Deltares

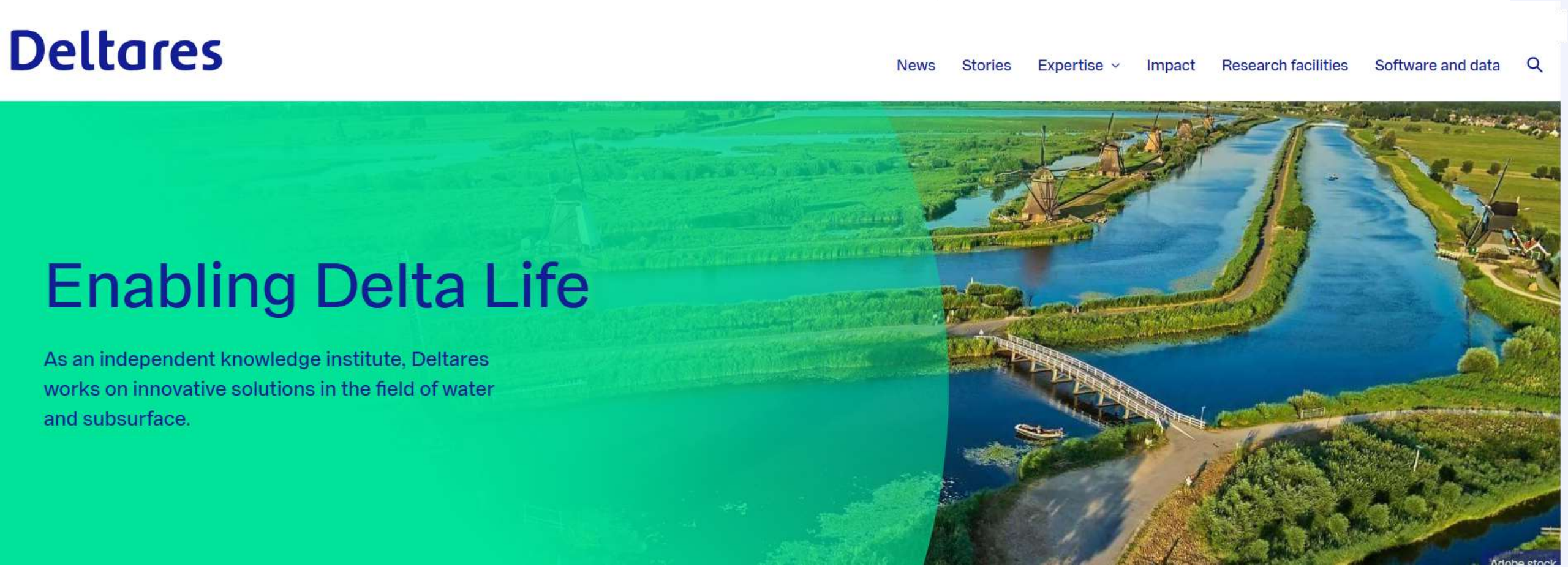
Introducing Deltares and OWM

FEWS Anwendertreffen 2025

Ben van Kester – Head of Operational Water Management Department – Deltares

Thursday, July 3rd, 2025

Deltares – Enabling Delta Life



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Deltares – Enabling Delta Life

WHY?

We have made our ambitions - challenging goals with huge societal importance - more concrete in moonshots. These can only be achieved by working together with others

HOW?

Research and Development

Software and support

Data and Services

Courses and Trainings

Expert consultancy

Deltares – Real time information

WHO?

About 50 people,
spread over 3 departments:

- **Operational Water Management**
- **Environmental Hydrodynamics and Forecasting**
- **Water Operations Software**

HOW?

