

Hydrological Modeling & Reservoir Operation in Delft-FEWS

Delft-FEWS User Days 2026

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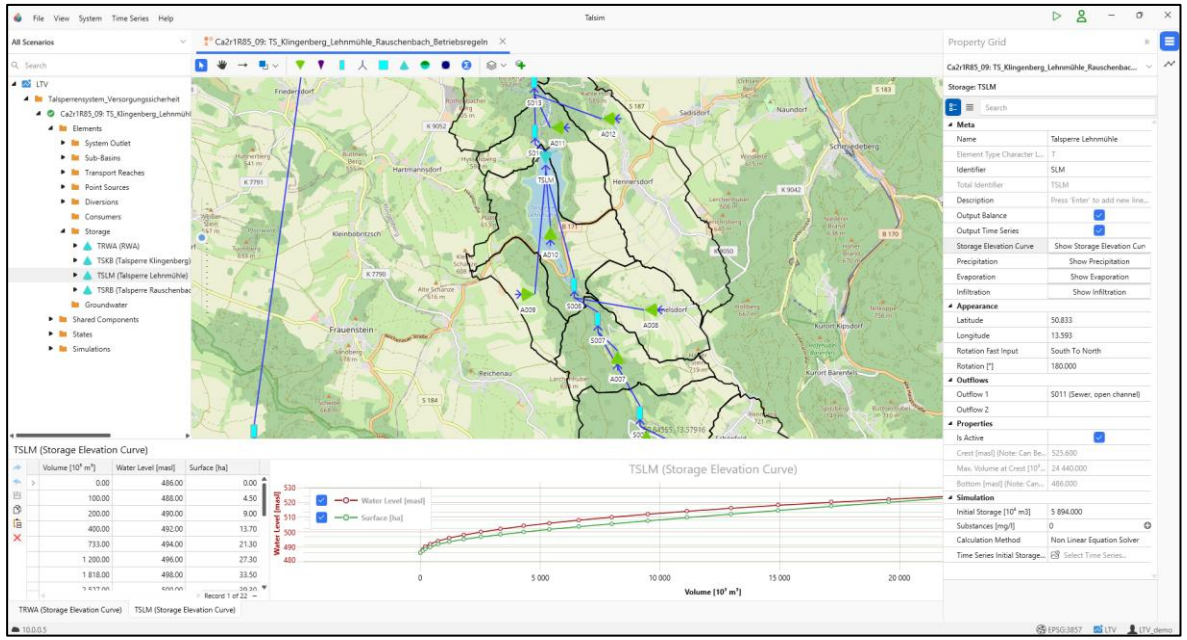
Talsim – hydrological modeling and decision support software

- Rainfall-runoff modeling
- Operation of water infrastructure
- Reservoir optimization
- Simulate & evaluate drought
- Flood forecasting
- Climate change assessments
- Simulate design floods for dam safety

