- **6** new export modules
- **5** improvements to the open archive
- **1** new display
- **1** improved/matured concept (CF)

(*majority of bugs found and resolved during testing)

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[Delft-FEWS International User Days presentation]

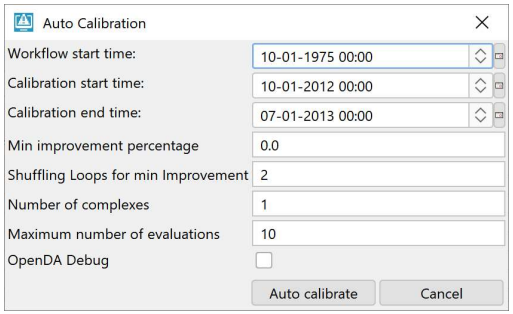
[Release Notes + documents (wiki)]

[New Features 2021.02 Webinar]

Some highlights from 2021.02…

- Auto Calibration using Delft-FEWS

Parameter name	KLCA2LWR		
	original value	modified value	
SCF	1	0.243	**AC**
MFMAX	0.85	0.85	AC
MFMIN	0.1	0.1	AC
NMF	0.15	0.15	AC
UADJ	0.05	0.05	AC
SI	9999	9999	AC
DAYGM	0	0	AC
MBASE	0	0	AC



- Sample Viewer extensions

Start Time: 01-01-1900 01: End Time: 01-01-2100 01: Heel jaar Apply

Location Name	Sample Id	Namespace	X_m...	Y_m
Woerden Wijkpark Molenvliet Woerden (95)	18-21095_WD95_OW_ECO	NL14		
Woerden Wijkpark Molenvliet Woerden (95)	18-21095_WD95_OR_ECO	NL14		
Houten Imkerpark (296)	18-21296_HT296_OW_ECO	NL14		
Houten Imkerpark (296)	18-21296_HT296_OR_ECO	NL14		

Location Name	Parameter Name	Value	Unit	Comment	Taxontype	Biotaxon
1	2	17	2	1	1	2
21112 Woerden ...	Bedekking[%]	3	%	Edited	Macrofyten	Nuphar lutea
21112 Woerden ...	Bedekking[%]	1	%		Macrofyten	Ceratophyllum demersum
21112 Woerden ...	Bedekking[%]	0	%		Macrofyten	
21112 Woerden ...	Bedekking[%]	0	%		Macrofyten	
21112 Woerden ...	Bedekking[%]	5	%		Macrofyten	
21112 Woerden ...	Bedekking[%]	0	%		Macrofyten	
21112 Woerden ...	Bedekking[%]	5	%		Macrofyten	
21112 Woerden ...	Bedekking[%]	1	%		Macrofyten	
21112 Woerden ...	Breedte[m]	17	m		Macrofyten	

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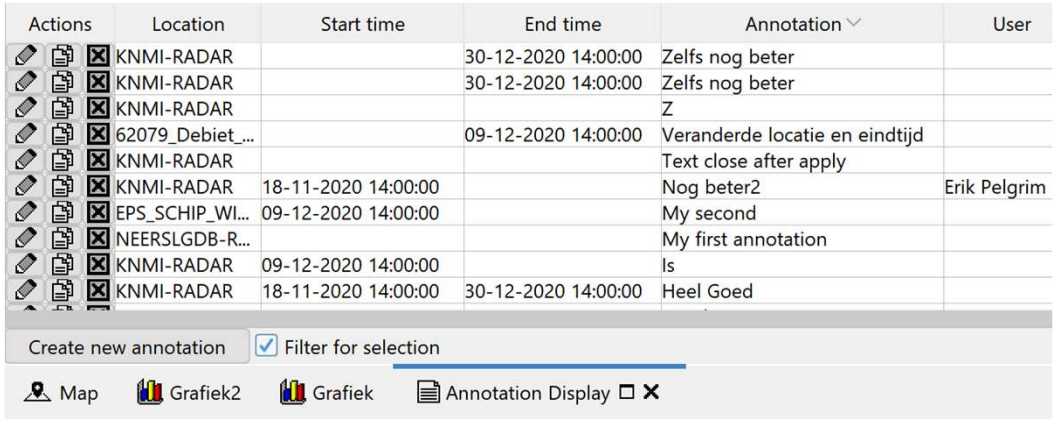
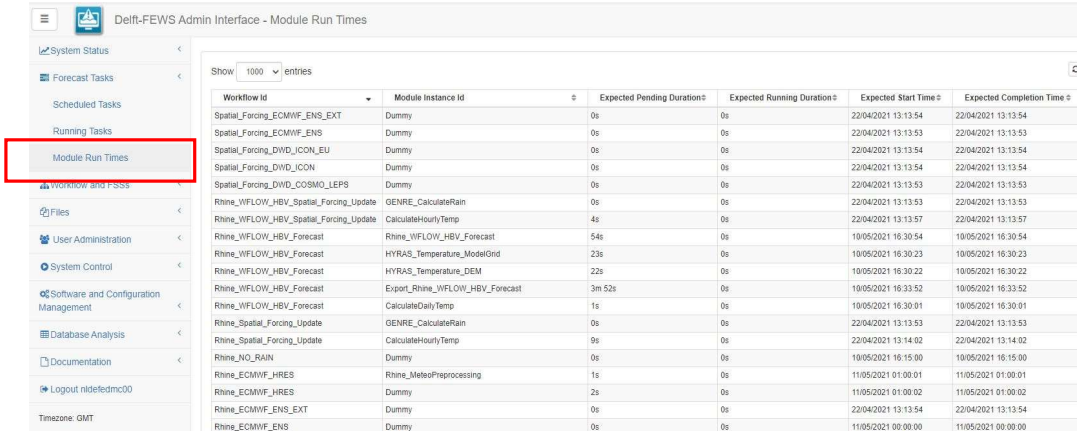
Some highlights from 2021.02…

- Annotations Display

(Notes on location level instead of time series & time step level)



- Admin Interface improvements
  - Upload of (zipped) config
  - Manage Base builds
  - Module Run Times information (also in client/webservice)



Delft-FEWS 2022.01 Benchmarks

106 new features (implemented)

258 bugs reported (**215** fixed)

6 new import modules

10 new features in FEWS-webservices

1 webservice: National Register (NL)

6 new features in timeseries display

4 new data transformations

9 new features in the FEWS explorer

8 new export modules

14 improvements to the open archive

1 new display

4 improvements to WhatifEditor

Pilot: dynamic Release Notes

Release Notes + documents (wiki)

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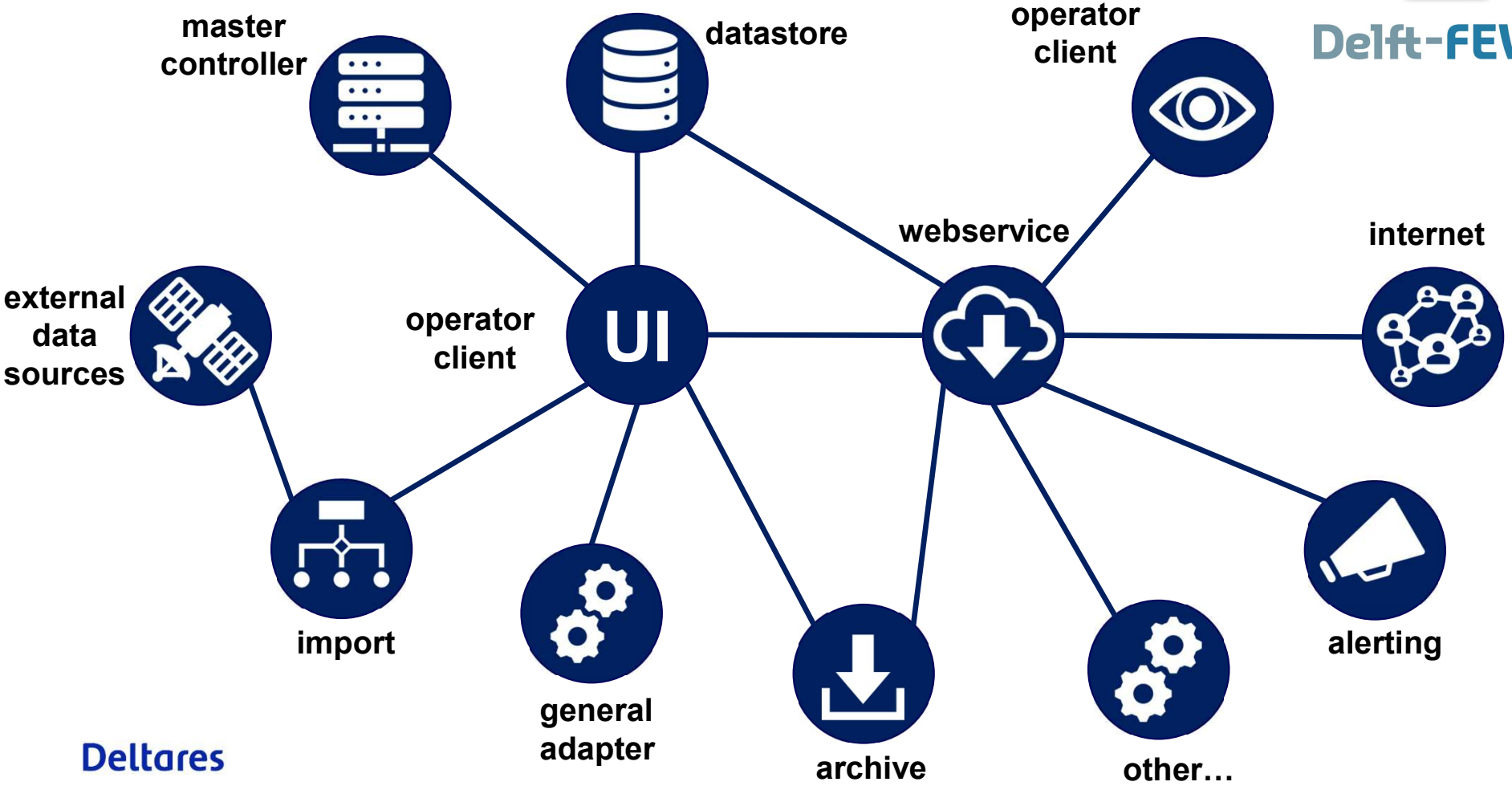
Delft-FEWS *Ecosystem*