Research and Development

Software and support

Data and Services

Courses and Trainings

Expert consultancy

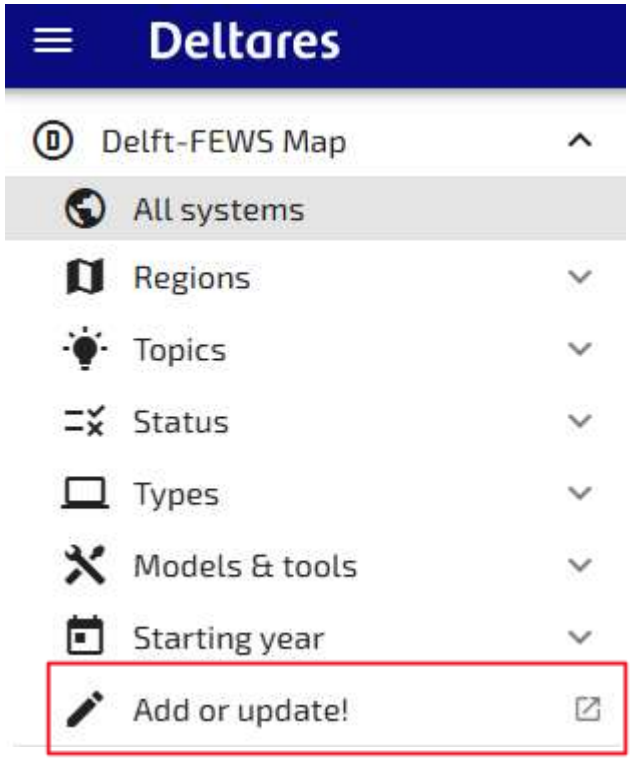

HILFIGER
NEW YORK

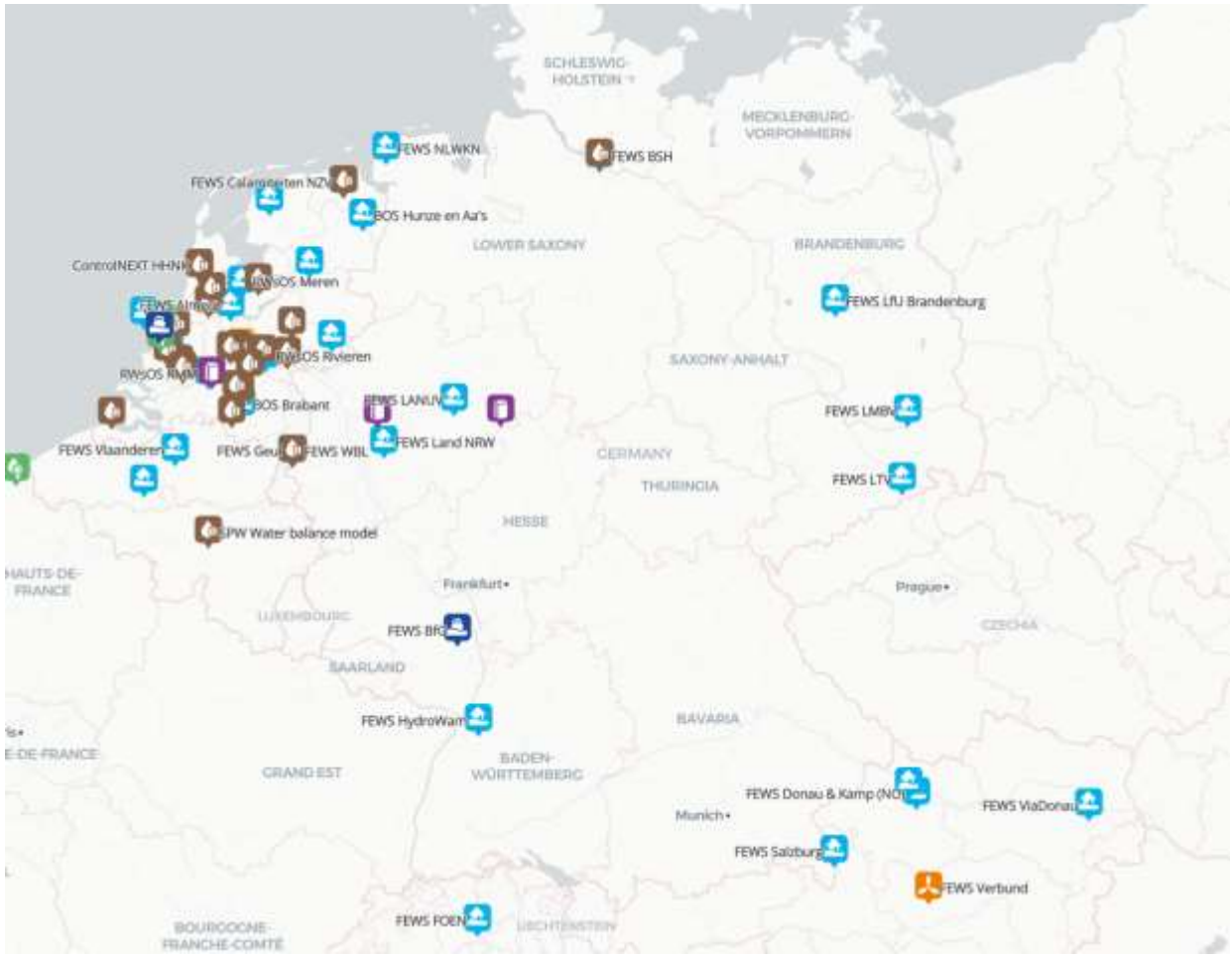
As software tools we use FEWS and RTC-Tools

