Deltares

Delft-FEWS New features of 2025.01

Delft-FEWS Anwendertreffen

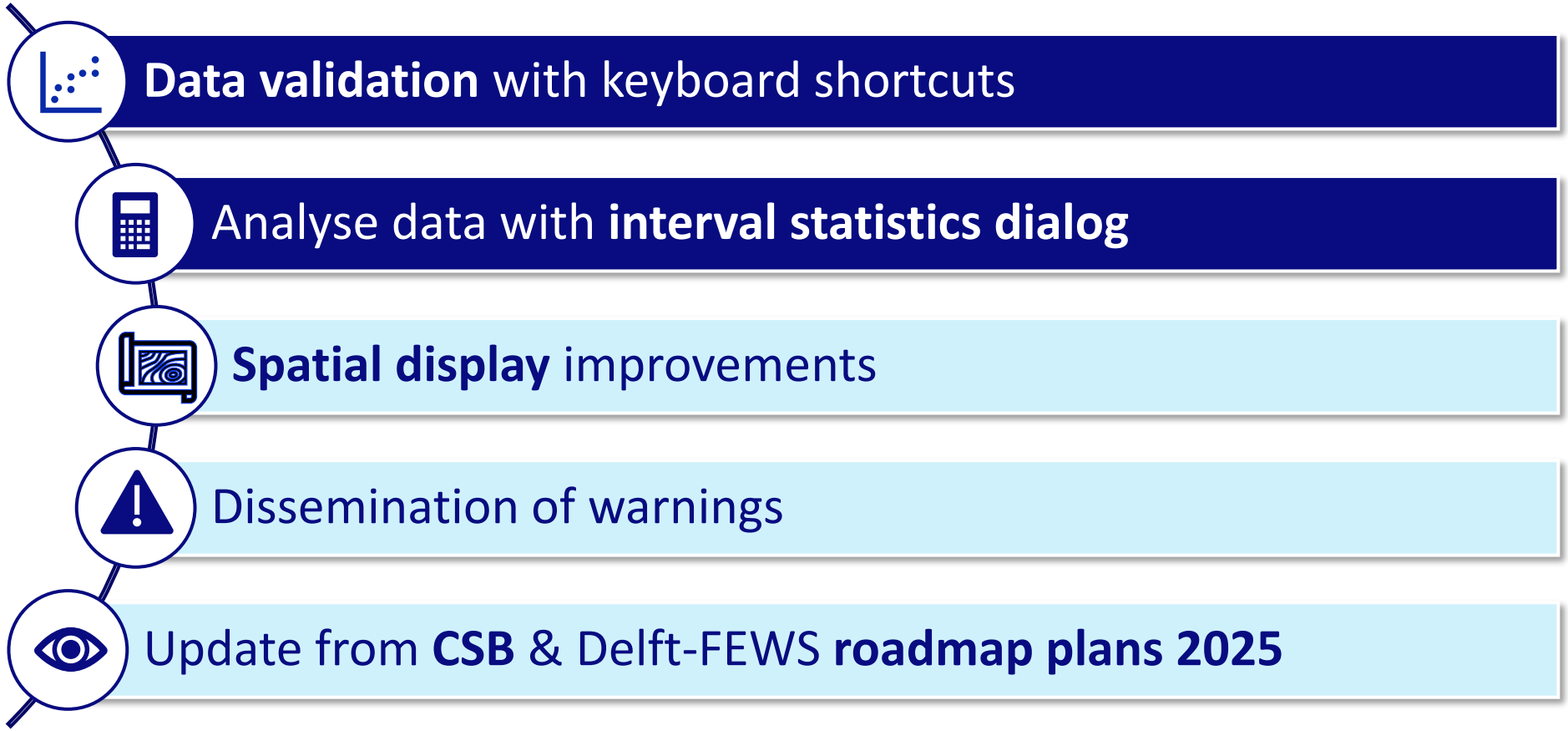
Marcel Ververs

July 2025

Introduction…

- Welcome
- What's new in 2024.02 and 2025.01
- Roadmap plans 2025
- As usual: Links for more info

Highlights of the 2024.02 and 2025.01



Data validation in Delft-FEWS

Use of quality flags

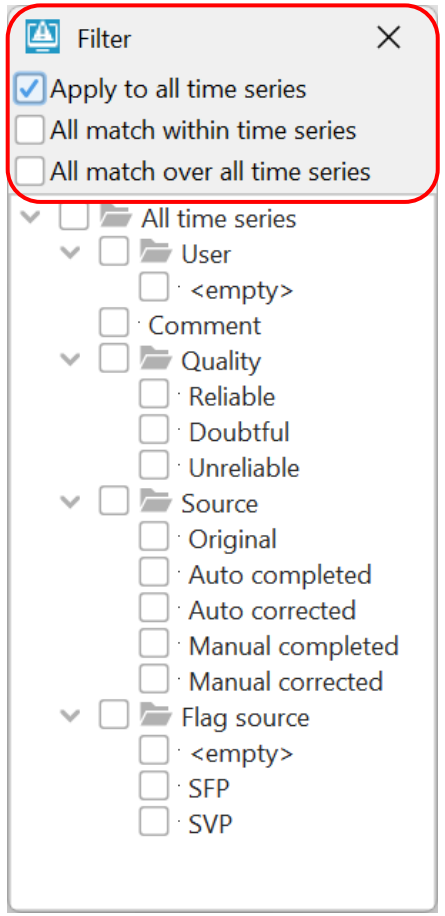
- Primary validation
- Secondary validation
- Manual edits/validation