Delft-FEWS

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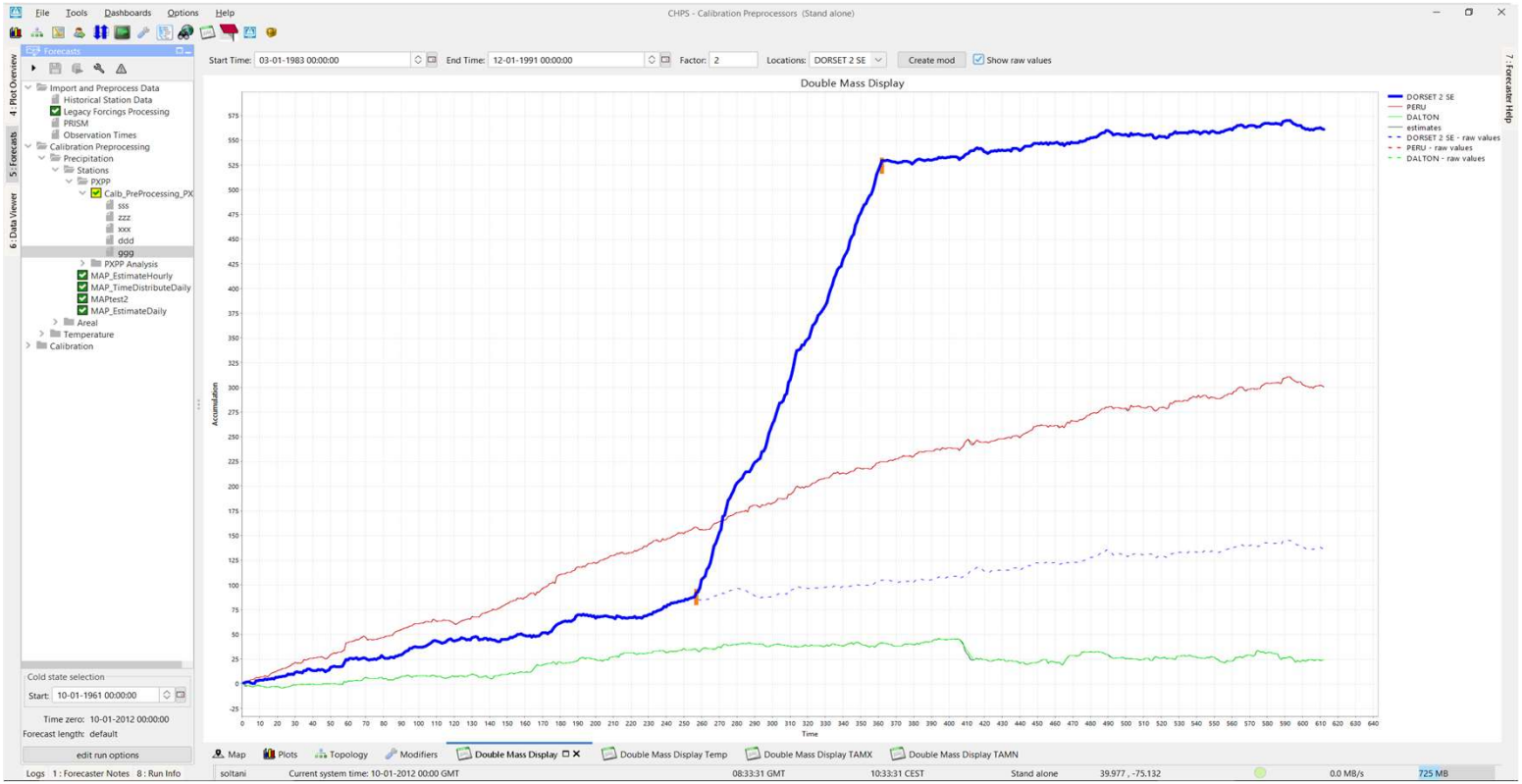
UI