FEWS Portal: https://oss.deltares.nl/web/delft-fews/events

Map: https://fewsmap.deltares.nl/topology/node/all_systems/map

But: Many are still missing





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Map: https://fewsmap.deltares.nl/topology/node/all_systems/map

OWM[1] Mission:

Enabling better forecast, enabling better decisions

[1]OWM: Deltares' Operational Water Management department

Department OWM strategy – Recap of ‘24

Enabling better forecast,
enabling better decisions

ML & AI

- **Decision making**
- **Real time control**
- **Improving forecasts**
- **Drought forecasting**
- **Impact forecasting**
- **Urban flooding and nowcasting**
- **Hydrological (flood) forecasting**

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AI for Flood Forecasting

Weather information and pre-processing

Title: Investigate the feasibility of applying an **AI weather forecasting** model for pre-processing within Delft-FEWS
Team: Bob van Rongen & Jing Zhao

Title: Machine-learning based **downscaling and correction for post-processing rainfall** forecasts
Team: Ruben Imhoff, Henrique Moreno Dumont Goulart, Jing Deng, Albrecht Weerts

Earth observation and global data for model derivation and initial states

Title: Operational **Data Fusion of Model and EO** Flood Maps
Team: Arjen Haag, Albrecht Weerts, Jaap Schellekens, Arnejan van Loenen, Tjalling de Jong

Title: **Generative AI for bathymetry**
Team: Willem Tromp & Martin Verlaan

Title: **LLMs for Delft-FEWS**
Team: Martijn Kwant, Jurian Beunk, Ruben Dahm & Dave de Koning

Rapid model emulators and flood forecasting approaches

Title: **Surrogate** flood modelling based on **LSG and SFINCS**
Team: Roel de Goede, Dirk Eilander & Tim Leijnse

Title: **GNN-based urban surrogate model** for flood hazard quantification in urban flood forecasting
Team: Xiaohan Li, Anaïs Couasnon, Peter Nelemans & Ruben Imhoff

Title: Machine Learning Demonstrator for Flood Forecasting using the **emulator of wflow_sbm**
Team: Ali Meshgi, Peter Nelemans, Tycho Bovenschen

Title: A **GNN** based model for **storm surge forecasting**
Team: Jing Zhao and Martin Verlaan

Title: **Hybrid-AI for storm surge forecasting**
Team: Martin Verlaan

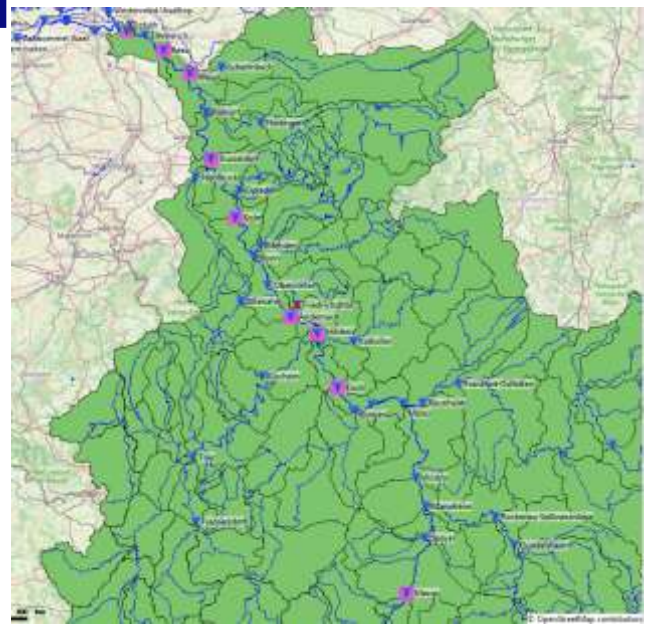
Post-processing, control and decisions

Title: Benchmarking **AI-based post-processing** for probabilistic forecasting for the Meuse
Team: Maarten Smoorenburg, Jing Deng, Maarten Verbrugge, Jurian Beunk, Hans Korving & Thies Blokhuijsen