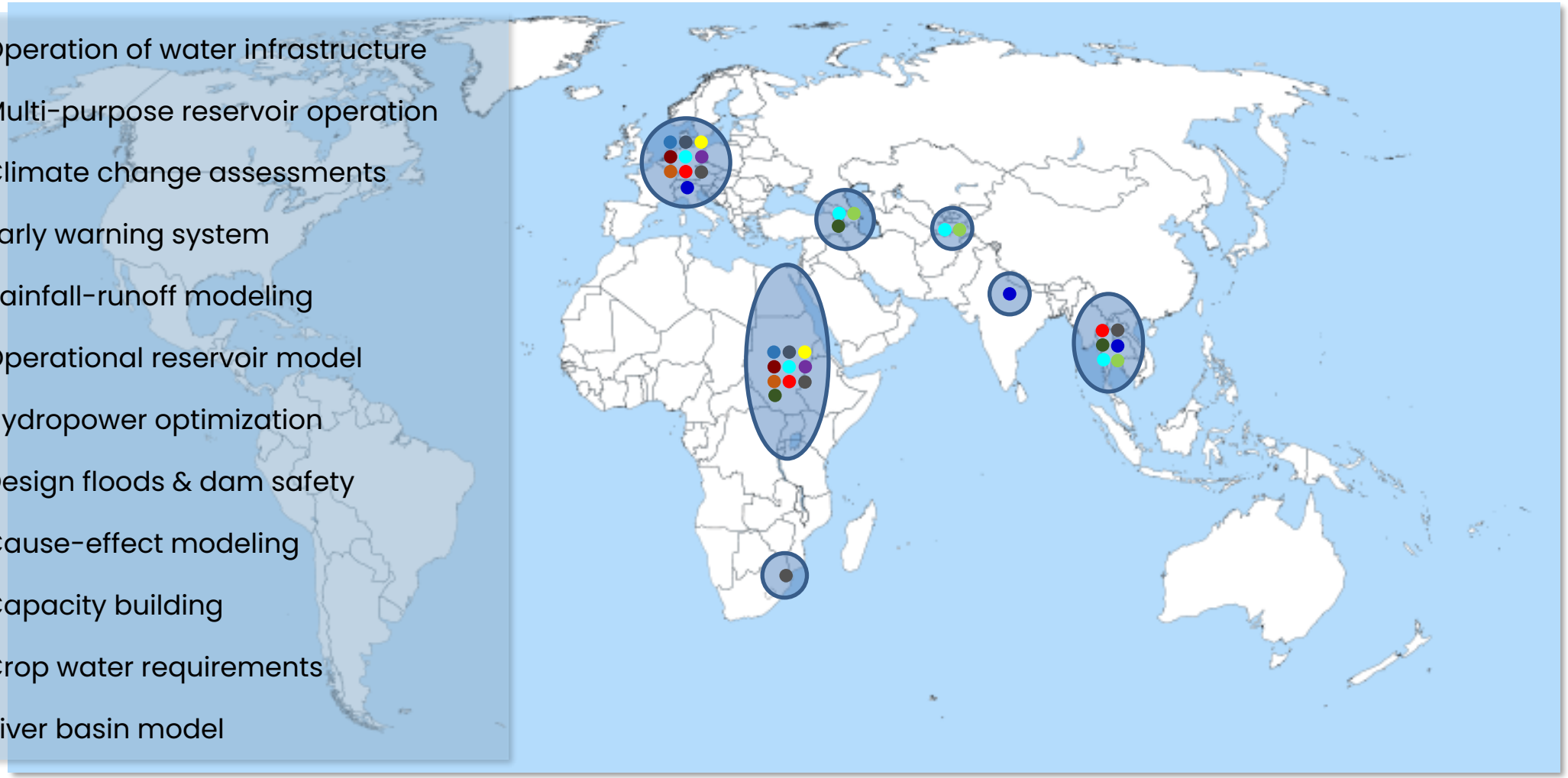


Since the 1990s: from a research project at the University of Darmstadt to Talsim 5 (2025) with a new user interface

talsimpy: Python package – interface to Talsim 4 datasets and Talsim 5 databases: read, edit, run simulations, evaluate time series

Talsim applications

- Operation of water infrastructure
- Multi-purpose reservoir operation
- Climate change assessments
- Early warning system
- Rainfall-runoff modeling
- Operational reservoir model
- Hydropower optimization
- Design floods & dam safety
- Cause-effect modeling
- Capacity building
- Crop water requirements
- River basin model



Where Talsim helps

Reservoirs

Design, simulate & evaluate operating rules – for single dams or whole reservoir systems

Floods

Flood forecasting and design floods for dam safety assessments

Droughts & climate change

Simulate & evaluate drought and climate change scenarios for long-term robustness