Improved keyboard shortcuts for navigation

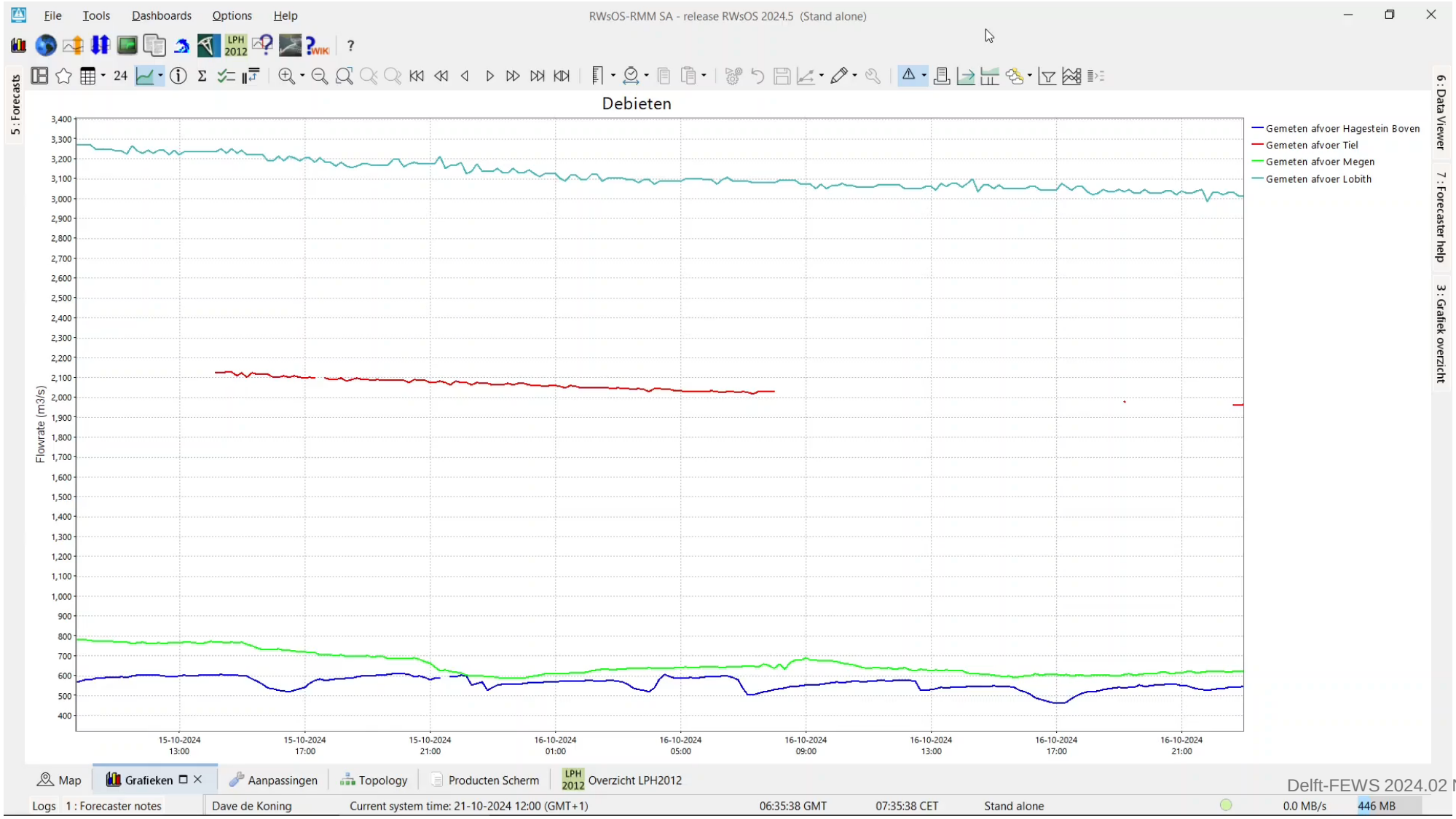
Improved indicators

Automatically clear the flag source column when the value of flag is changed

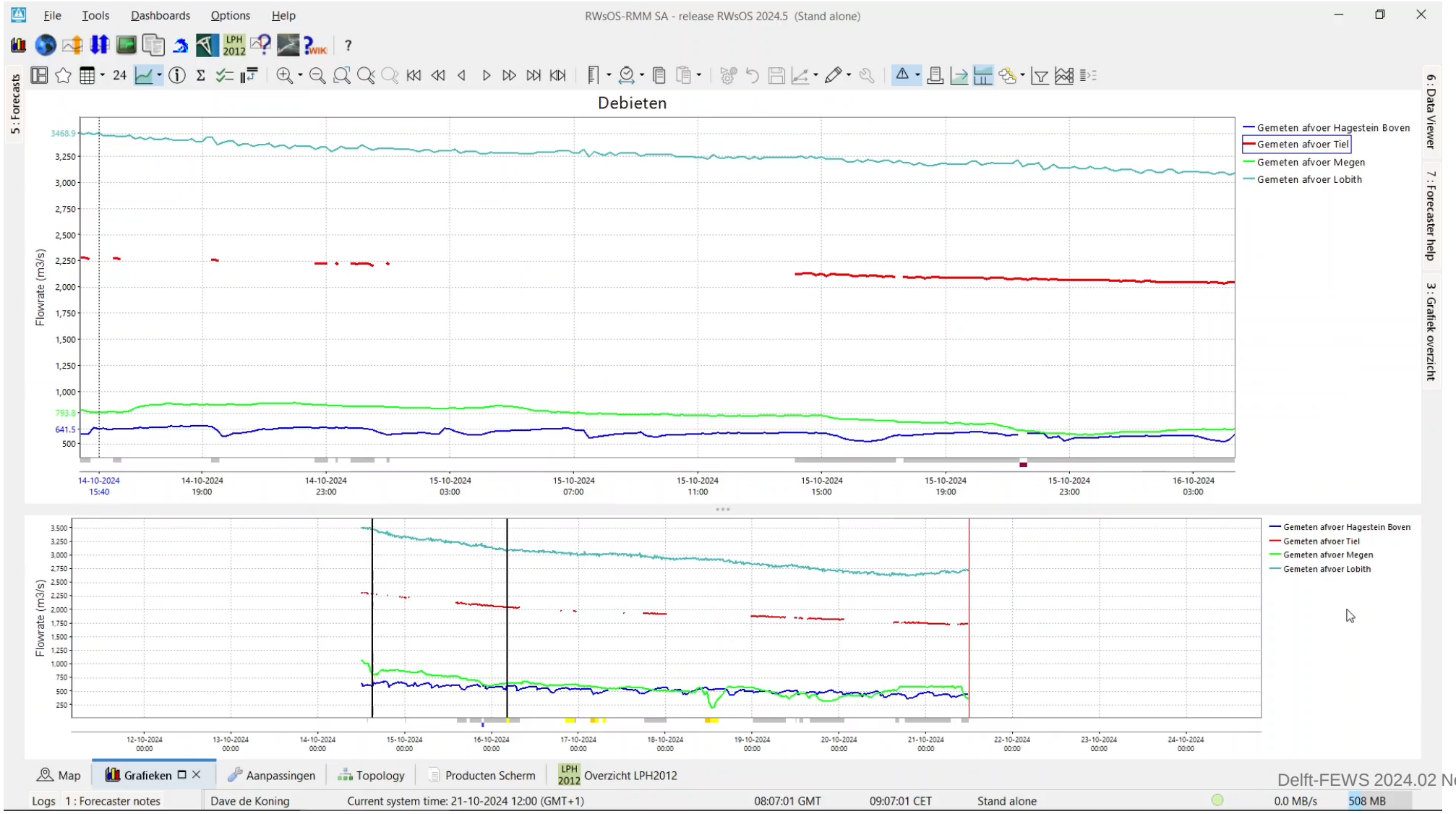
Filtering records based on: user, comment, quality, source and flagSource



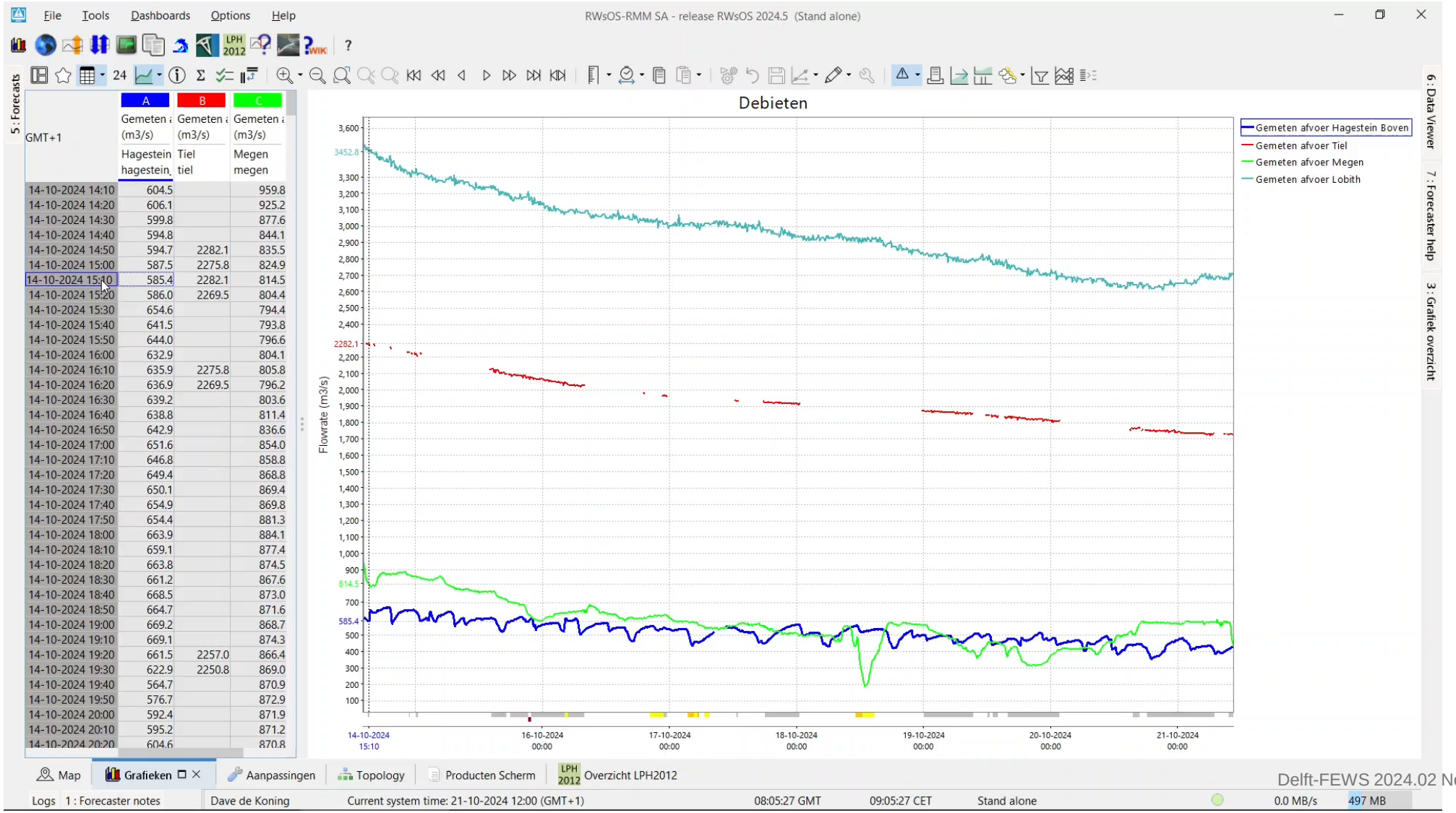
Data validation – show data flags in long term scroller