Client – Interactive Double Mass Display



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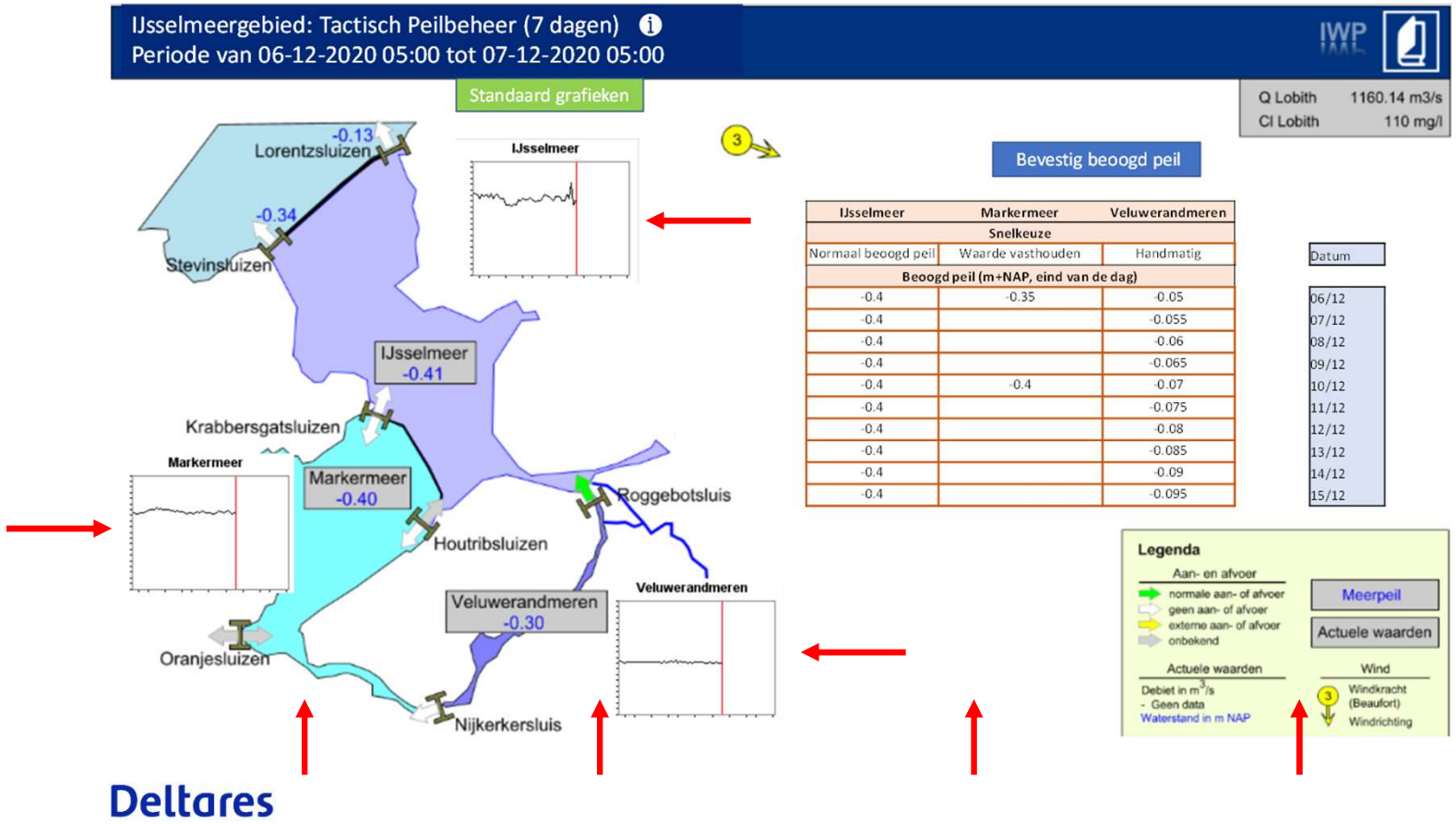
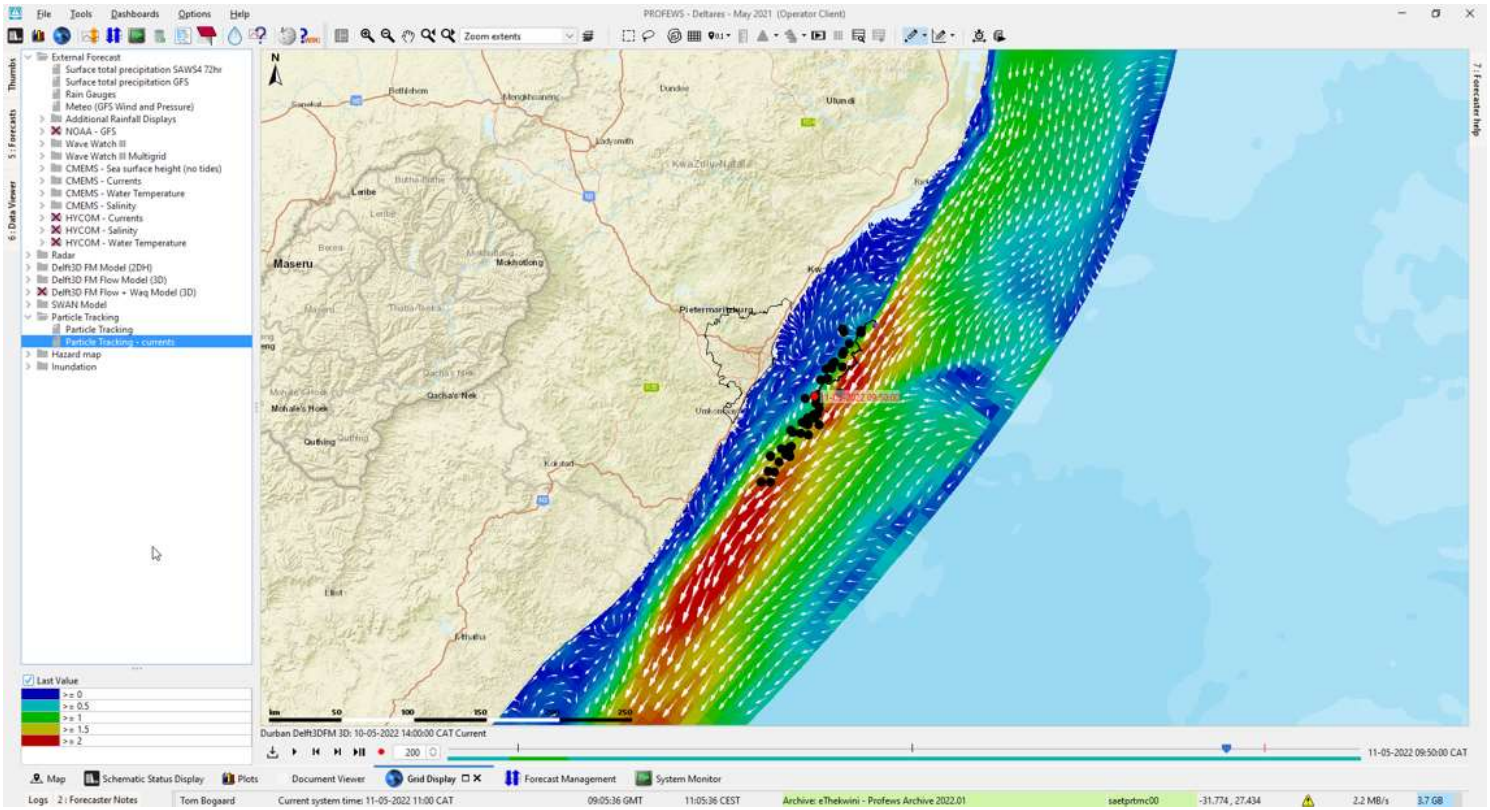
UI

Client – Thumbnails in Schematic Status Display



UI

Client – Spatial Display



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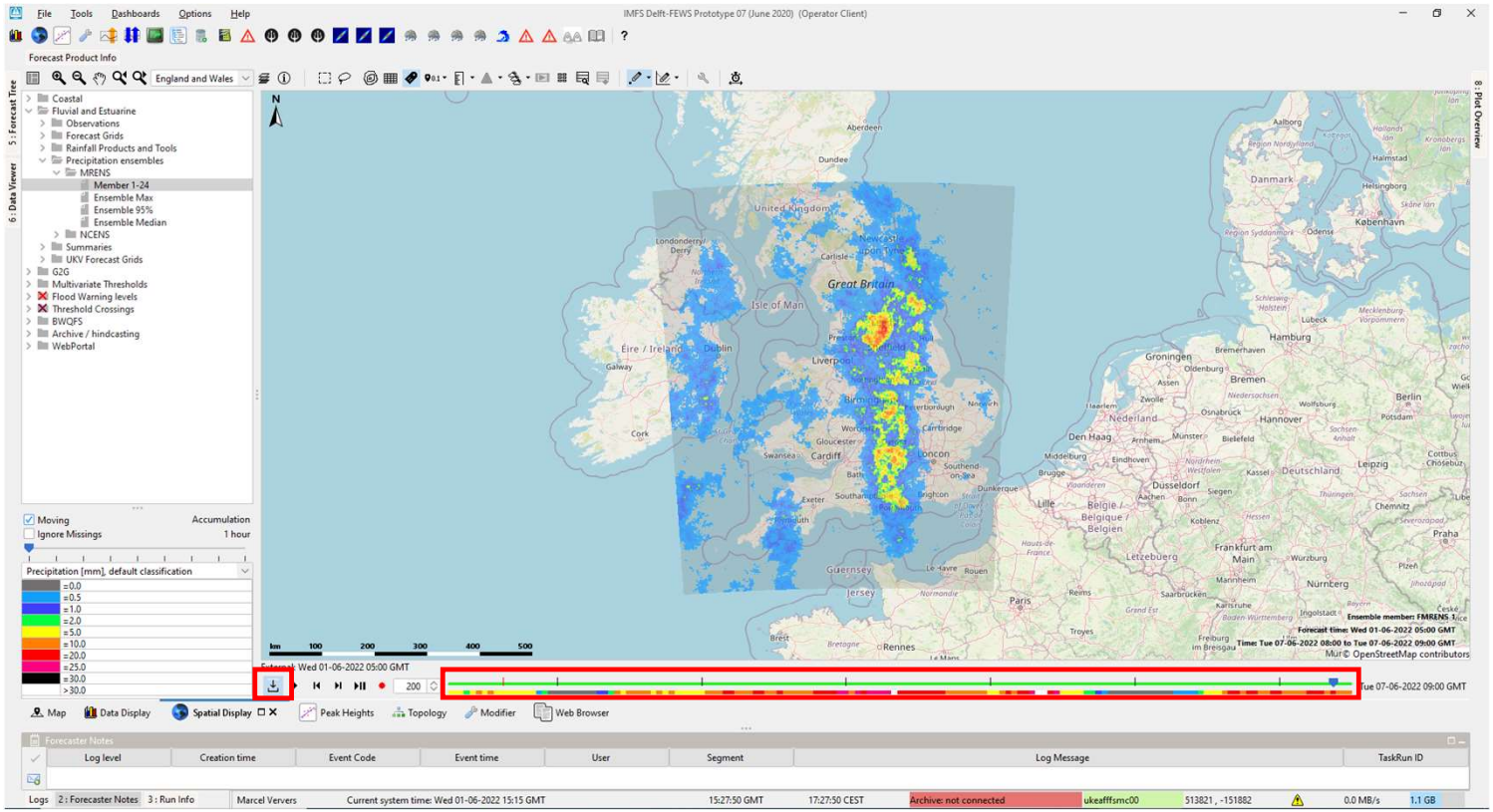
Client – Spatial Display