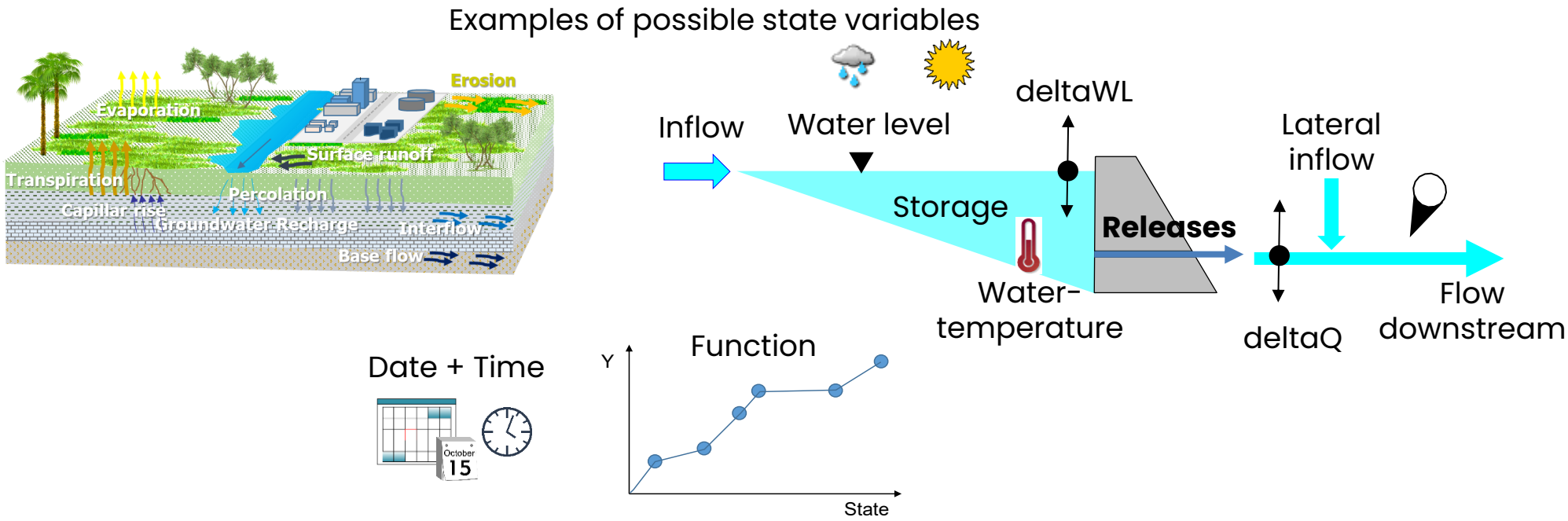
Operational use

Runs directly in Delft-FEWS via the TalsimFEWSAdapter – for any system size

Operating Rules

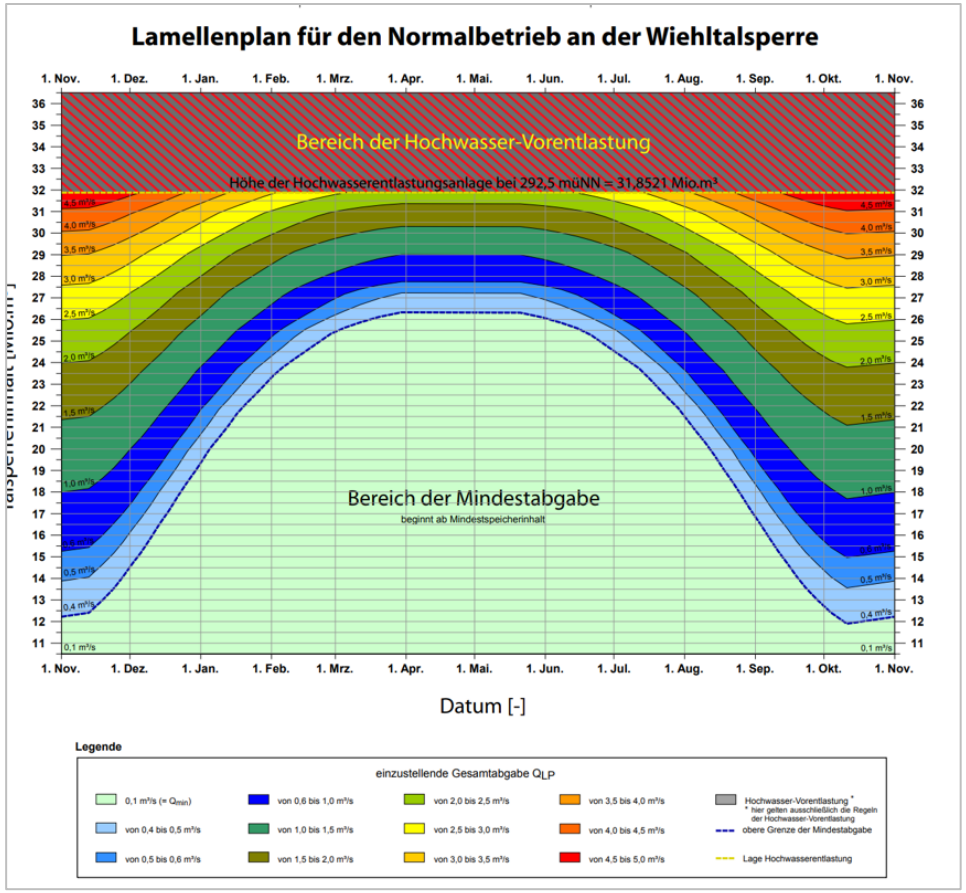
Managing water with operating rules in Talsim is simple yet very flexible and powerful:

1. Operating rules are described by means of functions (x-y functions or derivatives)
2. Functions can be dependent on one or several state variables
3. State variables and their functions can be combined to control clusters