Title: Hybrid usage of **AI and OR for real-time operational management of hydraulic structures** under flood conditions
Team: Ailbhe Mitchell & Bernhard Becker

Image created with Microsoft Copilot using input terms: “artificial intelligence”, “flooding” and “forecasting”

Operational Forecasting: LobithNN – data-driven model for hourly discharge forecasting at Lobith 48h ahead



- Background

RWsOS has a linear regression model (LobithW) for 2-day ahead daily discharge forecasting at Lobith.

- Objectives

Upgrade the data-driven model to carry out hourly discharge forecasting with a lead time of 48 hours.

Performance of the new model (LobithNN) should be equal or better than LobithW.

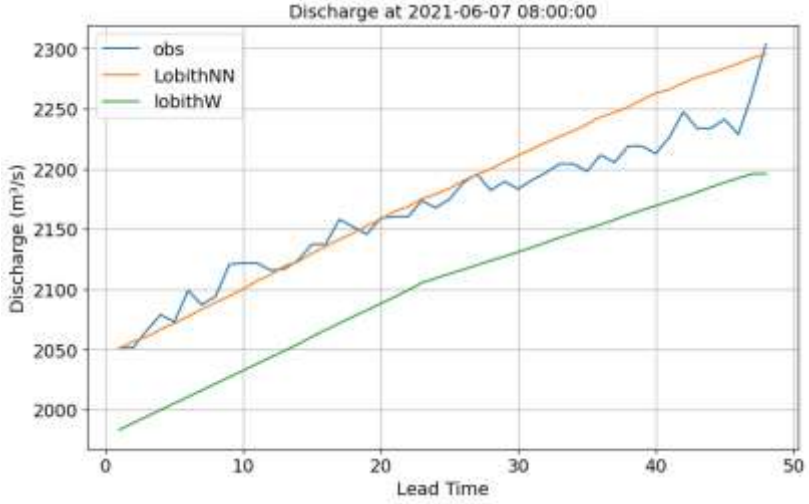
- Method

Model: single layer LSTM

Inputs: upstream station water levels + Lobith historical Q

- ML for operation (MLOps)

Input reliability, model performance robustness, development workflow, etc.



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Operationalisation of AI in the flood fore-cast, warning, response chain

Deltares, March 2025: Jan Verkade, Jan Talsma, Jurian Beunk

The advance of Artificial Intelligence has resulted in a wave of research in the scientific realm, but when it comes to *operationalising AI* in the hydrological forecasting, warning, and response chain, progress has been far less visible. Many agencies responsible for these chains are now confronted with the question of whether they are taking full advantage of AI's potential. Numerous reports explore AI's capabilities, but there remains a clear gap in *establishing best practices* for its real-world implementation. The challenge now is not just understanding what AI can do, but determining how to integrate it effectively into decision-making and response systems.

The present document aims to outline current thinking as to what could comprise such best practice. As the field is highly dynamic, our thinking is likely to change and new versions of this document are likely to come into existence.

Scope: flood early warning and 'the four pillars'

The present document is about *operationalising* AI-based technology in the forecast, warning and response chain. It is hoped that it provides some guidance in the decisions that need to be taken: which processes can benefit from AI? What are the expected benefits? What concerns should be addressed? What are the requirements to the technologies? What are the implications, in legal terms, in terms of maintenance and development, in terms of cost?