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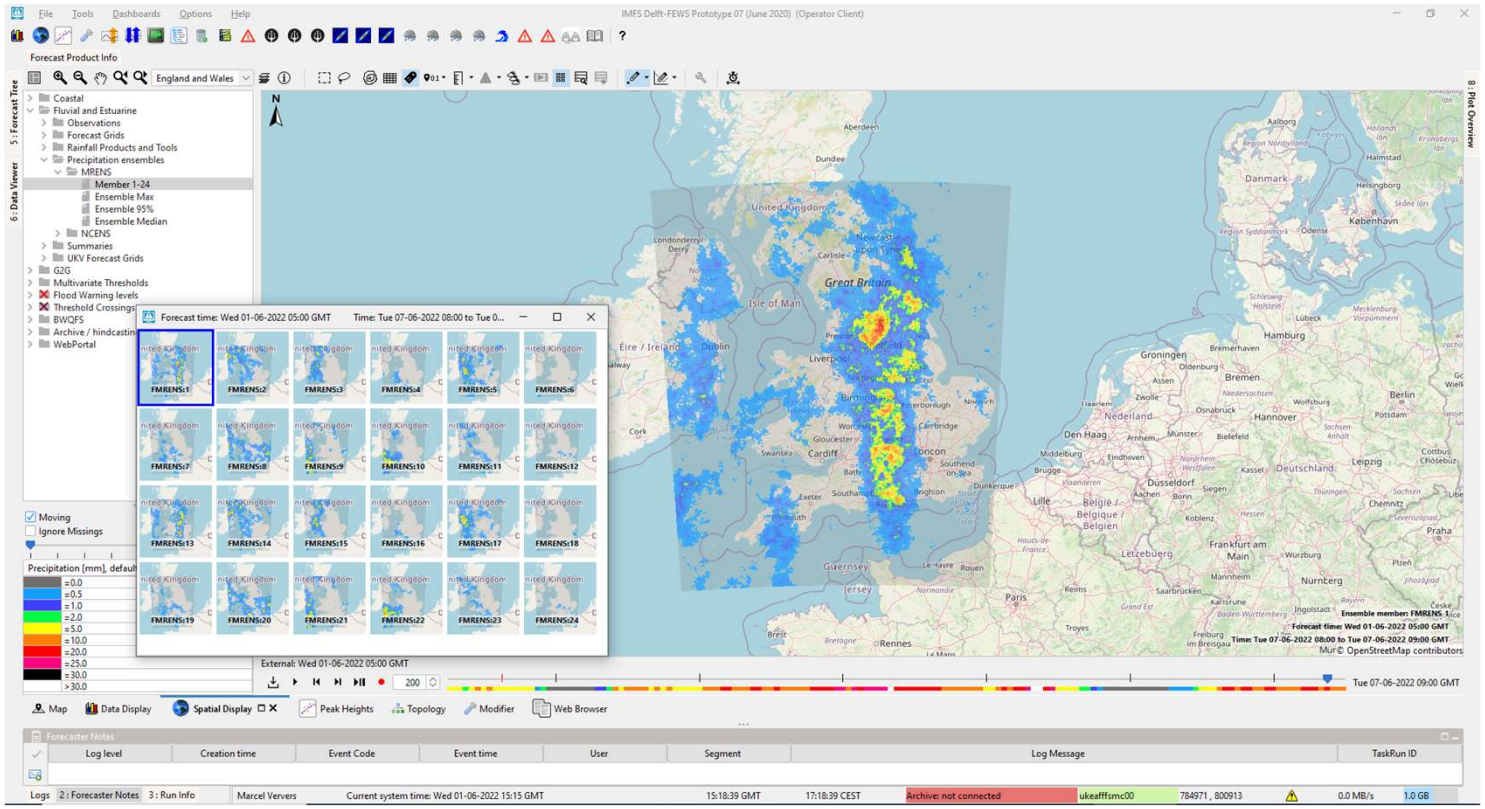
UI

Client – Spatial Display



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UI

Client – Spatial/Map Display

- Use a geoJSON files instead of shape files for your maps
- Support geoJSON for defining LocationSets

Demo geoJSON file

```
<geoJsonLayer id="geojson">
  <file>provinces.geojson</file>
  <shapeType>polygon</shapeType>
  <visible>false</visible>
  <lineColor>black</lineColor>
  <fillColor>light yellow</fillColor>
</geoJsonLayer>
```

```
<locationSet id="Provinces">
    <geoJsonFile>
        <file>provinces.geojson</file>
        <shapeType>polygon</shapeType>
        <id>%name%</id>
        <name>%name%</name>
        <attribute id="level">
            <number>%level%</number>
        </attribute>
    </geoJsonFile>
</locationSet>
```

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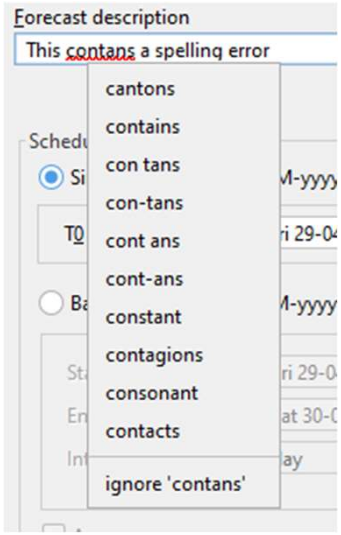
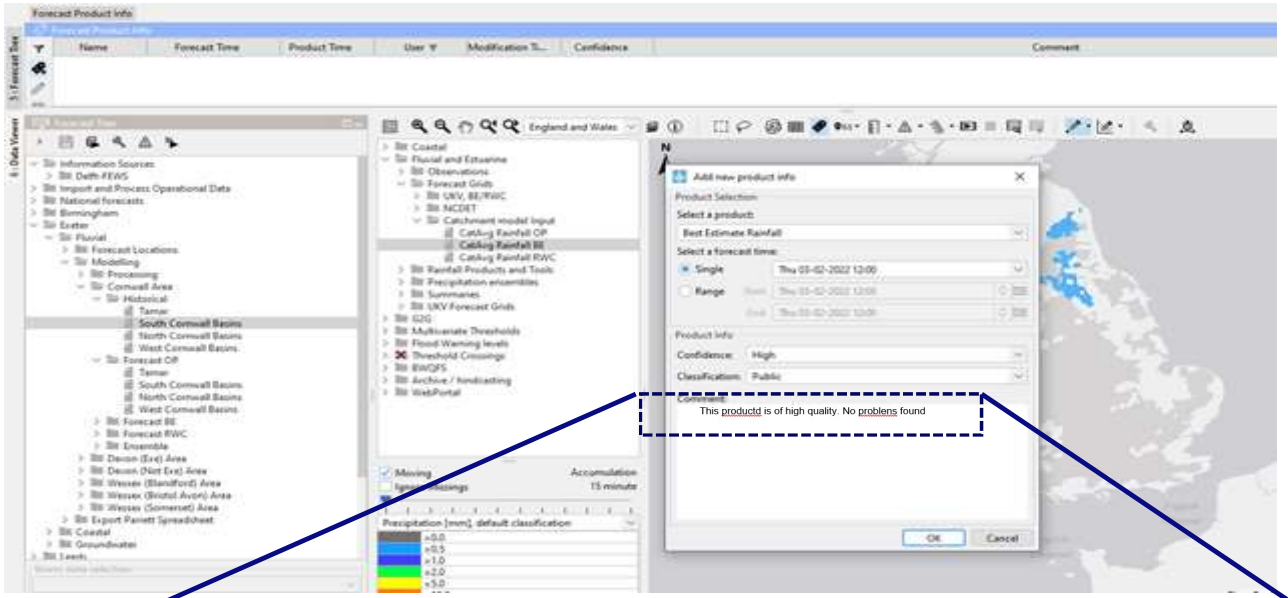
Client – Spell checker added to various panels

- Spelling checker functionality has been added to: **Annotation panel**, **Forecast Product Info panel**, **Data search panel**, **Manual Forecast dialog** and **Timeseries Dialog** (comment editor) and is available for Dutch, English (UK, US, AUS), Spanish and French.