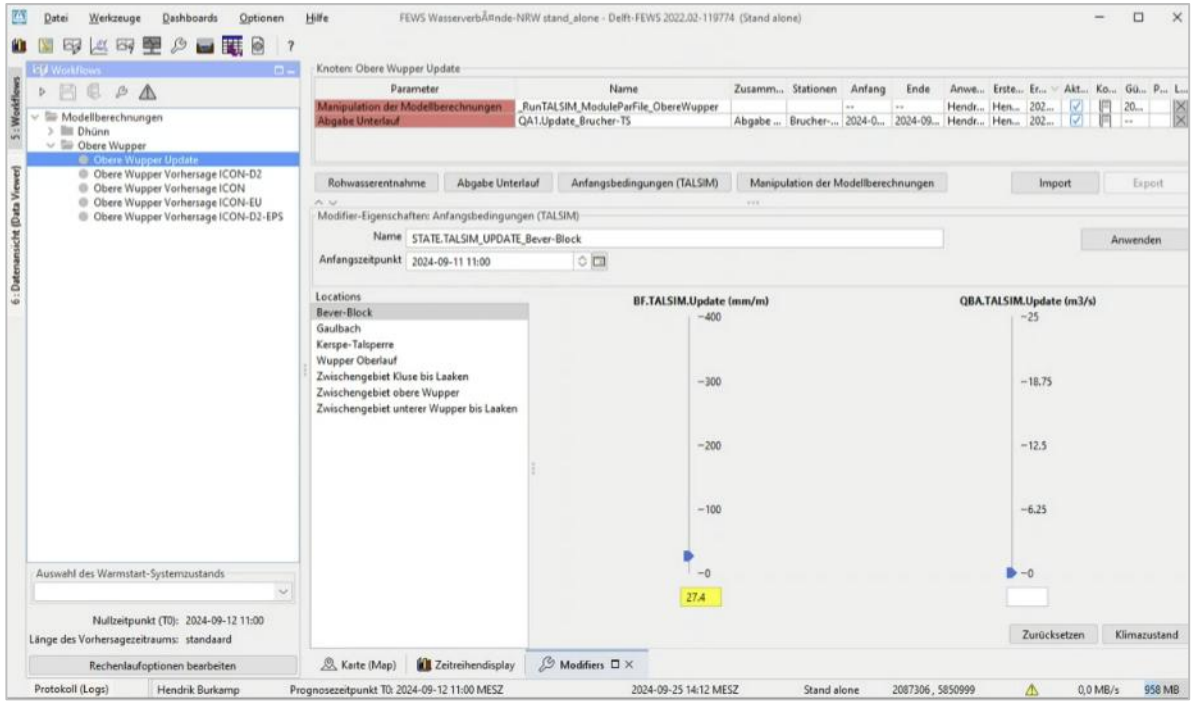


Operating rules in practice

Example 1: Create zoning plans with Talsim



Example 2: Use Delft-FEWS modifiers to override starting values / outflows



Talsim + Delft-FEWS

PART 1

How to use Talsim in Delft-FEWS?

Integration via the TalsimFEWSAdapter

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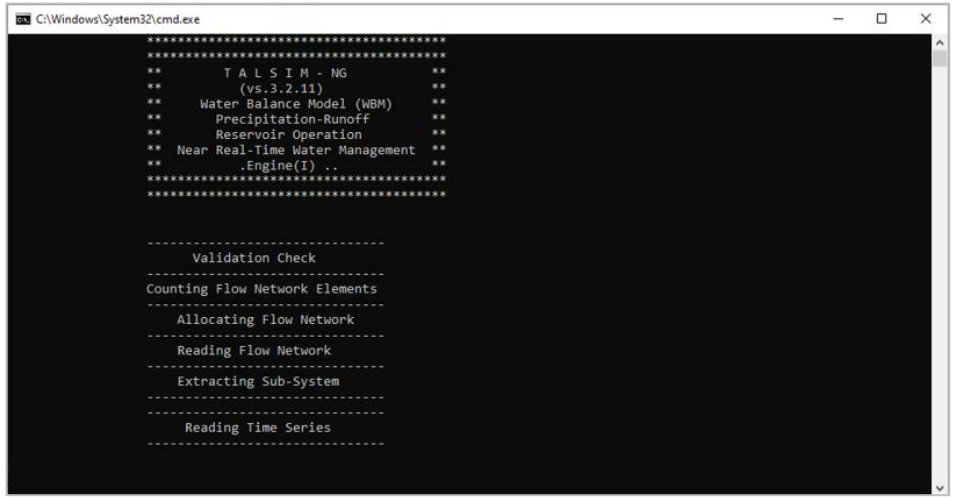
Talsim in Delft-FEWS

- The Talsim user interface is used to build the model: system model, operating rules & calibration
- Under Delft-FEWS, only the Talsim simulation engine is used and runs as a console application in the background