The present document discusses *flood* early warning systems. The findings may well apply to early warning systems for other hazards than floods. However, the 'flood' scoping will keep the present document as concise as possible. Starting point for the analysis that is presented in the present document is the "four pillars of early warning systems" design:

1. Risk awareness
2. Monitoring, detection and forecasting
3. Dissemination and communication
4. Preparedness and response capability

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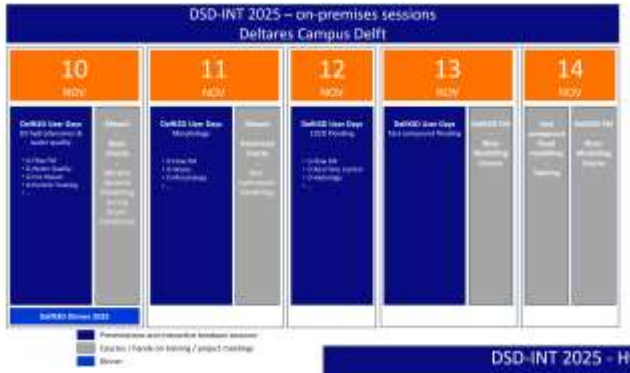

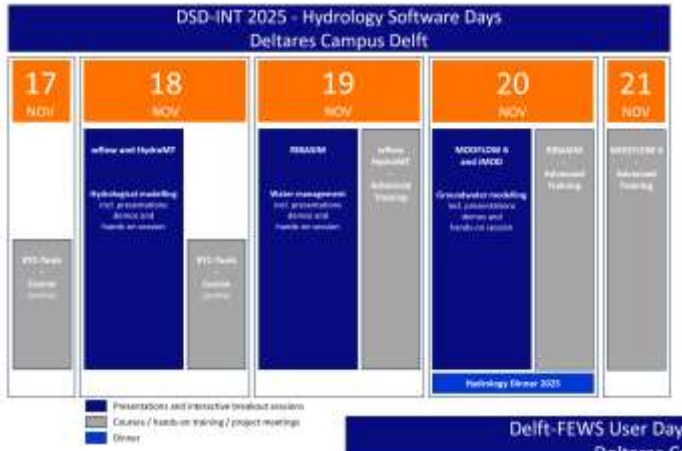

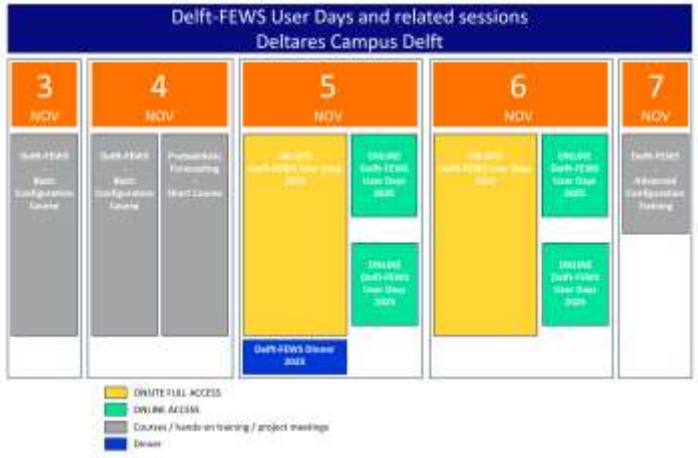

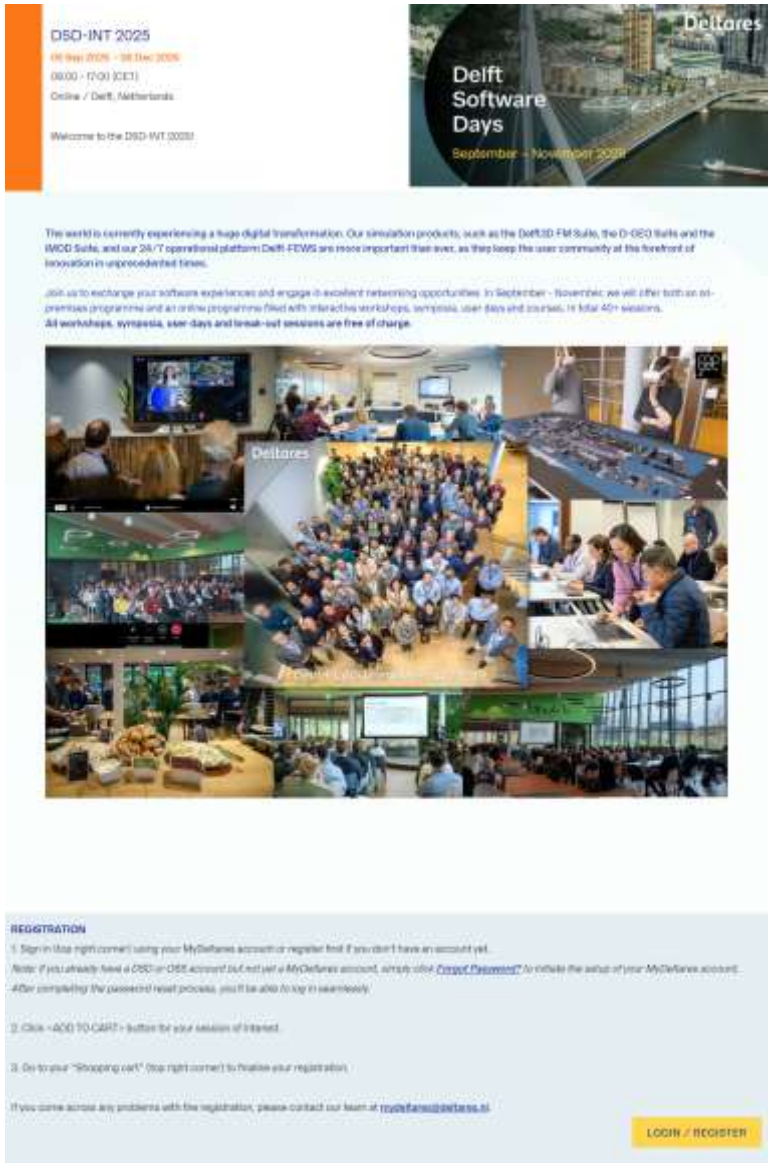

https://softwaredays.deltares.nl/program

International FEWS userdays

• Upcoming Events

03 Jul 2025

Regionales Delft-FEWS Anwendertreffen 2025

03 July 2025 - 04 July 2025

beim Ruhrverband in Essen, Germany

03 Sep 2025

Delft-FEWS User Days Australia 2025

03 September 2025 - 05 September 2025

Melbourne

24 Sep 2025

Delft-FEWS 2025.01 New Features Webinar, 4 PM CET (GMT+1)

24 September 2025
16:00 - 17:00 CET (GMT+1)

online

02 Oct 2025

FEWS Community Talk 11 - October 2, 2025

02 October 2025
16:00 - 17:00 PM (CET)

online

15 Oct 2025

Latin American Delft-FEWS Users Meeting

15 October 2025 - 16 October 2025

Argentina

05 Nov 2025

Delft-FEWS international user meeting 2025

05 November 2025 - 06 November 2025

Deltares and online

For our FEWS related events: https://oss.deltares.nl/web/delft-fews/events
Want to register? Register here