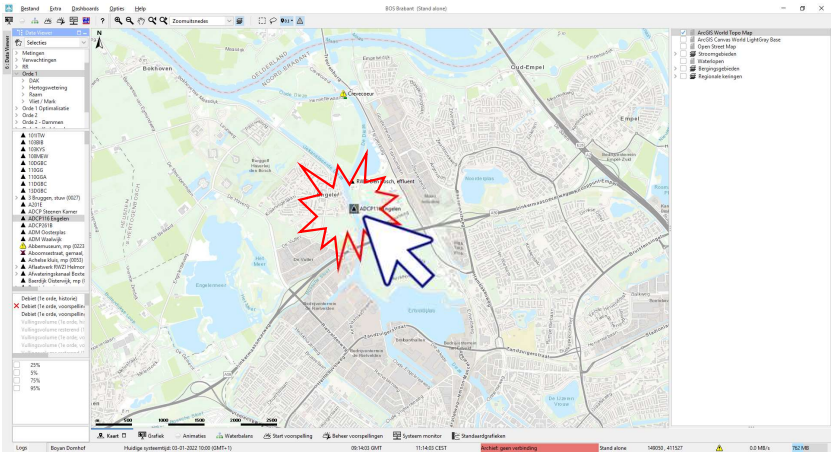


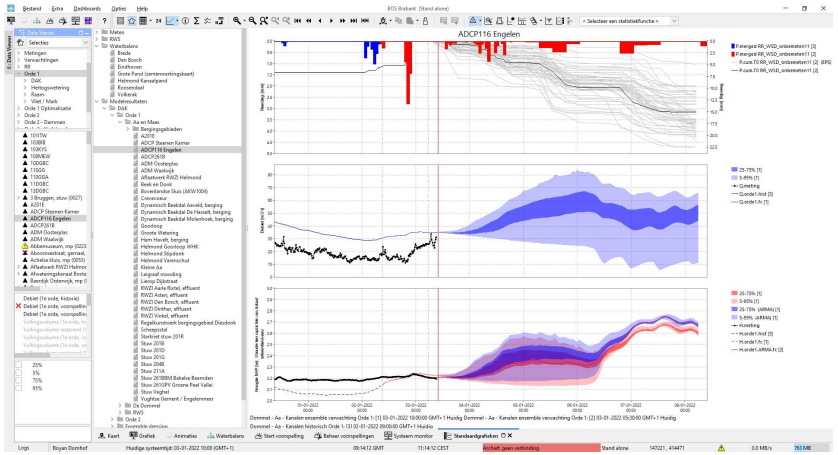


UI

Double-click on location in map or list opens chart

- New option **<doubleClickLocationEnabled>** in displayGroups.xml





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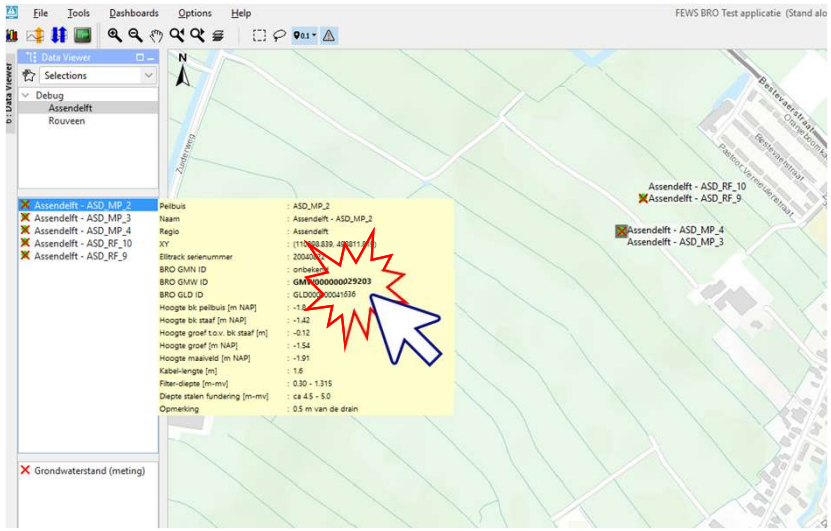
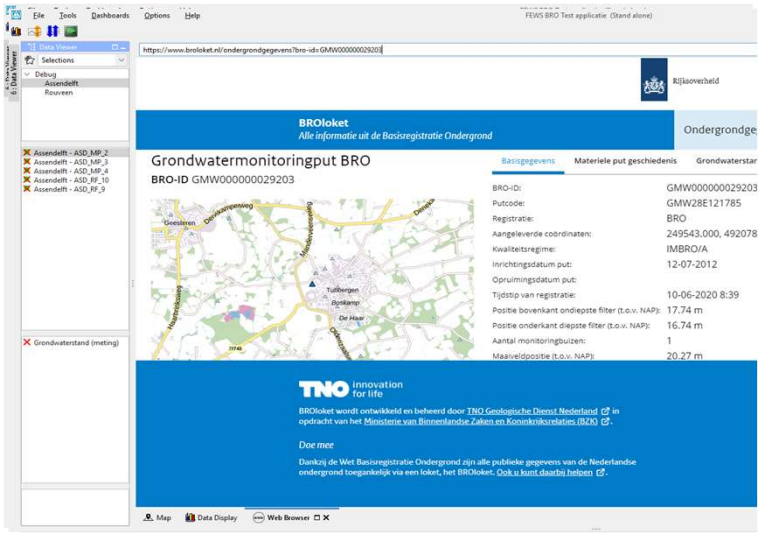
UI

Client – Display hyperlinks in tooltips in embedded Web browser

- Hyperlink can be included in a location tooltip. The <href> (url) configured there can be opened in the default/internal Web Browser Display. Web Browser Display must be configured for this, including some settings must be specified. Settings are: pages must be whitelisted in WebBrowserDisplay.xml





UI

Client - <F12> menu now permission-aware

- Enable <F12> menu if the user has **debugMenuPermission**. If this is not configured, then the F12 menu is accessible by everyone.

DebugMenuPermission

If the user has the debug menu permission, by pressing F12, the debug menu appears. Please note, if this permission is not configured, then the debug menu can be accessed by all users. An example of how to configure the debug menu permission and an screenshot of the debug menu follow:

```
<debugMenuPermission>admin</debugMenuPermission>
```

UI

Time dependent locations (datum)

- Long term (observed) timeseries may change in datum (z).
- To assess the timeseries as one, the settings ‘before’ and ‘after’ this change (date) can be configured.

```
<locationSet id="LocationSetWithTimeDependentAttributes">
   <csvFile>
      <file>TimeDependentLocationSet.csv</file>
      <id>%id%</id>
      <x>0</x>
      <y>0</y>
      <attributeFile>
         <csvFile>TimeDependentLocationSetAttributes.csv</csvFile>
         <id>%id%</id>
         <startDateTime>%START%</startDateTime>
         <endDateTime>%END%</endDateTime>
         <z>%z%</z>
         <attribute id="timeDependentAttribute">
            <text>%timeDependentAttribute%</text>
         </attribute>
      </attributeFile>
   </csvFile>
</locationSet>
```

```
ID;START;END;timeDependentAttribute;z
TD_Loc1;19000101;21000101;A;1
TD_Loc2;19000101;19850103;A;2
TD_Loc2;19850103;21000101;B;3
TD_Loc3;19000101;19850103;B;4
TD_Loc3;19850103;21000101;A;5
TD_Loc4;19000101;19850103;A;6
TD_Loc4;19850103;21000101;B;7
TD_Loc5;19000101;19850103;A;8
TD_Loc5;19850103;21000101;B;9
```

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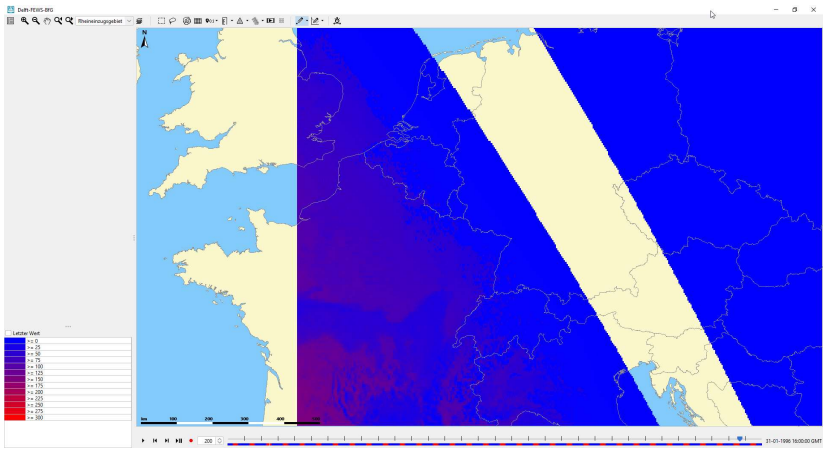
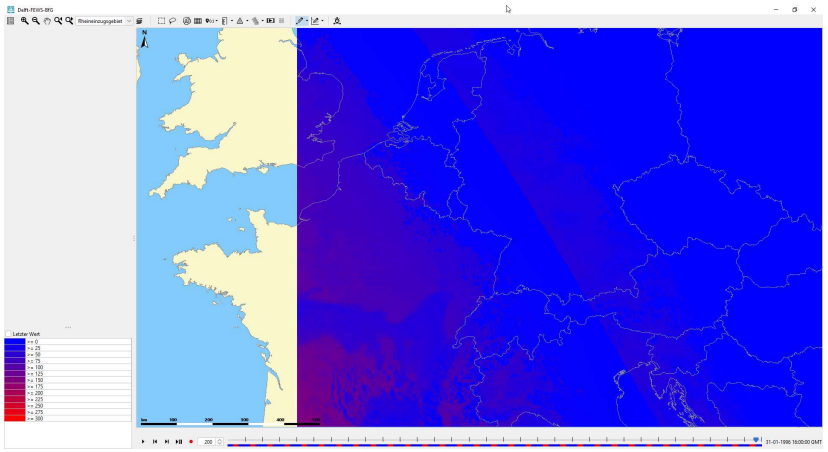
Transformation: InterpolationSerial Linear for grids

- Besides filling full grid ‘gaps’ in time, you can now also interpolate missing single pixel by linear interpolation between values before and after the time of the missing data.





```
<transformation id="fill_gap">
  <interpolationSerial>
    <linear>
      <inputVariable>
         <variableId>                    /variableId>
      </inputVariable>
      <maxGapLength>6</maxGapLength>
      <interpolateMissingGridCells>true</interpolateMissingGridCells>
      <outputVariable>
         <variableId>TMP_GLOB_FILLED</variableId>
      </outputVariable>
    </linear>
   </interpolationSerial>
</transformation>
```