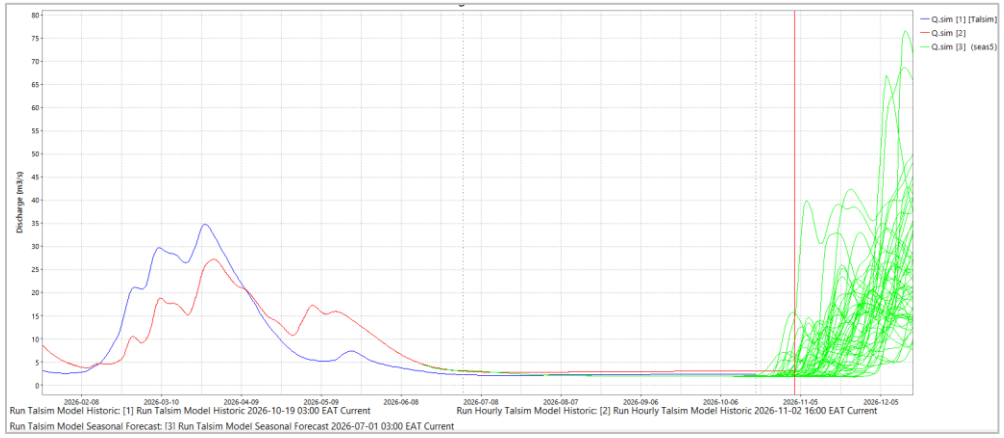
Talsim

Delft-FEWS



Talsim simulation engine (console application)

Adapter



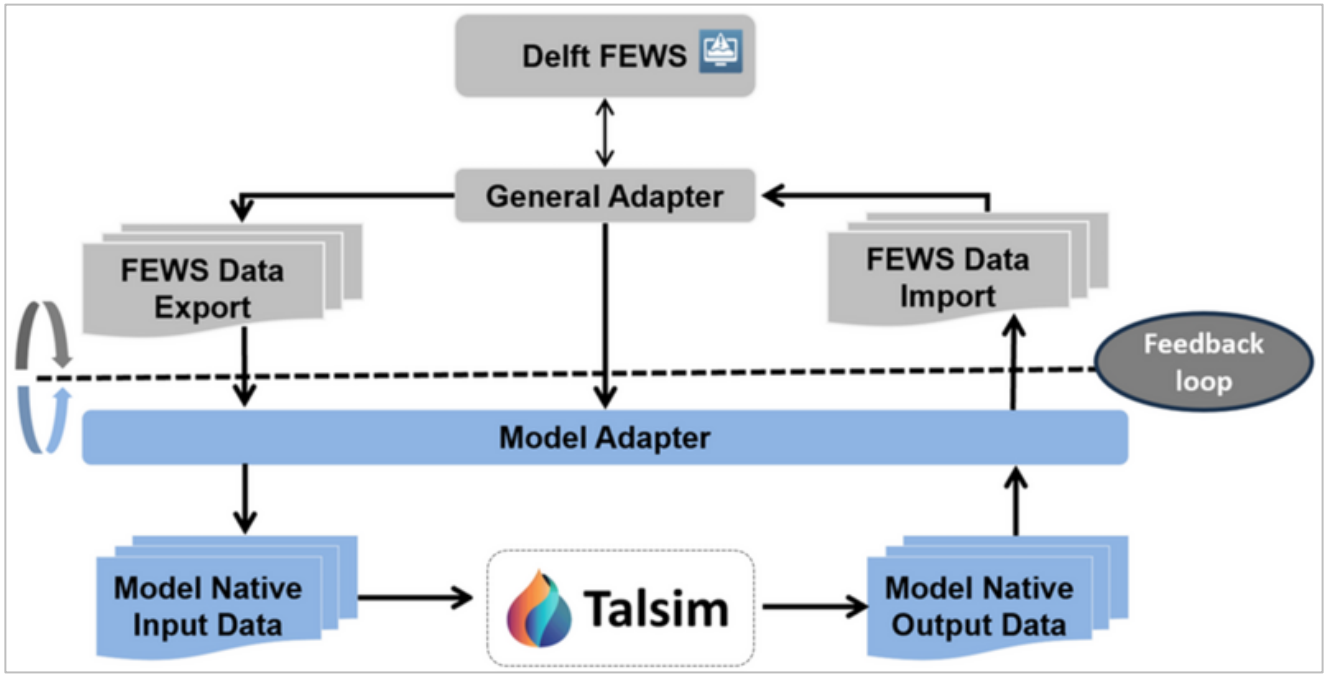
Forecasts & results in Delft-FEWS

By using the TalsimFEWSAdapter

The TalsimFEWSAdapter is responsible for:

- Converting FEWS export data to Talsim format
- Launching the simulation
- Converting Talsim results to FEWS format
- Writing a log file

Input from FEWS: precipitation & PET time series, simulation period, optional starting conditions



