Deltares USA

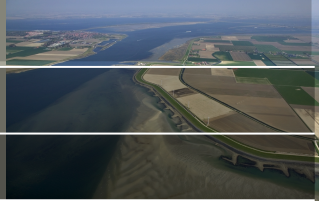
FEWS: A Forecasting Environment

Reservoir System Modeling Technologies Conference

February 22, 2012

Edwin Welles
Deltares USA

Presentation Overview



- Characteristics of any forecast system
- Description of FEWS, a multi-purpose forecast environment
- Example FEWS applications

Forecast Systems

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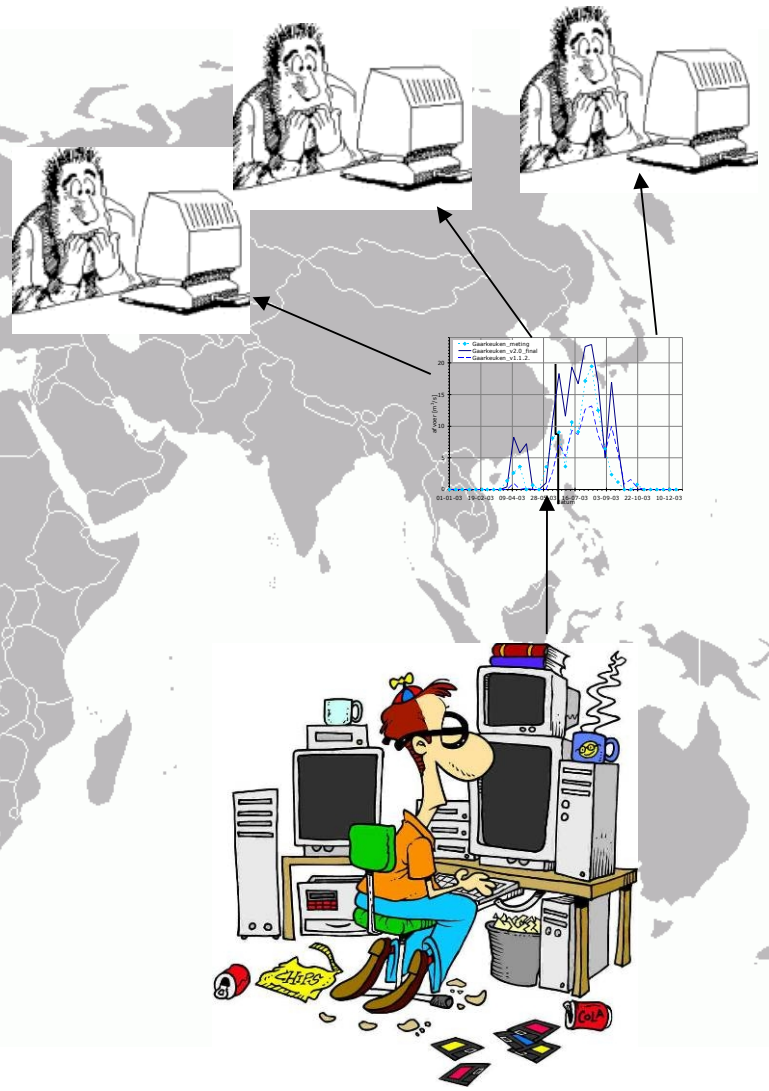
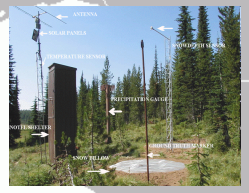
The Goal of a Forecast System

Linking Good Science to ....

- Water Supply Managers
- Planning Agencies
- Regulators
- Policymakers
- Operational Forecasting
- Emergency Managers
- Public



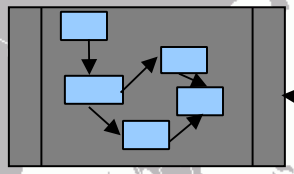
Elements of a Forecast System



Get data

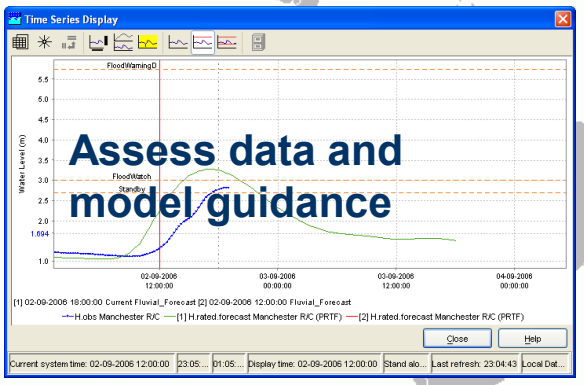
Forecaster, Planner, Custodian...