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Sign up for the sessions and presentations

05 November 2025

ON-SITE Delft-FEWS User Days 2025 (Day 1)

09:00 - 17:00 (GMT+1) | Free

ONLINE Delft-FEWS User Days 2025 (Day 1)

09:00 - 17:00 (GMT+1) | Free

06 November 2025

ON-SITE Delft-FEWS User Days 2025 (Day 2)

09:00 - 17:00 (GMT+1) | Free

ONLINE Delft-FEWS User Days 2025 (Day 2)

09:00 - 17:00 (GMT+1) | Free

Register here

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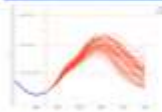
Or: Join workshops or courses on FEWS and RTCTools

03 November 2025

Delft-FEWS - Basic Configuration Course

09:00 - 17:00 (GMT+1) | € 1259

04 November 2025



Probabilistic Forecasting - Short Course

09:00 - 16:30 (GMT+1) | € 629

07 November 2025

Delft-FEWS - Advanced Configuration Training

09:00 - 13:00 (GMT+1) | € 360

13 November 2025

Delft-FEWS - Web Services Course

14:00 - 17:30 (GMT+1) | € 360

17 November 2025

RTC-Tools - Course

13:00 - 17:00 (GMT+1) | € 629

20 November 2025

Delft-FEWS - Water Quality Configuration Course

09:00 - 13:00 (GMT+1) | € 360

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https://oss.deltares.nl/web/delft-fews/events

Or other parts of Deltares' fields and software suite

- Delft3D-FM Hydrodynamic and/or Morphodynamic Modelling
- Wflow Hydrological Modelling
- Xbeach – Hydrodynamics and morphology
- IMOD – MODFLOW groundwater modelling
- WANDA – Pipeline systems design and control
- Many more

- Feel free to reach out to me or visit: https://academy.deltares.nl/en/home