Talsim + Delft-FEWS

PART 2

Project Examples

Lake Victoria Basin · Aggerverband · Wasserverband Eifel-Rur

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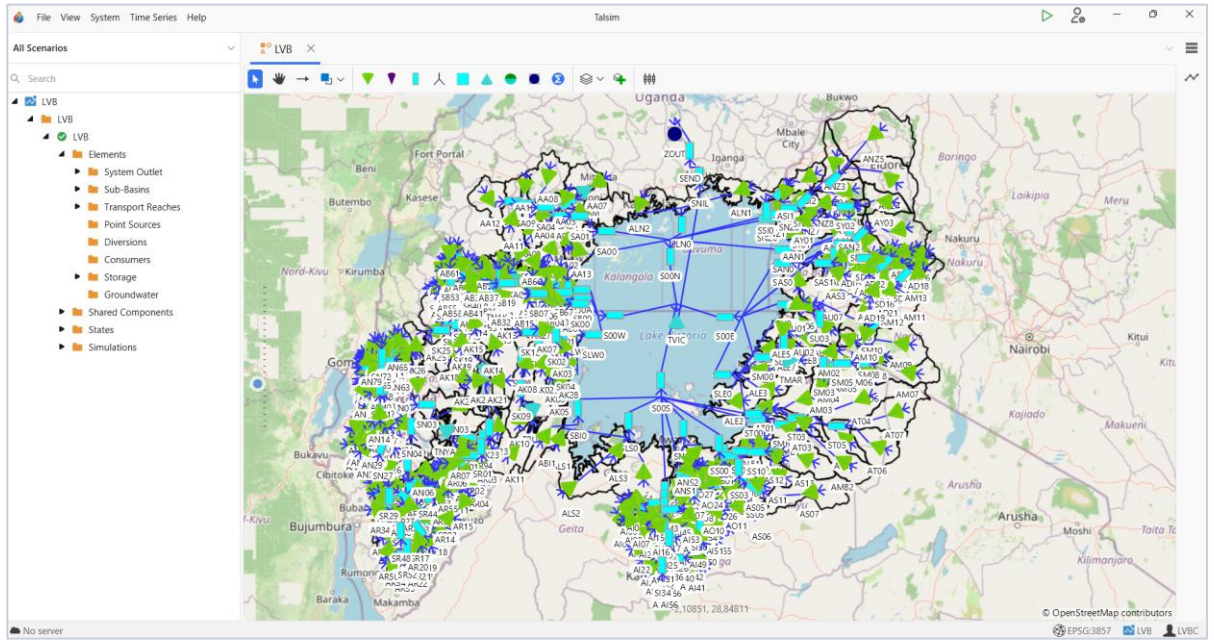
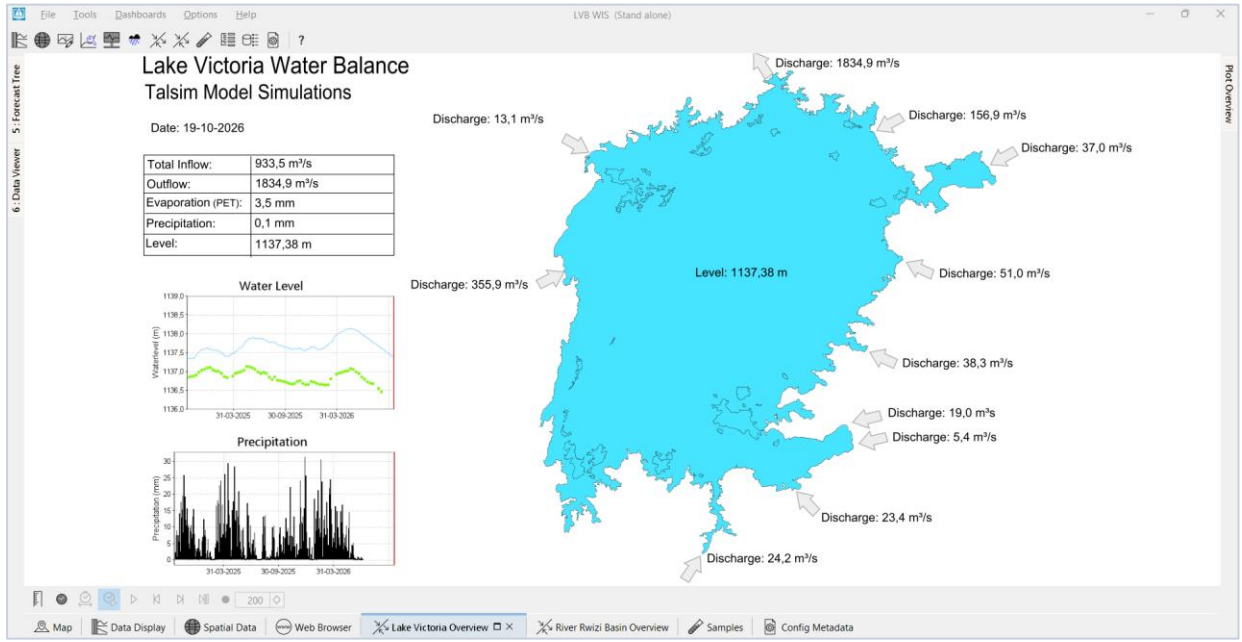
Lake Victoria Basin