Other Scientists and Operators



Run/control models

Scientific Assessment



Public Decision?

Public Action

User (Warnings, Releases, ...)

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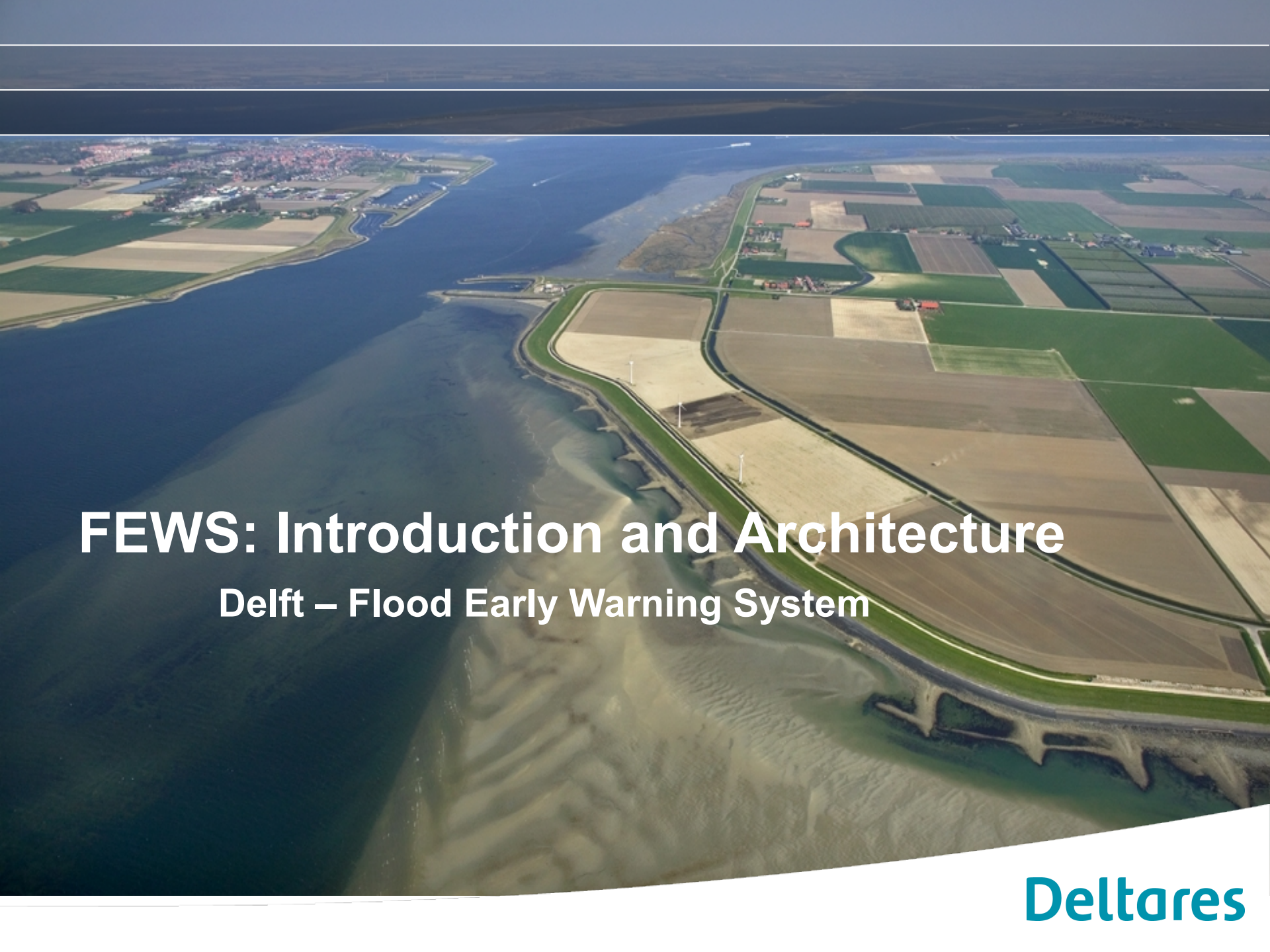

FEWS: Introduction and Architecture

Delft – Flood Early Warning System

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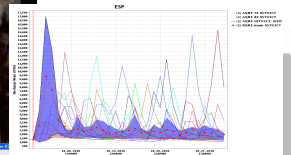
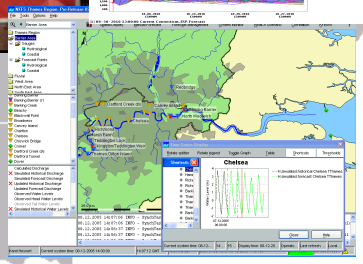
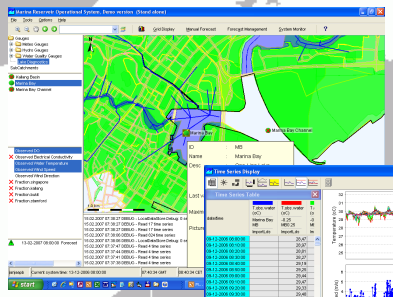
Wide Variety of Applications