Data validation – missing value crosses

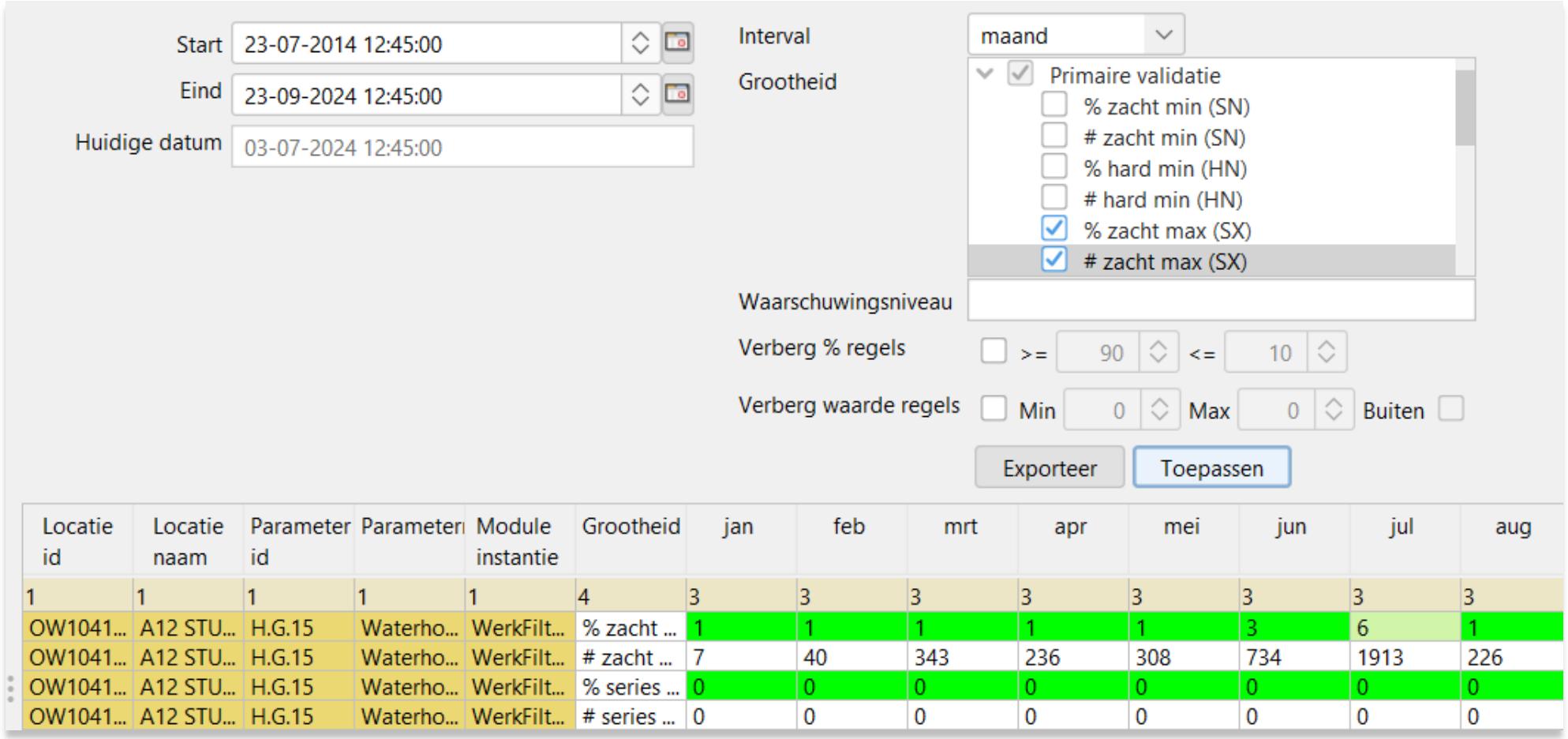


Data validation – jump to next flagged block



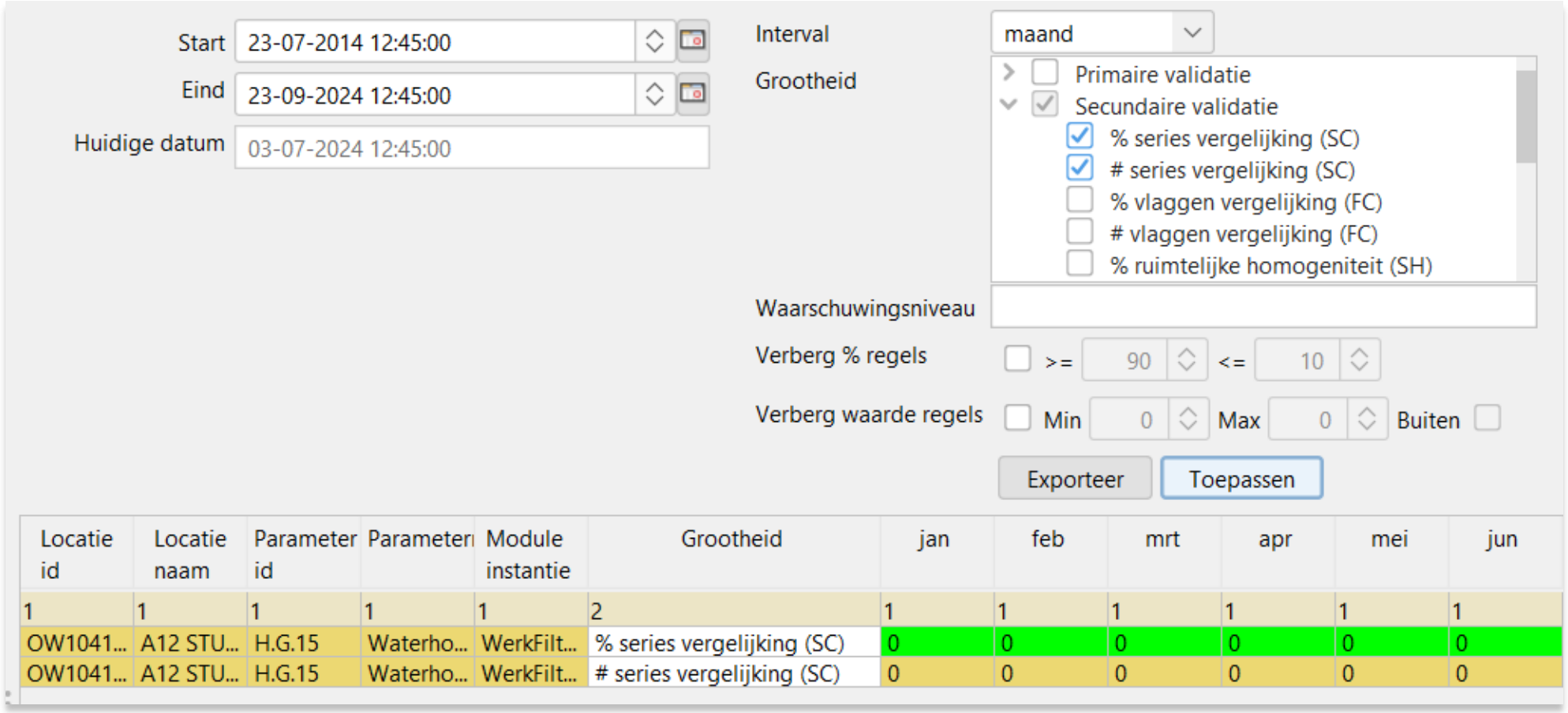
GMT+1	A Gemeten (m3/s) Hagestein hagestein	B Gemeten (m3/s) Tiel tiel	C Gemeten (m3/s) Megen megen
14-10-2024 14:10	604.5		959.8
14-10-2024 14:20	606.1		925.2
14-10-2024 14:30	599.8		877.6
14-10-2024 14:40	594.8		844.1
14-10-2024 14:50	594.7	2282.1	835.5
14-10-2024 15:00	587.5	2275.8	824.9
14-10-2024 15:10	585.4	2282.1	814.5
14-10-2024 15:20	586.0	2269.5	804.4
14-10-2024 15:30	654.6		794.4
14-10-2024 15:40	641.5		793.8
14-10-2024 15:50	644.0		796.6
14-10-2024 16:00	632.9		804.1
14-10-2024 16:10	635.9	2275.8	805.8
14-10-2024 16:20	636.9	2269.5	796.2
14-10-2024 16:30	639.2		803.6
14-10-2024 16:40	638.8		811.4
14-10-2024 16:50	642.9		836.6
14-10-2024 17:00	651.6		854.0
14-10-2024 17:10	646.8		858.8
14-10-2024 17:20	649.4		868.8
14-10-2024 17:30	650.1		869.4
14-10-2024 17:40	654.9		869.8
14-10-2024 17:50	654.4		881.3
14-10-2024 18:00	663.9		884.1
14-10-2024 18:10	659.1		877.4
14-10-2024 18:20	663.8		874.5
14-10-2024 18:30	661.2		867.6
14-10-2024 18:40	668.5		873.0
14-10-2024 18:50	664.7		871.6
14-10-2024 19:00	669.2		868.7
14-10-2024 19:10	669.1		874.3
14-10-2024 19:20	661.5	2257.0	866.4
14-10-2024 19:30	622.9	2250.8	869.0
14-10-2024 19:40	564.7		870.9
14-10-2024 19:50	576.7		872.9
14-10-2024 20:00	592.4		871.9
14-10-2024 20:10	595.2		871.2
14-10-2024 20:20	604.6		870.8

Interval Statistics Dialog – number of values



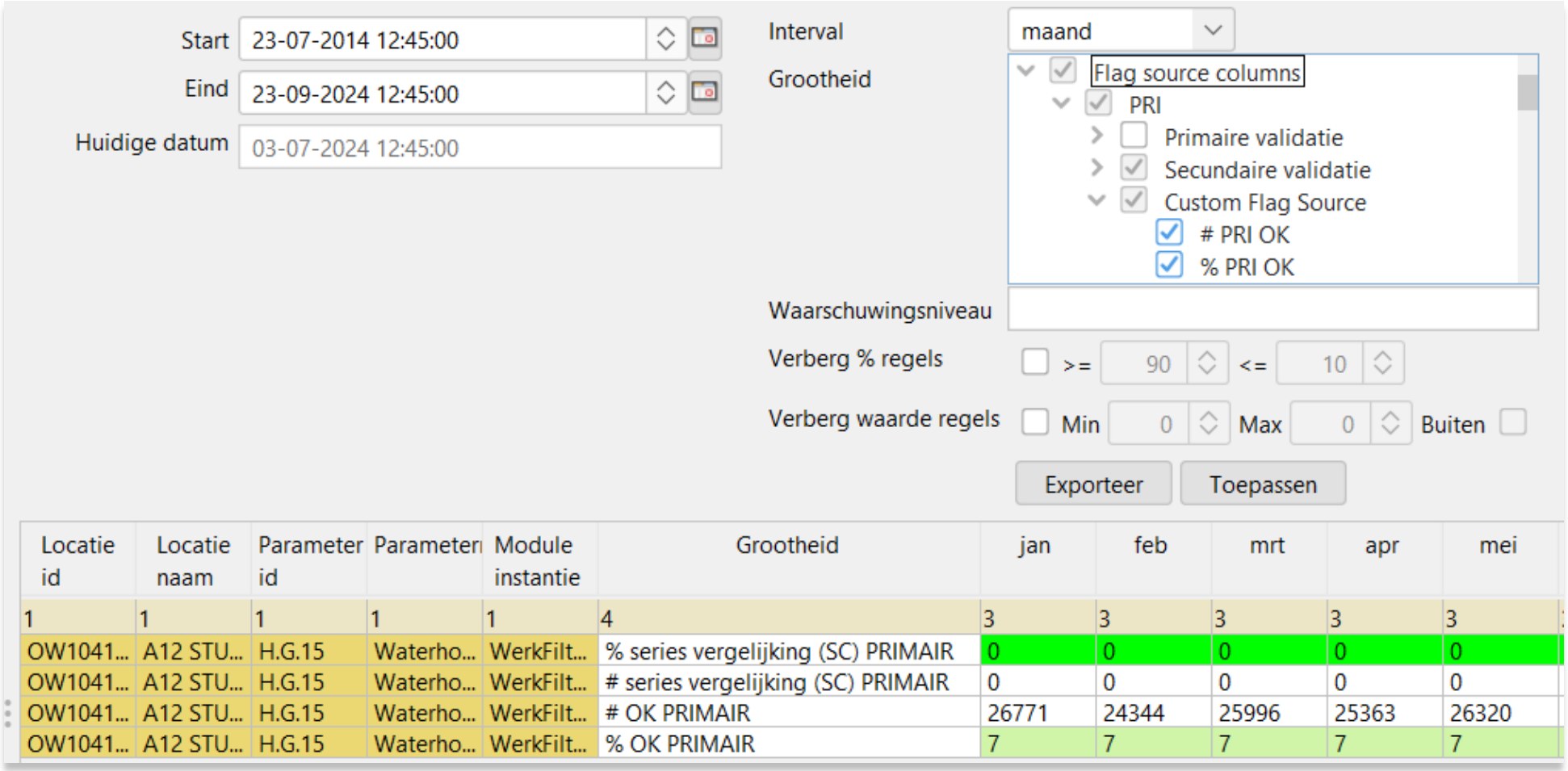
Locatie id	Locatie naam	Parameter id	Parameter	Module instantie	Grootheid	jan	feb	mrt	apr	mei	jun	jul	aug
1	1	1	1	1	4	3	3	3	3	3	3	3	3
OW1041...	A12 STU...	H.G.15	Waterho...	WerkFilt...	% zacht ...	1	1	1	1	1	3	6	1
OW1041...	A12 STU...	H.G.15	Waterho...	WerkFilt...	# zacht ...	7	40	343	236	308	734	1913	226
OW1041...	A12 STU...	H.G.15	Waterho...	WerkFilt...	% series ...	0	0	0	0	0	0	0	0
OW1041...	A12 STU...	H.G.15	Waterho...	WerkFilt...	# series ...	0	0	0	0	0	0	0	0

Interval Statistics Dialog – secondary validation



Locatie id	Locatie naam	Parameter id	Parameter	Module instantie	Grootheid	jan	feb	mrt	apr	mei	jun
1	1	1	1	1	2	1	1	1	1	1	1
OW1041...	A12 STU...	H.G.15	Waterho...	WerkFilt...	% series vergelijking (SC)	0	0	0	0	0	0
OW1041...	A12 STU...	H.G.15	Waterho...	WerkFilt...	# series vergelijking (SC)	0	0	0	0	0	0