- Talsim used for: Historical and forecast simulation of water level, streamflow & input for hydraulic model
- Hourly and daily simulations
- 1 Regional and 5 National Use Cases
- 451 catchments

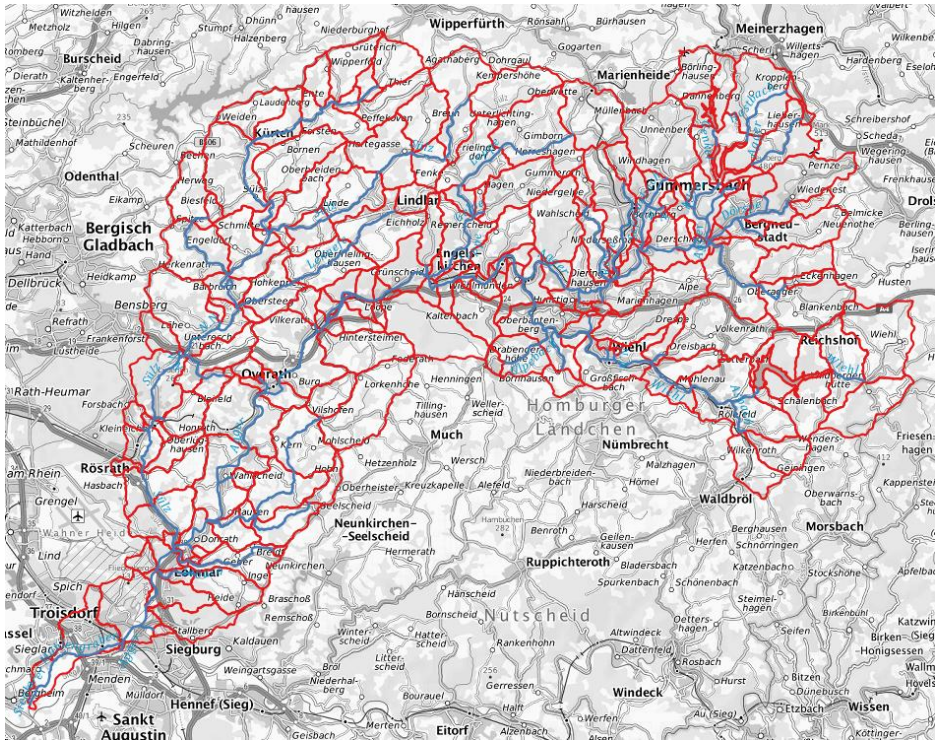


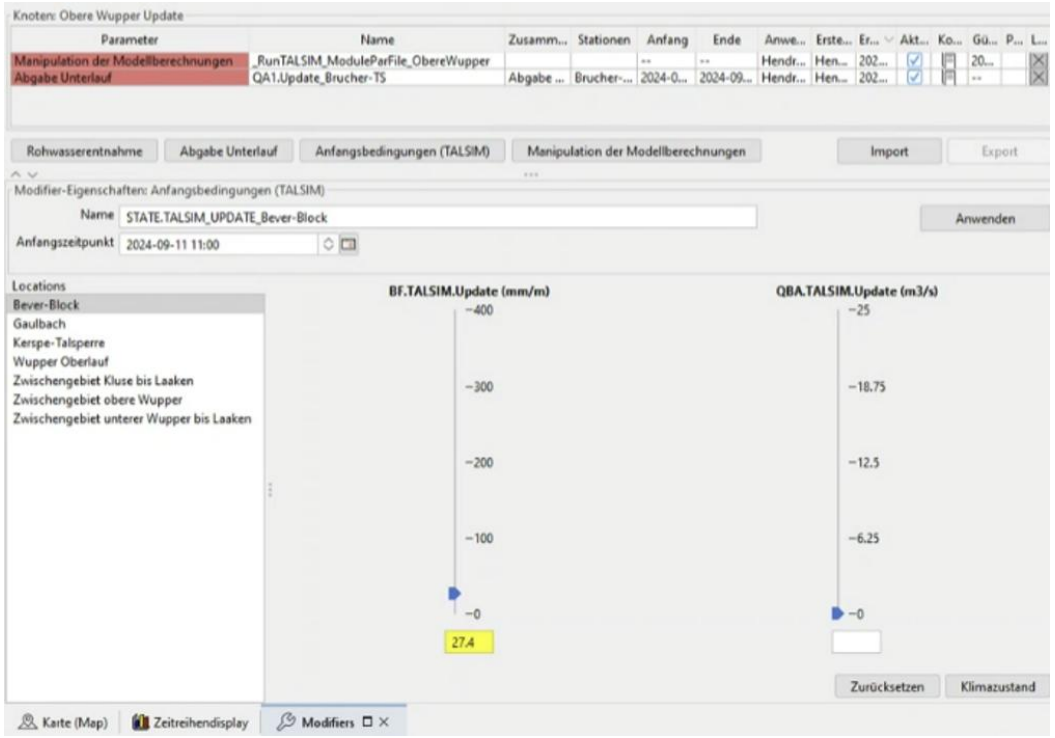


Aggerverband (Germany - NRW)

- 3 reservoirs | 825 km²
- Rainfall-runoff modeling
- Operating rules
- Calculation and forecasting of meteorological index SPEI for operating rules
- Extras: overriding options for outflow of each reservoir and soil moisture conditions using Delft-FEWS modifiers