Click to edit

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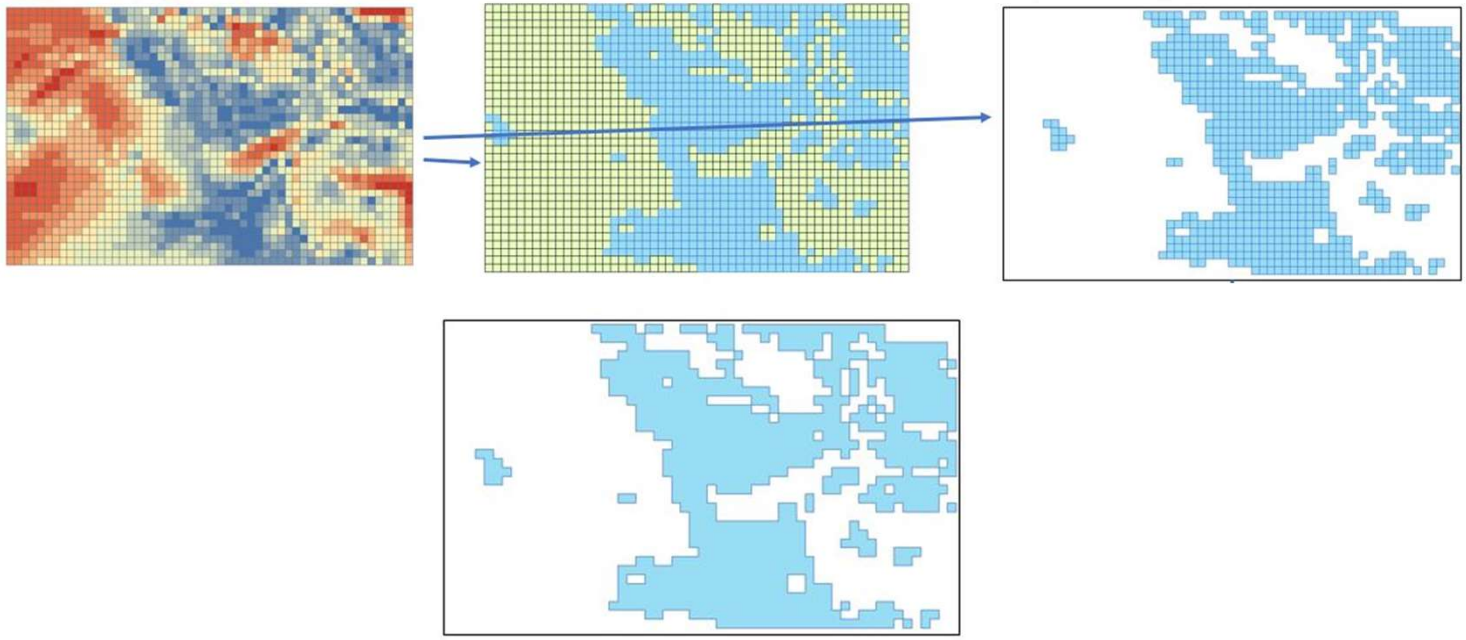
Transformation: Convert (regular) grid cells to polygons based on certain class breaks

- Create (and export) nice **polygon shape files** (incl. prj) based on gridded data, e.g. flood extent. The polygons are created on the basis of **class breaks** which can be configured



Export module: configuration option to export changes

- A new option has been added to the export timeseries module to only export changes in a configured period.
- Use the configuration option **<exportChanges>**

```
<general>
    <exportType>PI</exportType>
    <folder>$EXPORT_FOLDER$</folder>
    <exportFileName>
        <name>exportedTimeSeries.xml</name>
    </exportFileName>
    <exportChanges>
        <dbChangeViewPeriod unit="day" multiplier="2"/>
    </exportChanges>
</general>
```

Export module: other features

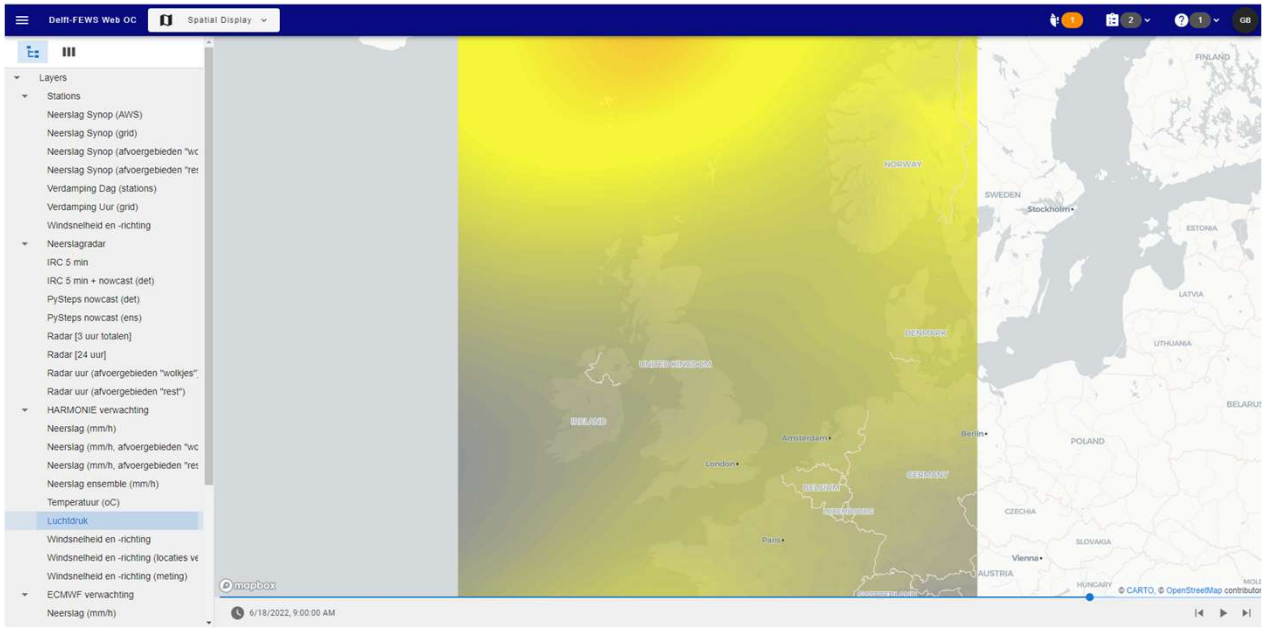
- Improvements to CAP exports **(CAP= Common Alerting Protocol)**

- Shape file exports
  - PRJ file added
  - Add configurable attribute table (e.g. polygonId or pointId for joining GIS data)

- NetCDF file export
  - Delft-FEWS attributes can be exported as metadata of a NetCDF file

Delft-FEWS Webservices

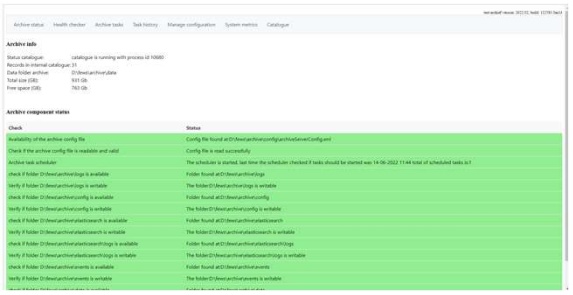
- Calling “getMap” is now much easier since a default time is returned for external historical and external forecasting timeseries. By default the **last timestep** is returned.
- Security improvements by enabling support for **Open ID Connect** to authorize API requests. It’s also possible to integrate Delft-FEWS User Groups & Permissions configurations with Open ID Connect.

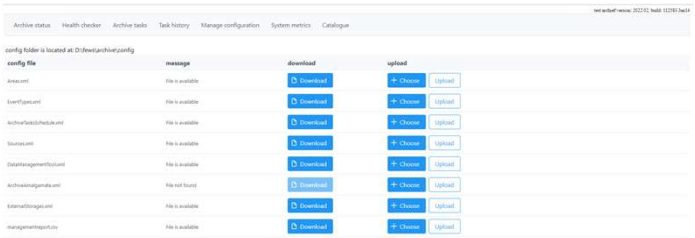


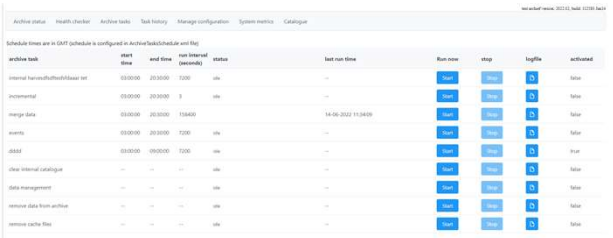
Source: web oc test client (Deltares)

Open Archive

- MongoDB + Seamless integration (improved Open Archive database API)
- Search options improved with custom-IDs (provided at export) to be used as filters
- Import datasets from Archive into client-server system is possible (but default off)
- Direct download (via Archive display, Archive catalogue) without OpenDAP
- Look & feel (Archive admin console)