Interval Statistics Dialog – Flag Source Columns

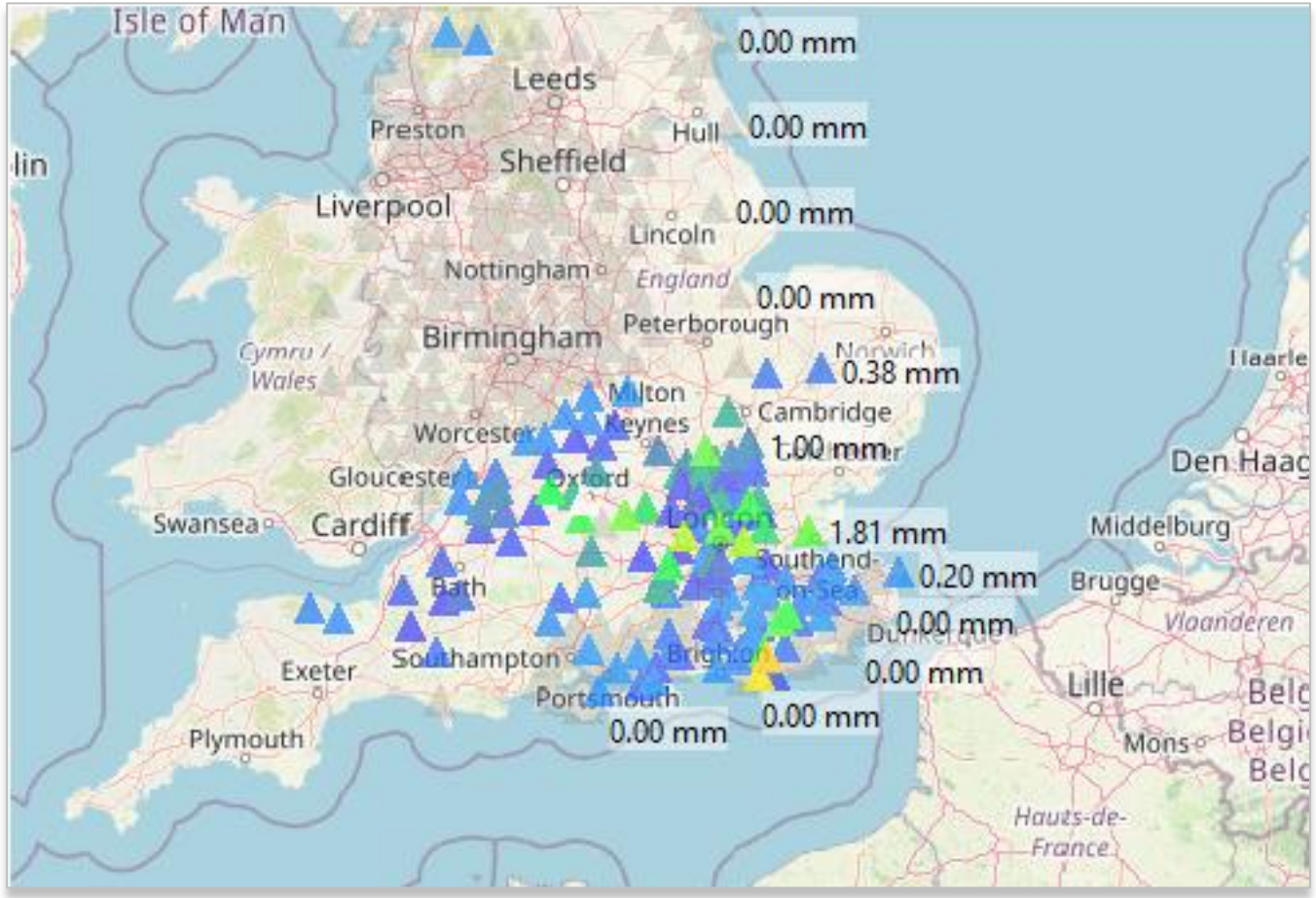


Locatie id	Locatie naam	Parameter id	Parameter	Module instantie	Grootheid	jan	feb	mrt	apr	mei
1	1	1	1	1	4	3	3	3	3	3
OW1041...	A12 STU...	H.G.15	Waterho...	WerkFilt...	% series vergelijking (SC) PRIMAIR	0	0	0	0	0
OW1041...	A12 STU...	H.G.15	Waterho...	WerkFilt...	# series vergelijking (SC) PRIMAIR	0	0	0	0	0
OW1041...	A12 STU...	H.G.15	Waterho...	WerkFilt...	# OK PRIMAIR	26771	24344	25996	25363	26320
OW1041...	A12 STU...	H.G.15	Waterho...	WerkFilt...	% OK PRIMAIR	7	7	7	7	7

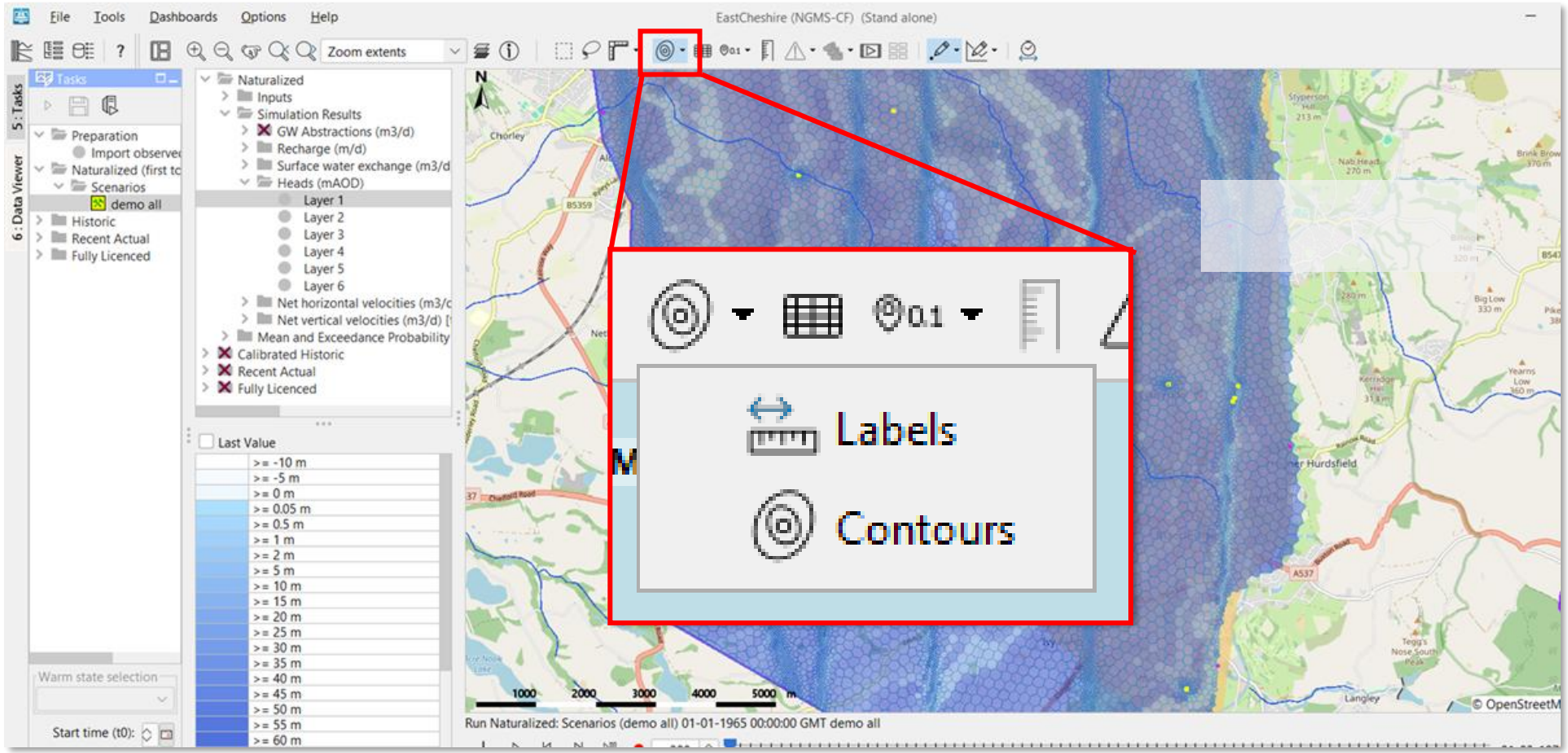
Spatial display – allow custom symbols

Use custom symbol (svg)
Every layer own symbol
Automatic resizing
Colour changes according to legend

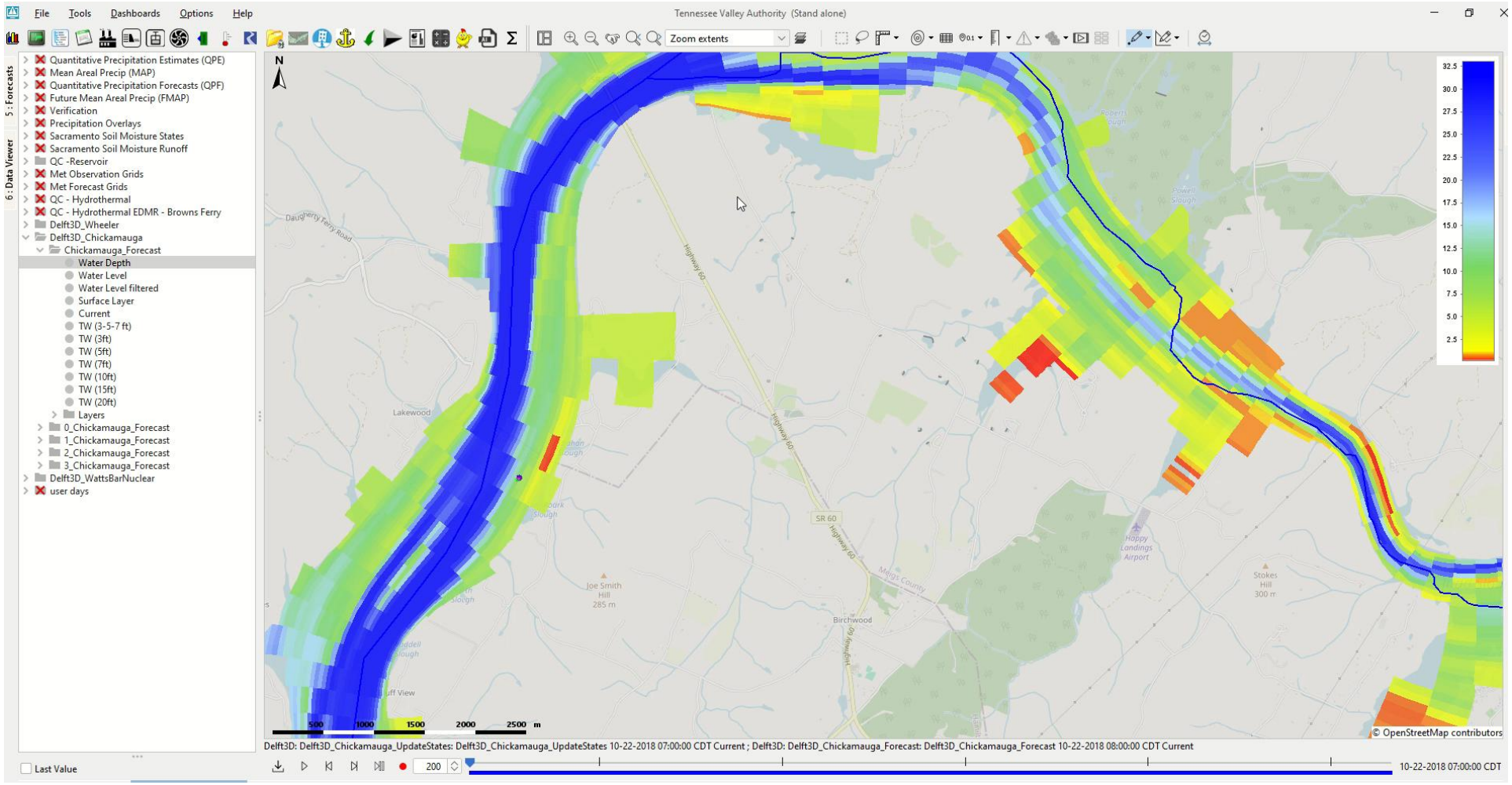
```
dataLayer>
   <symbolSvg>triangle.svg</symbolSvg>
   <timeSeriesSet>
      <moduleInstanceId>DummyImport</moduleInstanceId>
      <valueType>scalar</valueType>
      <parameterId>H.m</parameterId>
      <locationId>SX.E7842</locationId>
      <timeSeriesType>external historical</timeSeriesType>
      <timeStep unit="hour"/>
      <readWriteMode>read complete forecast</readWriteMode>
   </timeSeriesSet>
</dataLayer>
```