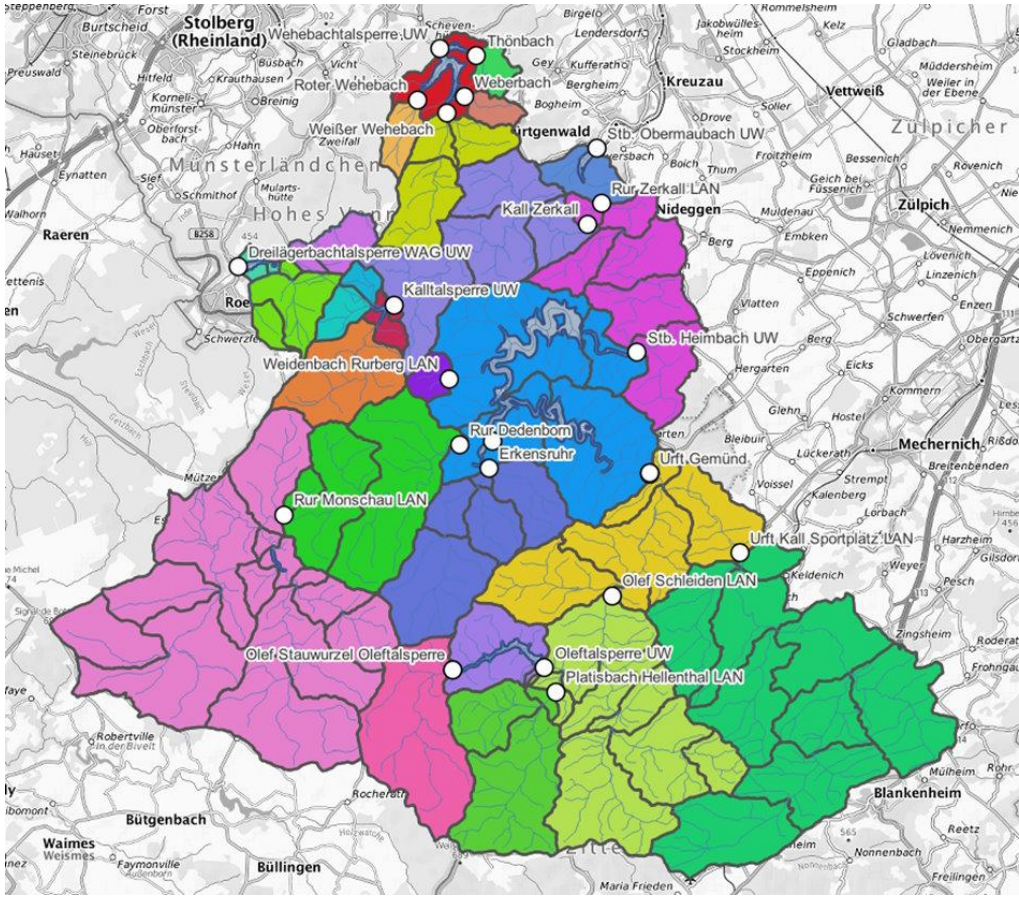






Wasserverband Eifel-Rur (Germany - NRW)

- Dam System Eifel-Rur including operating rules
- Catchment size: 866 km²
- Early warning system and real time operation
- Extras: possibility of overriding options for outflow of each reservoir and soil moisture conditions



Project details

Talsim-FEWS integration for the Eifel-Rur dam system (sydro.de)

Talsim + Delft-FEWS

GET IN TOUCH

Questions? Talk to us

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