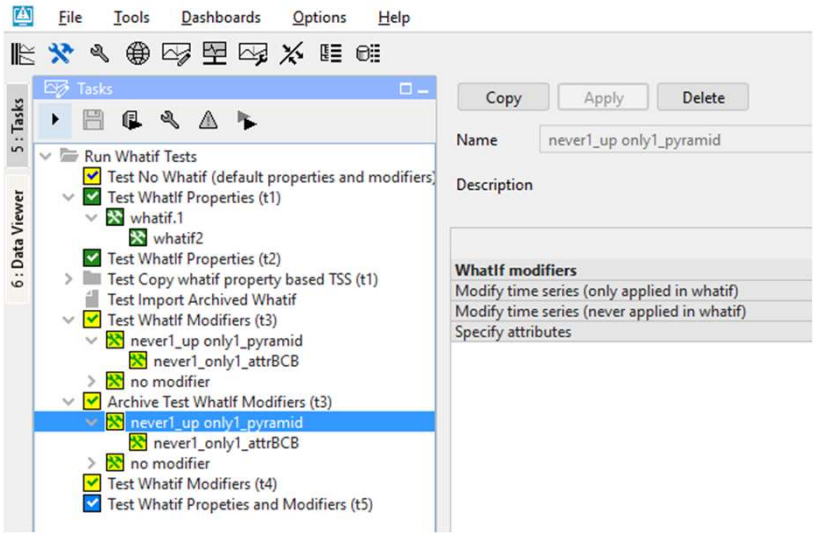


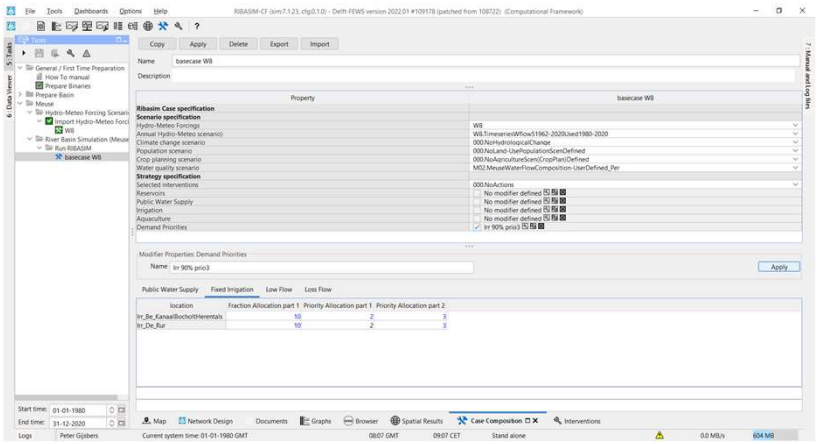




Computational Framework

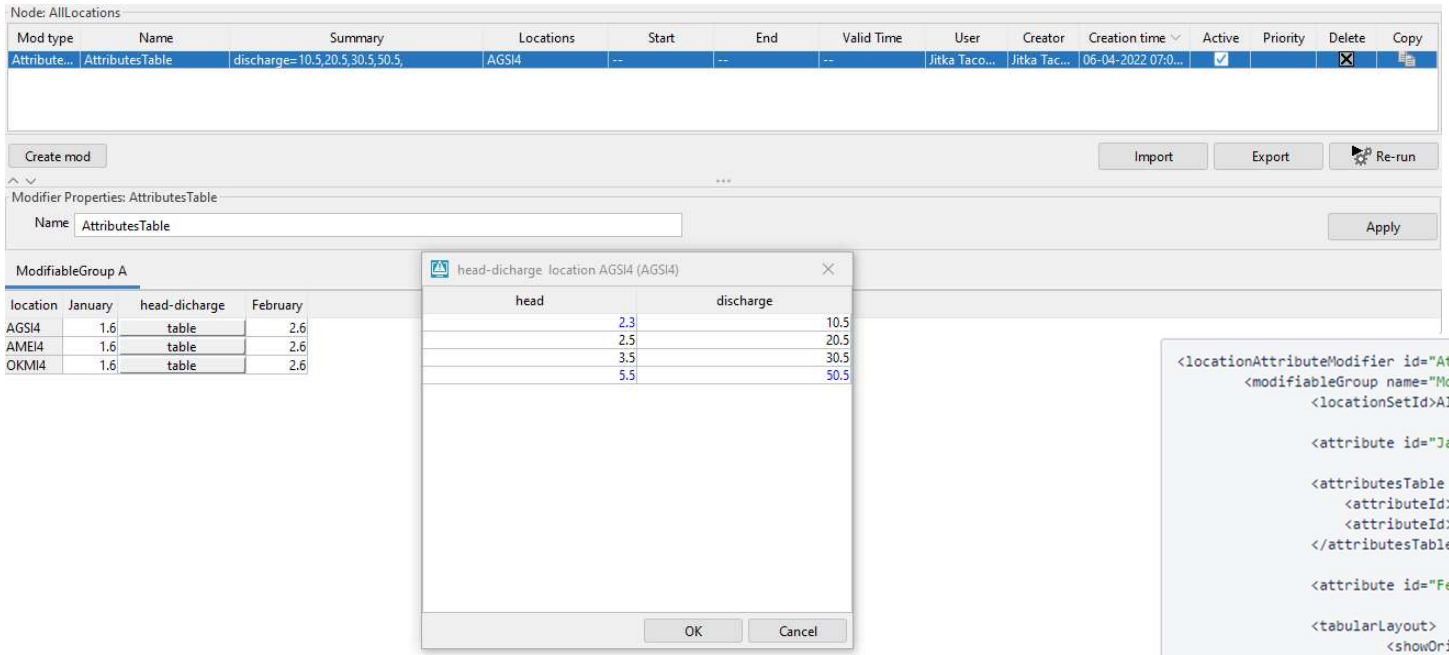
- Delft-FEWS in *scenario mode* (not strictly in the 'now' time frame.
- Introducing the new 'what-if' concept (including modifiers) → also for 'normal' client-server systems
- Difference functionality between scenarios (TSD) now also works longitudinal profiles
- Multi-value attribute modifier
- Typical Profile Modifier (to be finalized) → client-server context (last missing piece)
  - Works with synchronizing and DDA clients
- Modifier editing panel embedded in Whatif-Editor
- <F12> option to get warning in case of 'old what-if' usage detected or present





Modifiers: introducing a multi-value attribute

- A multi-value attribute modifier is intended to modify multiple location attributes in one go. E.g. both ‘head’ and ‘discharge’ of a pump curve.




```
<locationAttributeModifier id="AttributesTable" name="AttributesTable">
        <modifiableGroup name="ModifiableGroup A">
                <locationSetId>AllLocations</locationSetId>

                <attribute id="January"/>

                <attributesTable id="head-dicharge">
                    <attributeId>head</attributeId>
                    <attributeId>discharge</attributeId>
                </attributesTable>

                <attribute id="February"/>

                <tabularLayout>
                        <showOriginalValues>true</showOriginalValues>
                        <locationOrientation>row</locationOrientation>
                </tabularLayout>
        </modifiableGroup>
</locationAttributeModifier>
```

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Third Party Library upgrades

- NetCDF libraries have been upgraded to version 5.5.2 (and supporting NetCDF-C library to 4.8)
- Chromium browser (JCEF package) for **Web Browser Display**: one version supports all Delft-FEWS versions. One download required for Windows or LINUX

Downloads

The JCEF package, which is a Java wrapper for CEF is provided for both Windows and Linux and as of April 2022

For FEWS branches older than 2020.01 you need the most recent FEWS patch to be able to use this package. Th

CEF / Chromium version	Windows	Linux
100.0.14+g4e5ba66 / 100.0.4896.75	jcef.zip	jcef.zip

Upgrade and update strategy

Introduction

This (internal) page is meant for discussing, defining and detailing the Delft-FEWS upgrade/update strategy ·

- Supported versions of (central) databases: Oracle, PostgreSQL and SQLServer
- Supported versions of operating systems (linux, Windows)
- Java JDK
- Important middleware: Tomcat, ElasticSearch, Thredds, JCEF
- Important third party libraries (e.g. log4j)

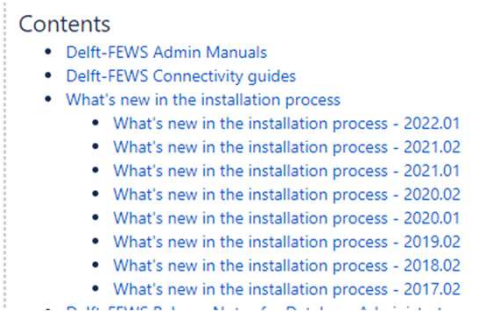
Central database

*) expiry date is regular expiry date, infinite extended support possible

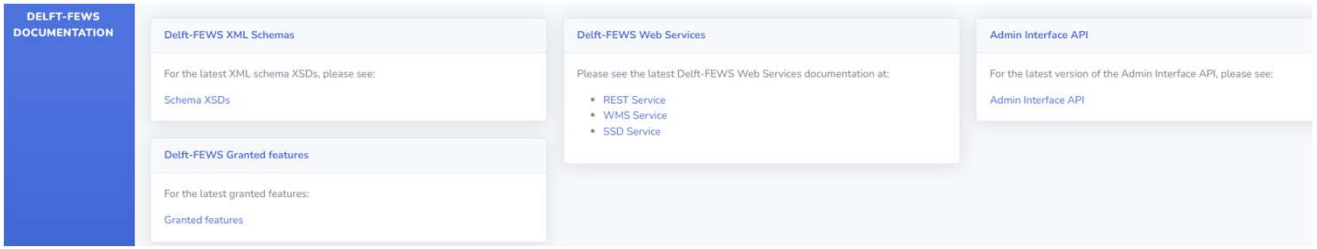
database	expiry date	release version
Oracle 21c	Apr 2024*	tested on XE only
Oracle 19c LTS	Apr 2024*	2018.02 and later
Oracle 18c	Jun 2021*	
Oracle 12c	Nov 2020*	
PostgreSQL 14	Nov 2026	untested
PostgreSQL 13	Nov 2025	2021.02-2025.01
PostgreSQL 12	Nov 2024	2018.02-2024.01