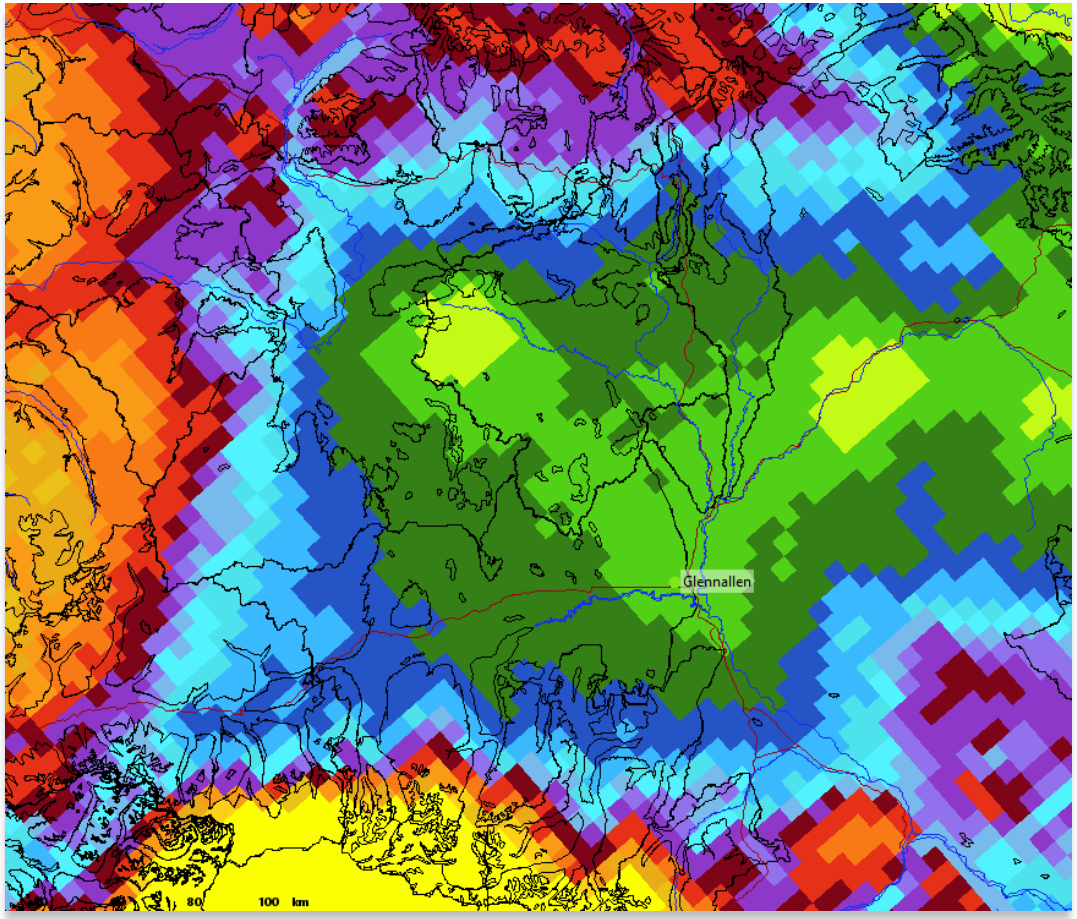
Spatial display & on-the-fly grid interpolation

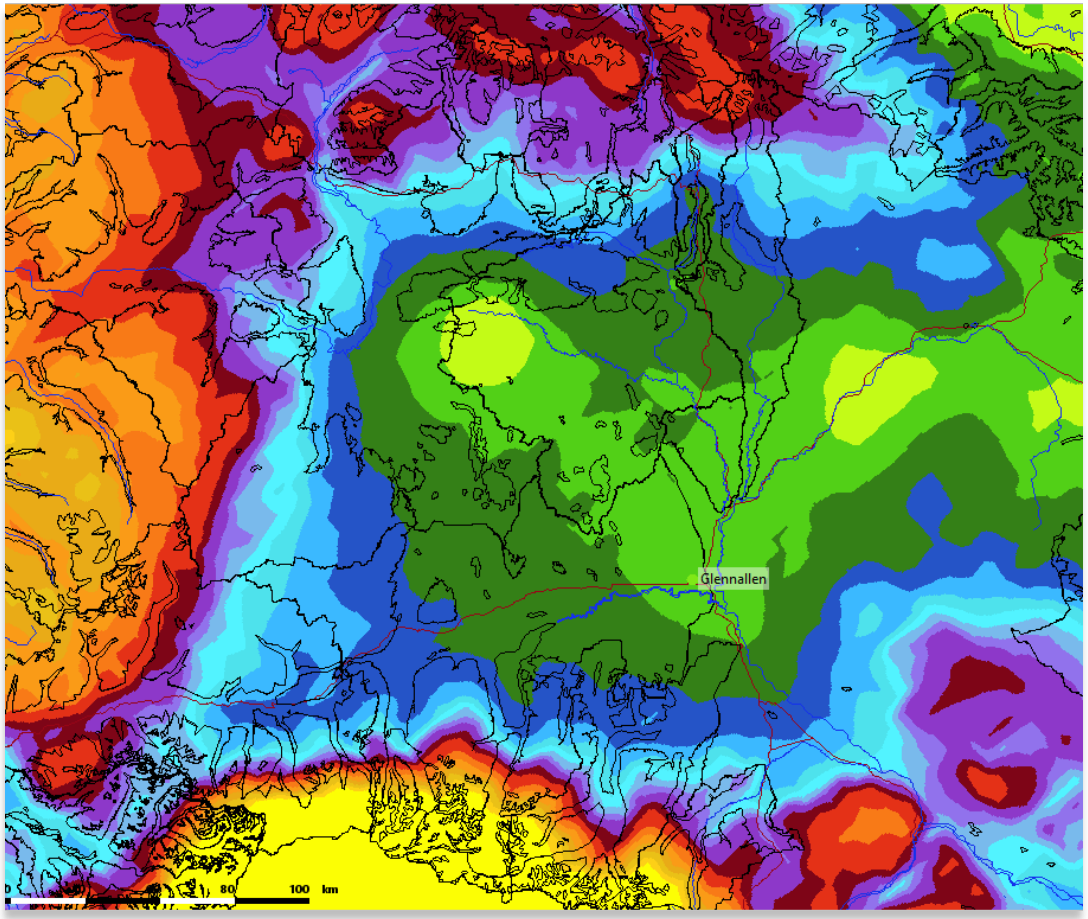


Spatial display – Smoothening irregular grids



Spatial display – Smoothening rotated grids





Interactive Report Editor

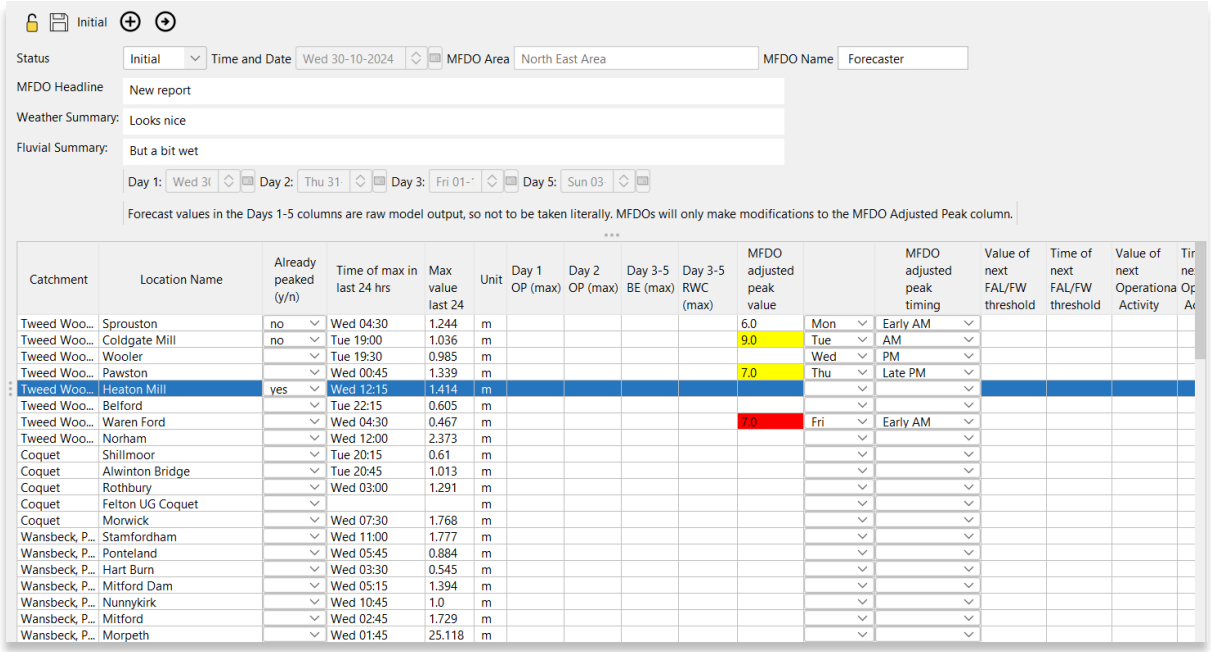
Value Properties Entry Display

- Technical name, based on the way it stores data

Interactive Report Editor (this use case)

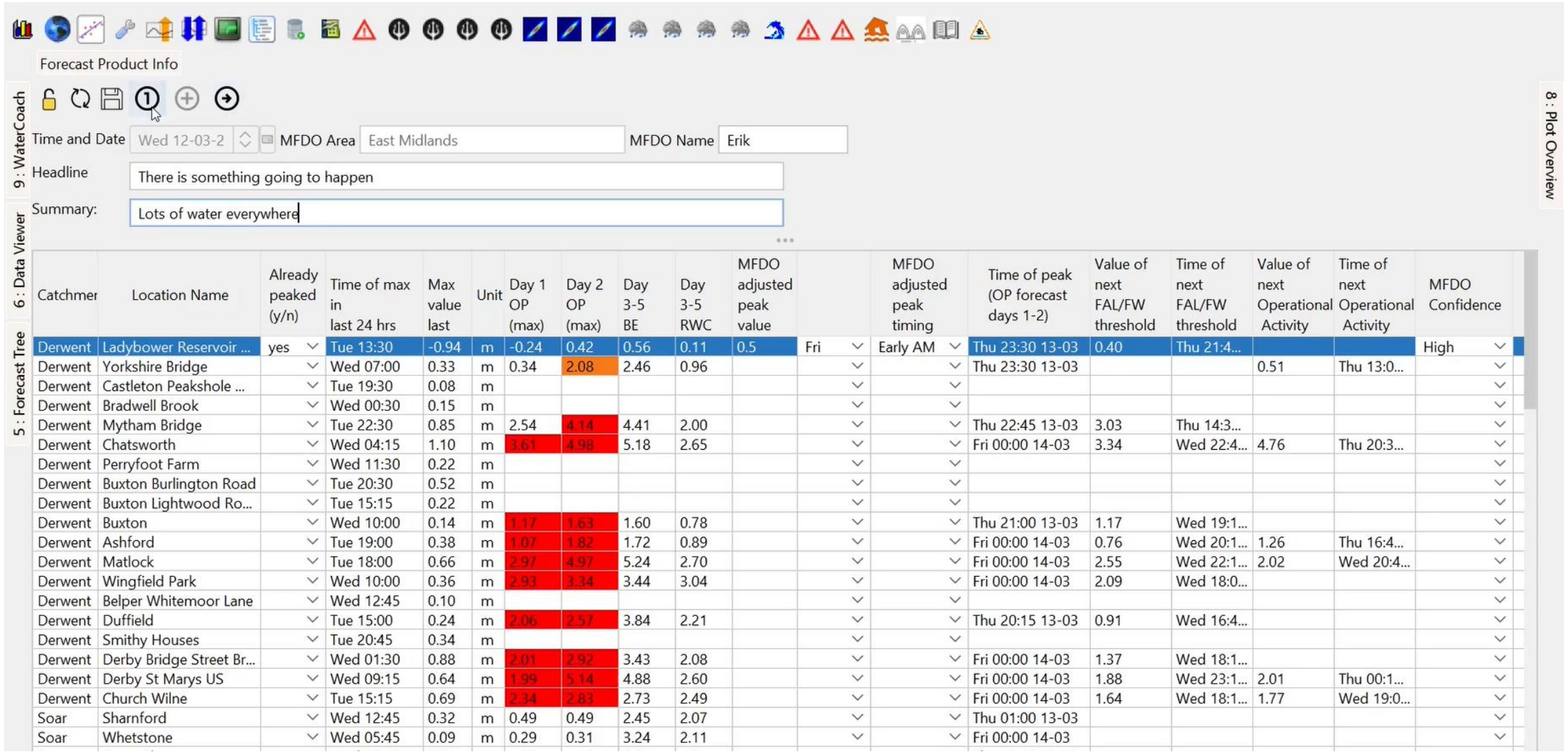
- Peak water level prediction overview to which extra information can be added manually
- All information at the screen can then be exported to a report

Every element is freely configurable and contents will be stored as value properties in Delft-FEWS



Catchment	Location Name	Already peaked (y/n)	Time of max in last 24 hrs	Max value last 24	Unit	Day 1 OP (max)	Day 2 OP (max)	Day 3-5 BE (max)	Day 3-5 RWC (max)	MFDO adjusted peak value		MFDO adjusted peak timing	Value of next FAL/FW threshold	Time of next FAL/FW threshold	Value of next Operationa Activity	Tir ne Op Ac
Tweed Woo...	Sprouston	no	Wed 04:30	1.244	m					6.0	Mon	Early AM				
Tweed Woo...	Coldgate Mill	no	Tue 19:00	1.036	m					9.0	Tue	AM				
Tweed Woo...	Wooler		Tue 19:30	0.985	m						Wed	PM				
Tweed Woo...	Pawston		Wed 00:45	1.339	m					7.0	Thu	Late PM				
Tweed Woo...	Heaton Mill	yes	Wed 12:15	1.414	m											
Tweed Woo...	Belford		Tue 22:15	0.605	m											
Tweed Woo...	Waren Ford		Wed 04:30	0.467	m					7.0	Fri	Early AM				
Tweed Woo...	Norham		Wed 12:00	2.373	m											
Coquet	Shillmoor		Tue 20:15	0.61	m											
Coquet	Alwinton Bridge		Tue 20:45	1.013	m											
Coquet	Rothbury		Wed 03:00	1.291	m											
Coquet	Felton UG Coquet				m											
Coquet	Morwick		Wed 07:30	1.768	m											
Wansbeck, P...	Stamfordham		Wed 11:00	1.777	m											
Wansbeck, P...	Ponteland		Wed 05:45	0.884	m											
Wansbeck, P...	Hart Burn		Wed 03:30	0.545	m											
Wansbeck, P...	Mitford Dam		Wed 05:15	1.394	m											
Wansbeck, P...	Nunnykirk		Wed 10:45	1.0	m											
Wansbeck, P...	Mitford		Wed 02:45	1.729	m											
Wansbeck, P...	Morpeth		Wed 01:45	25.118	m											

Interactive Report Editor



Catchmer	Location Name	Already peaked (y/n)	Time of max in last 24 hrs	Max value last	Unit	Day 1 OP (max)	Day 2 OP (max)	Day 3-5 BE	Day 3-5 RWC	MFDO adjusted peak value		MFDO adjusted peak timing	Time of peak (OP forecast days 1-2)	Value of next FAL/FW threshold	Time of next FAL/FW threshold	Value of next Operational Activity	Time of next Operational Activity	MFDO Confidence
Derwent	Ladybower Reservoir ...	yes	Tue 13:30	-0.94	m	-0.24	0.42	0.56	0.11	0.5	Fri	Early AM	Thu 23:30 13-03	0.40	Thu 21:4...			High
Derwent	Yorkshire Bridge		Wed 07:00	0.33	m	0.34	2.08	2.46	0.96				Thu 23:30 13-03			0.51	Thu 13:0...	
Derwent	Castleton Peakshole ...		Tue 19:30	0.08	m													
Derwent	Bradwell Brook		Wed 00:30	0.15	m													
Derwent	Mytham Bridge		Tue 22:30	0.85	m	2.54	4.14	4.41	2.00				Thu 22:45 13-03	3.03	Thu 14:3...			
Derwent	Chatsworth		Wed 04:15	1.10	m	3.61	4.98	5.18	2.65				Fri 00:00 14-03	3.34	Wed 22:4...	4.76	Thu 20:3...	
Derwent	Perryfoot Farm		Wed 11:30	0.22	m													
Derwent	Buxton Burlington Road		Tue 20:30	0.52	m													
Derwent	Buxton Lightwood Ro...		Tue 15:15	0.22	m													
Derwent	Buxton		Wed 10:00	0.14	m	1.17	1.63	1.60	0.78				Thu 21:00 13-03	1.17	Wed 19:1...			
Derwent	Ashford		Tue 19:00	0.38	m	1.07	1.82	1.72	0.89				Fri 00:00 14-03	0.76	Wed 20:1...	1.26	Thu 16:4...	
Derwent	Matlock		Tue 18:00	0.66	m	2.97	4.97	5.24	2.70				Fri 00:00 14-03	2.55	Wed 22:1...	2.02	Wed 20:4...	
Derwent	Wingfield Park		Wed 10:00	0.36	m	2.93	3.34	3.44	3.04				Fri 00:00 14-03	2.09	Wed 18:0...			
Derwent	Belper Whitemoor Lane		Wed 12:45	0.10	m													
Derwent	Duffield		Tue 15:00	0.24	m	2.06	2.57	3.84	2.21				Thu 20:15 13-03	0.91	Wed 16:4...			
Derwent	Smithy Houses		Tue 20:45	0.34	m													
Derwent	Derby Bridge Street Br...		Wed 01:30	0.88	m	2.01	2.92	3.43	2.08				Fri 00:00 14-03	1.37	Wed 18:1...			
Derwent	Derby St Marys US		Wed 09:15	0.64	m	1.99	5.14	4.88	2.60				Fri 00:00 14-03	1.88	Wed 23:1...	2.01	Thu 00:1...	
Derwent	Church Wilne		Tue 15:15	0.69	m	2.34	2.83	2.73	2.49				Fri 00:00 14-03	1.64	Wed 18:1...	1.77	Wed 19:0...	
Soar	Sharnford		Wed 12:45	0.32	m	0.49	0.49	2.45	2.07				Thu 01:00 13-03					
Soar	Whetstone		Wed 05:45	0.09	m	0.29	0.31	3.24	2.11				Fri 00:00 14-03					

Report exported from display

Time and Date: Wed 12-03-2 | MFDO Area: East Midlands | MFDO Name: Erik

Headline: There is something going to happen

Summary: Lots of water everywhere

Catchmer	Location Name	Already peaked (y/n)	Time of max in last 24 hrs	Max value last	Unit	Day 1 OP (max)	Day 2 OP (max)	Day 3-5 BE	Day 3-5 RWC	MFDO adjusted peak value		MFDO adjusted peak timing
Derwent	Ladybower Reservoir ...	yes	Tue 13:30	-0.94	m	-0.24	0.42	0.56	0.11	0.5	Fri	Early AM
Derwent	Yorkshire Bridge		Wed 07:00	0.33	m	0.34	2.08	2.46	0.96			
Derwent	Castleton Peakshole ...		Tue 19:30	0.08	m							
Derwent	Bradwell Brook		Wed 00:30	0.15	m							
Derwent	Mytham Bridge		Tue 22:30	0.85	m	2.54	4.14	4.41	2.00			
Derwent	Chatsworth		Wed 04:15	1.10	m	3.61	4.98	5.18	2.65			

MFDO Forecast Report

MFDO Area: East Midlands
MFDO Name: Erik
Report Time: 14/03/2025 10:56
MFDO Headline: There is something going to happen
Summary: Lots of water everywhere

Forecast Location Water Level

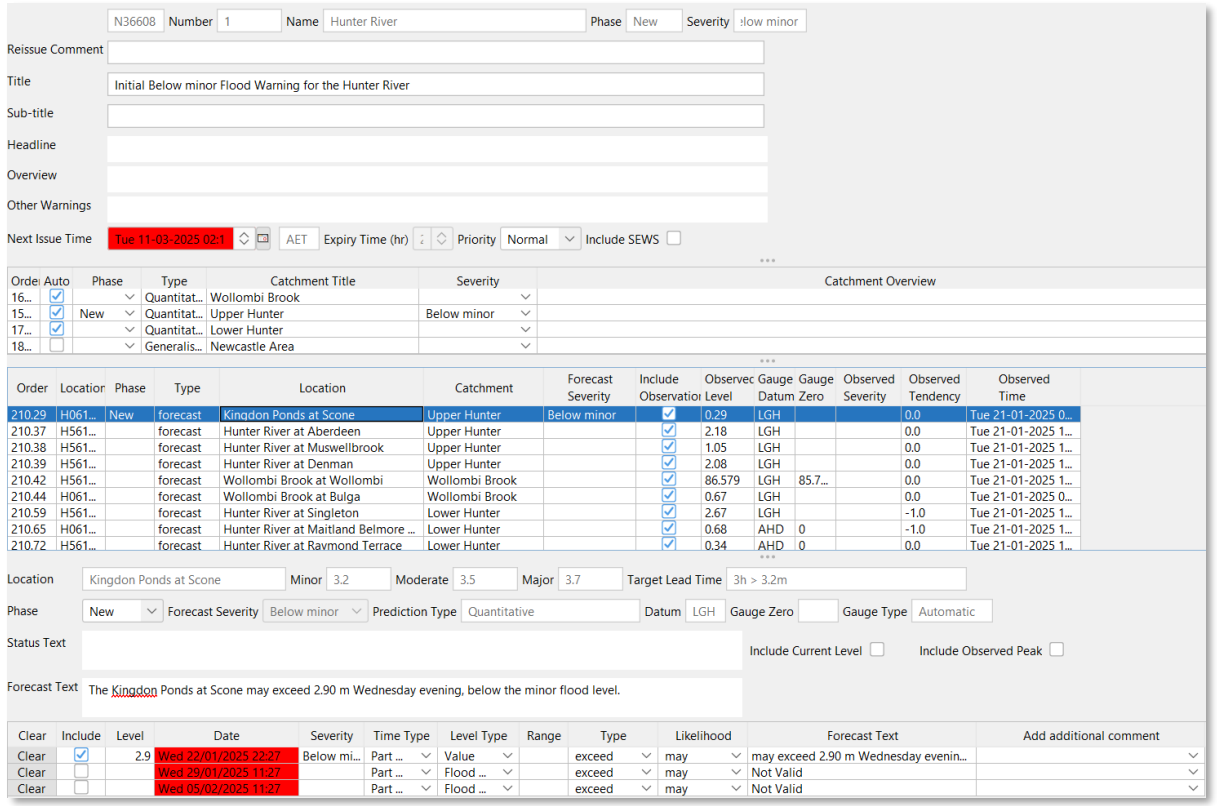
Catchment	Location Name	Already Peaked	Max in last 24 hrs		Unit	Day 1 OP	Day 2 OP	Day 3-5 BE	Day 3-5 RWC	MFDO Adjusted	
			Time	value		(max)	(max)	(max)	(max)	Peak Value	Peak Time
Derwent	Ladybower Reservoir Level	yes	Tue 13:30	-0.94	m	-0.24	0.42	0.56	0.11	0.50	Fri Early AM
Derwent	Yorkshire Bridge		Wed 07:00	0.33	m	0.34	2.08	2.46	0.96		
Derwent	Castleton Peakshole Water		Tue 19:30	0.08	m						
Derwent	Bradwell Brook		Wed 00:30	0.15	m						
Derwent	Mytham Bridge		Tue 22:30	0.85	m	2.54	4.14	4.41	2.00		
Derwent	Chatsworth		Wed 04:15	1.10	m	3.61	4.98	5.18	2.65		