Documentation

- Improvements to the WIKI
  - Stable version based pages for **installing** and **upgrading** Delft-FEWS
  - Stable version based pages for **installing** and **upgrading** the Open Archive
  - Stable version based pages for **hardware and software requirements**
  - Easier to update, maintain and understand



- Extended – dynamic and generated content: https://fewsdocs.deltares.nl/
  - Delft-FEWS schemas (XSD)
  - Granted features for future versions
  - Delft-FEWS webservices (Open API style)
  - Admin Interface API (Open API style)
  - **NEW:** Dynamic Release Notes → currently in pilot for FEWS release 2022.01, final for FEWS release 2022.02



Deltares

Outlook 2022.02 Features

- Granted features (daily updates) via https://fewsdocs.deltares.nl/jira/fews-jira/

Estimated & granted (154)

Components
Total Issues: **154**

Plugin - Module - Data Import	14
System - Continuous Deployment	13
System - FEWS webservices - PI REST	13
App - Admin Interface	11
Plugin - Gui - Time Series	11
App - Archive	9
Plugin - Gui - Grid Display	6
Plugin - Module - Data Export	5
App - Archive - Harvester	4
App - Operator Client Gui (Explorer)	4
Other...	78

Implemented (43)

Components
Total Issues: **43**

App - Archive	4
Plugin - Gui - Grid Display	4
System - FEWS webservices - PI REST	4
App - Operator Client Gui (Explorer)	3
Plugin - Gui - Time Series	3
Configuration	2
Database - Datastore	2
Plugin - GUI - IFD - Forecasts	2
Plugin - Module - Data Export	2
Plugin - Module - Data Import	2
Other...	17

Estimated & on-hold (101)

Not estimated & on-hold (45)

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Developments themes: GUI

- Important element (within the ‘limits’ of Java)
- Digital Accessibility
- Look & Feel: menus, icons, colors, maps, graphs, tables, user-experience
- Improving the GUI is an evolution, not a revolution…
  - Color schemes, font size %
  - Windows 10, flat look & feel (“flatlaf”)
  - New default icons on buttons
- Coming in 2022.02: consistent and more ‘slick’ icons…

Developments themes:

- **Connecting to models:** in-memory data-exchange (and write once!) to prevent time loss during opening/closing files (in case of ‘many fragmented imports or model runs).
- **Computational Framework**: non-operational / Scenario Mode of Delft-FEWS: finalizing
- **Open Archive** storage solutions, in combination with **seamless integration** + archiving options to merge edited and archived NetCDFs (HyFS work) and development of a “Product Service” for the archive…
- **Water Coach**: ‘replay events mode’ of Delft-FEWS to train forecasters (separate presentation)
- **FEWS Webservices**: start from SA (and OC) + patchable – 2022.02
- **WebOC** (separate presentation)
- …and many more to look forward to!

Delft-FEWS Community…!

- NL / B User meeting
- German User Meeting
- Canadian meeting (@hydro conference)
- Community Talks! **Community Talk**

- **Save the date** for the International Delft-FEWS User Days:

9th + 10th of Nov '22.

Contact

www.delft-fews.com

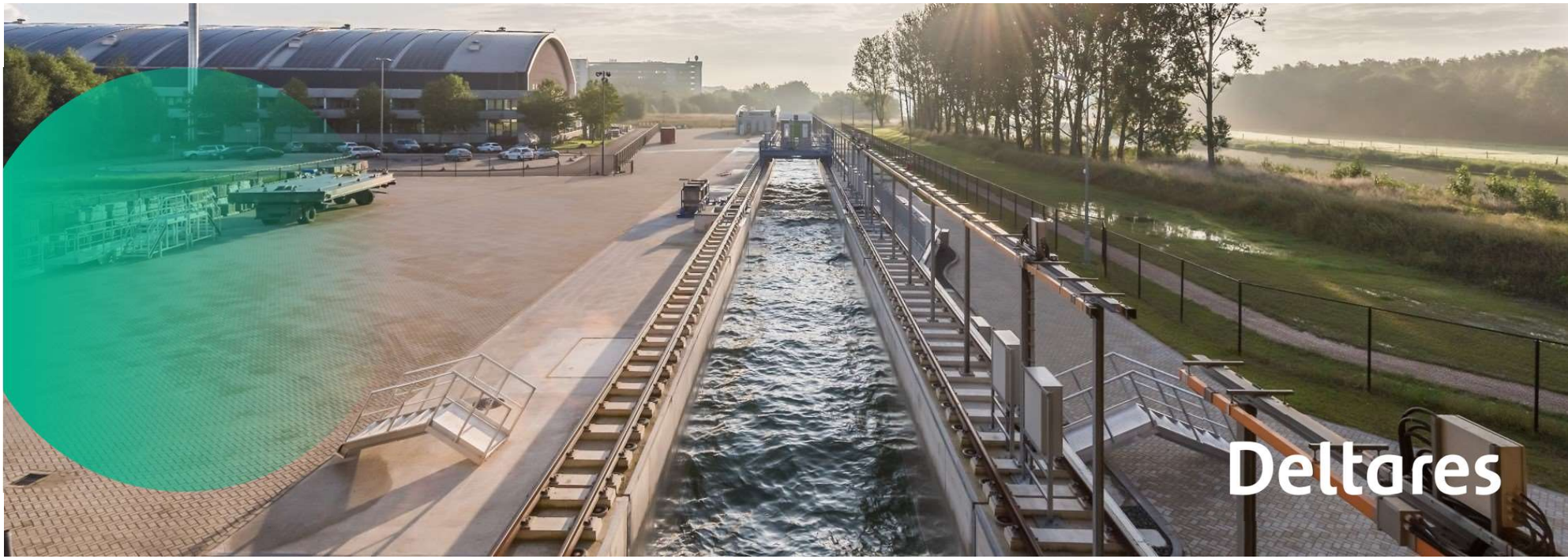
@DelftFEWS

linkedin.com/company/deltares

fews-pm@deltares.nl

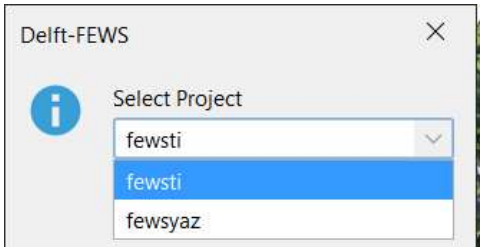
@deltares

facebook.com/deltaresNL



Datastore

- A single time series with more than 20164 time steps can now be stored in a single blob
- TableLocalModificationTimes table is now a memory optimized table
- Support of Azure SQLServer Managed instances
- It is now possible to have multiple FEWS schemas/systems in a single (managed) database instance



Workflow Test Runner

- Internal module (originally meant for testing purposes) to run workflows automatically (and logs about it)…

Purpose
To automatically assess the effect of changed configuration…
(results should be the same)

- New feature: output of this Workflow Test Runner can be written in Junit XML → allows for integration with common tooling for CI/CD and automated testing (Azure DevOps)

System - Continuous Deployment

Use Azure pipelines to roll out complete FEWS system in Kubernetes:

- Create FEWS schema in PostgresQL database
- Create Docker image with MC/AI/FSS software
- Configure MC and AI with database connection
- Upload selected Delft-FEWS configuration via AI-API
- Upload MC-FSS settings for Delft-FEWS configuration via AI-API
- Remove entire MC system from Kubernetes

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Configuration – Load moduleInstances from CSV (with possibility to add extra attributes)

```
<?xml version="1.0" encoding="UTF-8"?>
<moduleInstanceDescriptors 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/moduleInstanceDescriptors.xsd" version="1.0">
   <moduleInstanceDescriptorsCsvFile>
      <file>moduleInstanceDescriptors.csv</file>
      <id>%ID%</id>
      <name>%NAME%</name>
      <attribute id="test">
         <text>%test%</text>
      </attribute>
      <attributeFile>
         <csvFile>moduleInstanceDescriptors_attributes.csv</csvFile>
         <id>%ID%</id>
         <attribute id="EXTERNAL_ID">
            <text>%EXTERNAL_ID%</text>
         </attribute>
      </attributeFile>
   </moduleInstanceDescriptorsCsvFile>
</moduleInstanceDescriptors>
```

Attributes can be used as metadata in netCDF exports (see Exports slide)

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