Other use cases

Multiple tables in display

Different input types:

- Dates / Boolean checkboxes



- Different export formats
  - Xml, can be used to upload predictions into another system
  - Simply use a different template:

```
<forecast-period >
   <element>$sequence$</element>
   <text type="warning_situation">
        $fw_headline$
        $fw_summary$
        $fw_otherwarning$
   </text>
   <element type="severity">%SEVERITY%</element>
</forecast-period>
```

Update from FEWS Community Strategy Board

Topics:

Input for FEWS Vision 2030

Developments and bugfixes for Web-OC

- Supported backend versions
- Backporting strategy

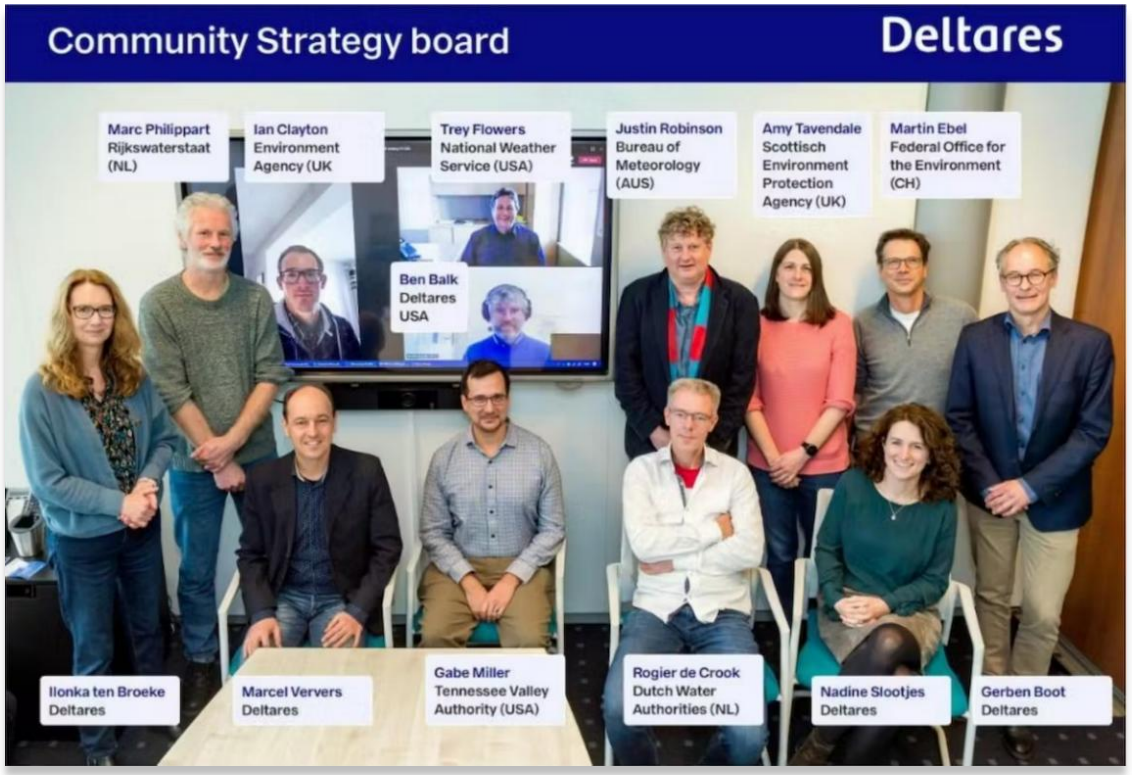
FEWS Community in Latin America

AI and ML in operational forecasting and warning

FEWS Community Talks

- Talk 11 October 2, 2025

Community Talk



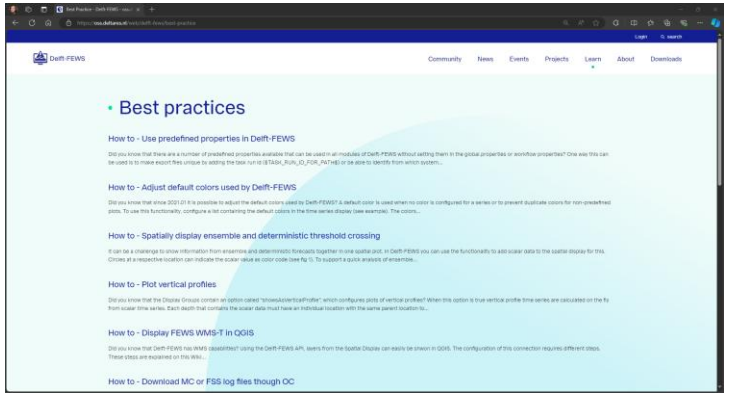
References

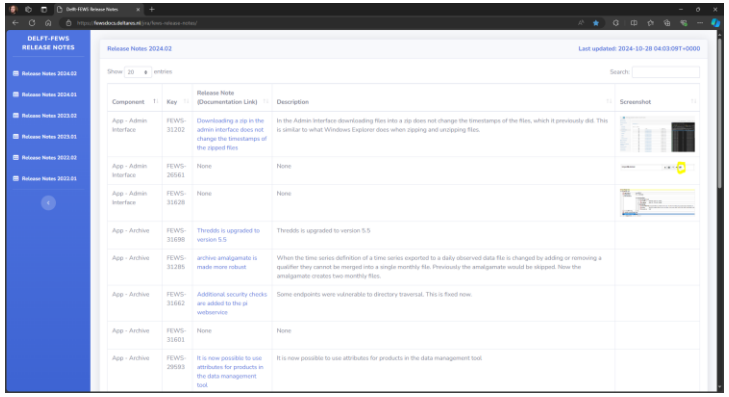
Portal (delft-fews.com)

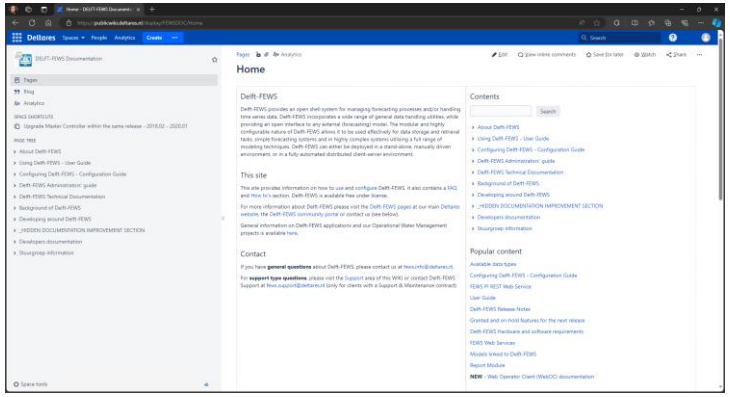
- How to’s (Best practice)
- New features (Webinars)

Release notes page (fewsdocs.deltares.nl)

Wiki (publicwiki.deltares.nl)







Deltares

PMT Water Operations Delft-FEWS Suite

Roadmap 2025 Overview

Delft-FEWS Product Management

July 2025

Roadmap 2025 – Timeline & Topics selection process

Input (Oct ’24 – Jan ‘25)

- Internal ideas & initiatives
- International Delft-FEWS User Days

Digestion (Jan ’25 – Feb ‘25)

- Selection & aligning with on-going Deltares initiatives
- Vision/strategy processes & planning – Deltares strategic period: 2026-2029
- International and software strategy

4 clusters (Spring 2025)

- Software themes
- Artificial intelligence
- Python integration
- Miscellaneous

https://delft-fews.com/roadmaps

Software themes

Software aspects

- Security
- Test automation
- Code quality
- Cloud & Dev/Ops

General improvements

- Delft-FEWS
- Web Operator Client
- Open Archive
- FEWS webservices

Artificial Intelligence (AI)

Every day AI

- Github CoPilot and IntelliJ CoPilot for developers

Scientific AI

- Flood mapping using AI data & model fusion
- Integrating AI generated weather forecast data (ECWMF)
- Agentic workflow (FEWS Bot)

Python integration

Wrapper

- Wrapper for FEWS webservices

Forecast Verification

- Forecast verification package enhancing existing methods & functionality (from BoM and RWS)

Miscellaneous

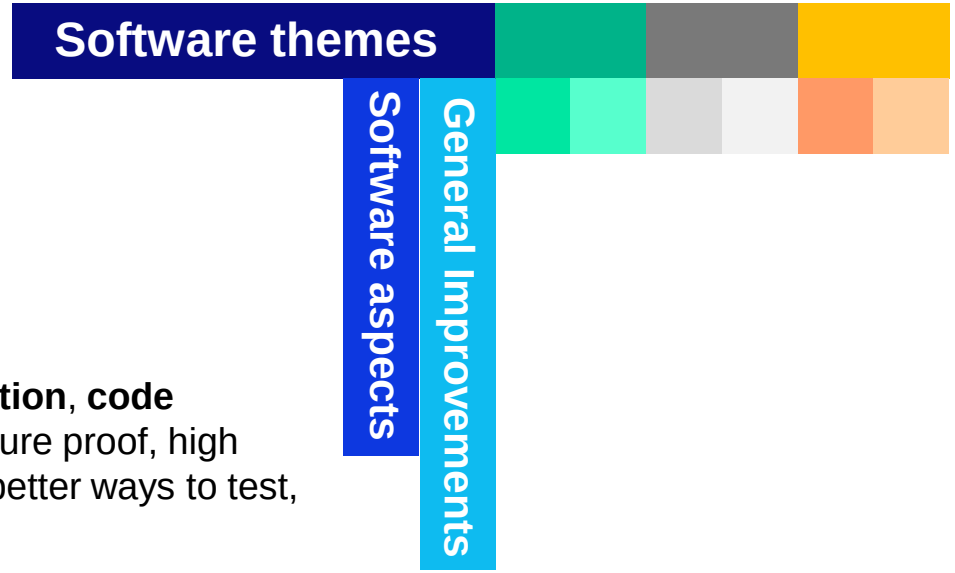
Engagements

- Explore Azure Data Lakes
- Rainfall downscaling/bias correction module
- BMI compliancy (extended)
- Delft-FEWS community

Easier configuration

- FEWS-Conform: set-up of configuration conventions, templates, documentation, checks etc.

Software Themes



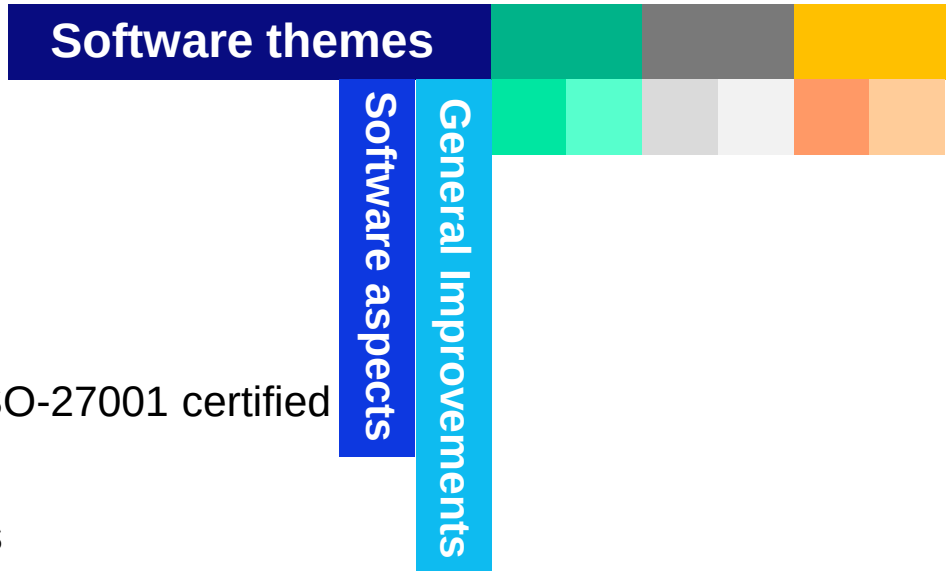
Software aspects

For the sub theme software aspects we will be addressing **cybersecurity**, **test automation**, **code quality and clean up**, and **cloud dev/ops activities**. All aimed to keep the software future proof, high quality and secure. Our activities involve regular maintenance, as well as investigating better ways to test, check and maintain our software.

General improvements

To keep Delft-FEWS fast, robust and easy to use, we need to keep the code up to date with the **latest development standards** as well as **developing improvements that allow users to keep enjoying the benefits**, while at the same time making life of developers easier. We do this for example by adding functionality to upload a localDataStore into a client server system, include support for HTML components and reports and improving the data management tool for the Open Archive.

Software Themes



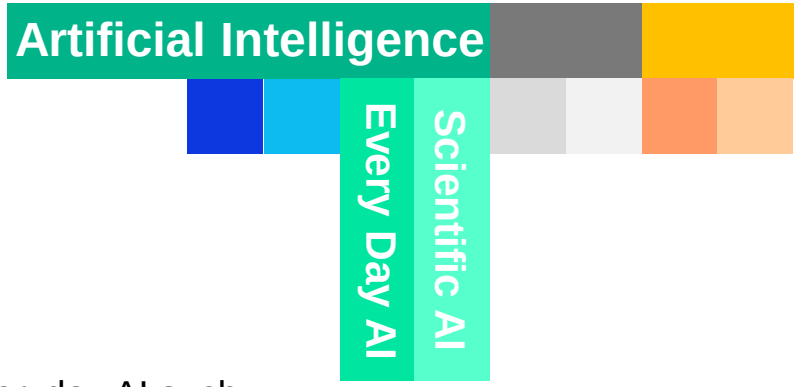
Software aspects

- Cybersecurity: OIDC complete, 3rd party libraries updates and Deltares ISO-27001 certified
- Test automation: improve stress testing and automated GUI testing
- Code quality and clean up: new tooling for static and dynamic code scans
- Cloud dev/ops activities: maintain Azure, improve AWS knowledge, infra as code, FSS scaling

General improvements

- Delft-FEWS: improving scenario comparisons, easier backend replication, more system metrics for easy troubleshooting
- Delft-FEWS Web OC (incl. webservices): modular approach, support for external visualisation tools & automated testing
- Open Archive: pilot for DB plugin for scalar data, improve robustness and performance and simplify installation

Artificial Intelligence (AI)



Everyday AI

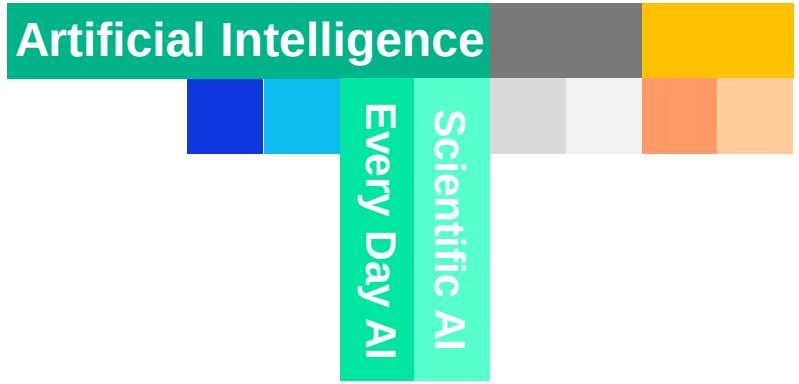
To increase the efficiency (and fun) of our daily work, we are investigating ways to incorporate everyday AI such as CoPilot when developing Delft-FEWS. We will work together and share experiences with the other software departments and initiatives within Deltares to benefit most from these experiments with AI.

Scientific AI

Performance and accuracy are two of the most important features of flood early warning systems. With the recent increase in use cases of AI, we want to investigate how this can be of use to further improve the performance and accuracy of our Delft-FEWS applications. For example, by making Delft-FEWS bots, and working on AI generated weather forecasts and fusion of AI and models to generate flood maps.

Deltares' Strategic Agenda 2026-2029 states: "Our AI/ML strategy for the coming strategic period focuses on developing advanced AI/ML techniques to deepen experimental, numerical and data-driven understanding of water and subsoil ("Scientific AI") and on increasing efficiency in daily operational processes ("Everyday AI").

Artificial Intelligence (AI)



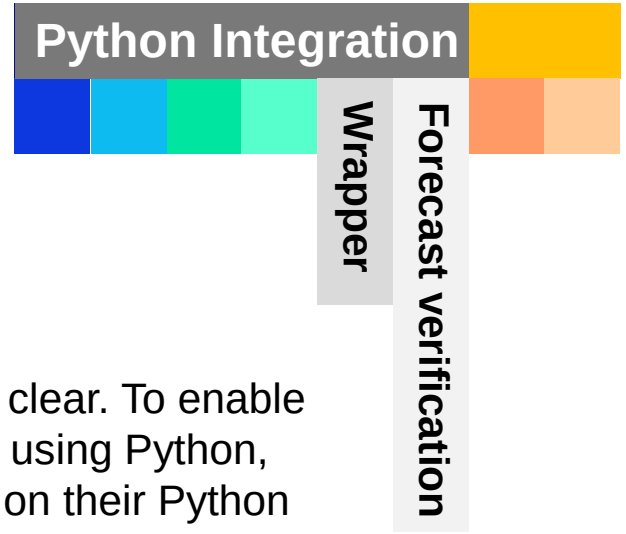
Everyday AI

- Integrate AI tools in day-to-day development processes
- Pilots & knowledge sharing within the development team and between development teams
- Code reviews, pull requests, identifying code smells, refactoring and creating unit tests more easily using AI tools

Scientific AI

- Large Language Models for Delft-FEWS (FEWS bots)
- Fusion of AI tooling, Earth Observation (EO) and models for flood mapping
- Exploring application of (ECMWF) AI generated weather data products in an operational context

Python Integration



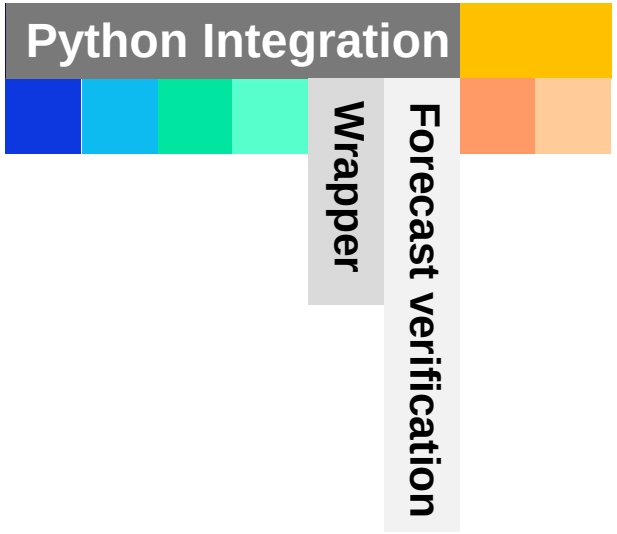
Python integration – Delft-FEWS Webservices wrapper

The importance of embracing and integrating Python as a development tool for researchers is clear. To enable internal colleagues and external end users of our software to directly interact with Delft-FEWS using Python, the standard connection facilities will be provided. In this way, Python users can directly focus on their Python algorithms and arrays without having to spend time on figuring out connection and data I/O with Delft-FEWS.

Python integration – Forecast Verification

Determining quality and performance of forecasts is becoming more important. In order to assess forecast quality, many tools are available. Building on previous projects, forecast verification knowledge will be collected and improved in a dedicated Python package which will be available for all end users to learn from and apply in their contextual situation.

Python Integration



Python integration – Delft-FEWS Webservices wrapper

- Robust, performant and standard way for timeseries I/O from Delft-FEWS
- Support for Python-ready array format (Xarrays, Pandas)
- Deltares maintained separate Python package (optional component)

Python integration – Forecast Verification

- Detach in ‘wrapper’ code (see above) → focus on ‘forecast verification’ code
- Enhance the forecast verification part with threshold exceedance info (e.g. skill/hit rate/false alarm rate)
- Enabling continuous verification
- Comparing skill(s) of different models running via the General Adapter of Delft-FEWS.

Miscellaneous

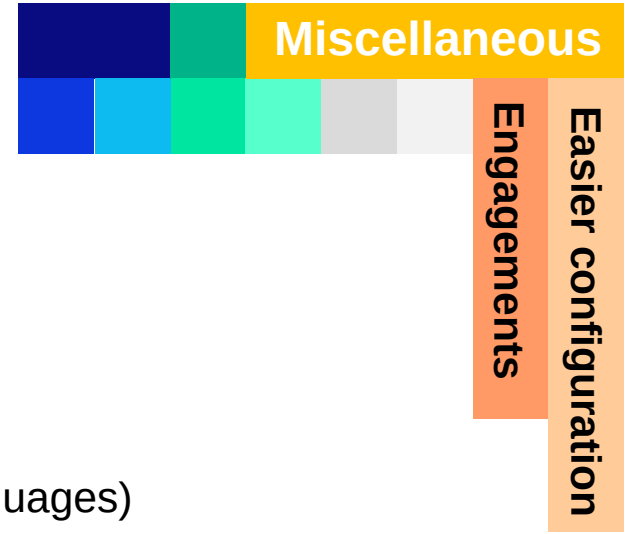
Engagements

From the Delft-FEWS perspective we would like to engage with and to other domains. Focus will be on the data storage and data processing (Azure data lakes), on model integration using the BMI interface and on meteorology by developing our own rainfall downscaling and bias correction module. We engage with our user community as well under this roadmap theme.

Easier Configuration

The FEWS-Conform initiative summarizes the Easier Configuration sub theme. It is a new approach to flatten the configuration learning curve, while at the same time providing consistent documentation, configuration examples and training materials following these conventions. Starting internally, we will soon expand externally by involving our end users and consultants using Delft-FEWS.

Miscellaneous



Engagements

- Azure Data Lakes exploration
- Extending the BMI Interface (module adapters supporting different modelling software languages)
- Rainfall Downscaling and Bias Correction Module
- Delft-FEWS Community

Easier Configuration

- FEWS-Conform initiative: Configuration convention, consistent materials (documentation, courses)

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