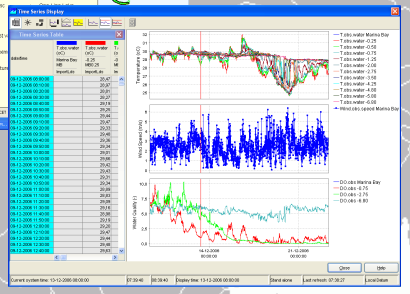


floods &
water supply

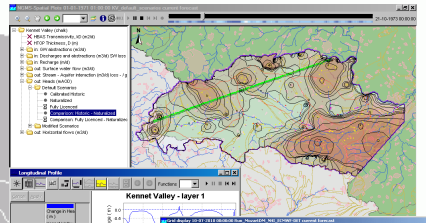


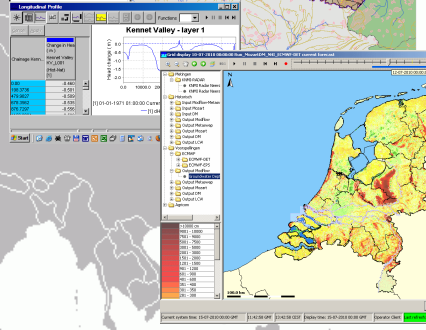
water quality



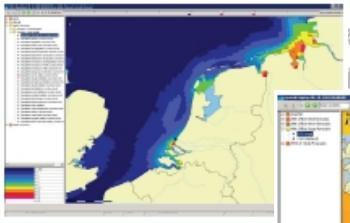


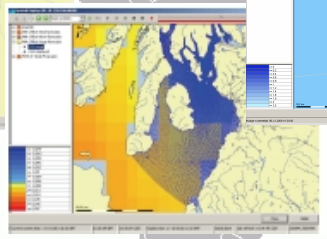
groundwater

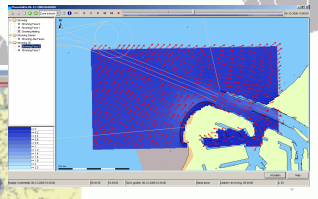




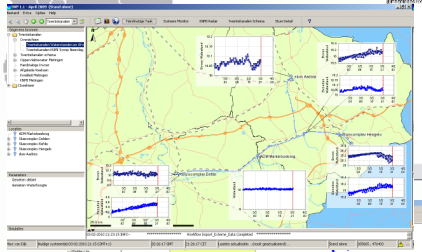
coastal WQ storm surge navigation

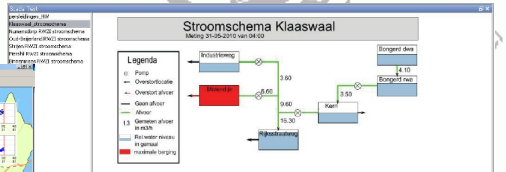


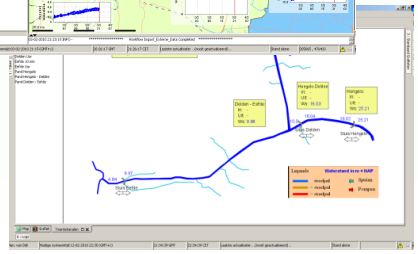


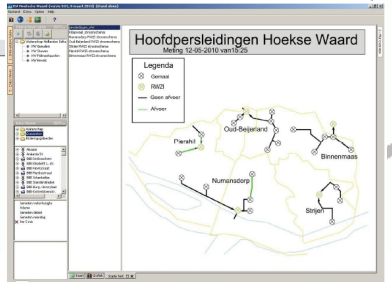


real time control

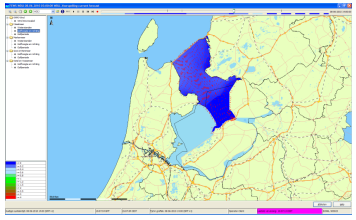




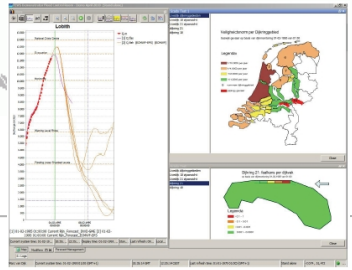




lakes & reservoirs



dike strength



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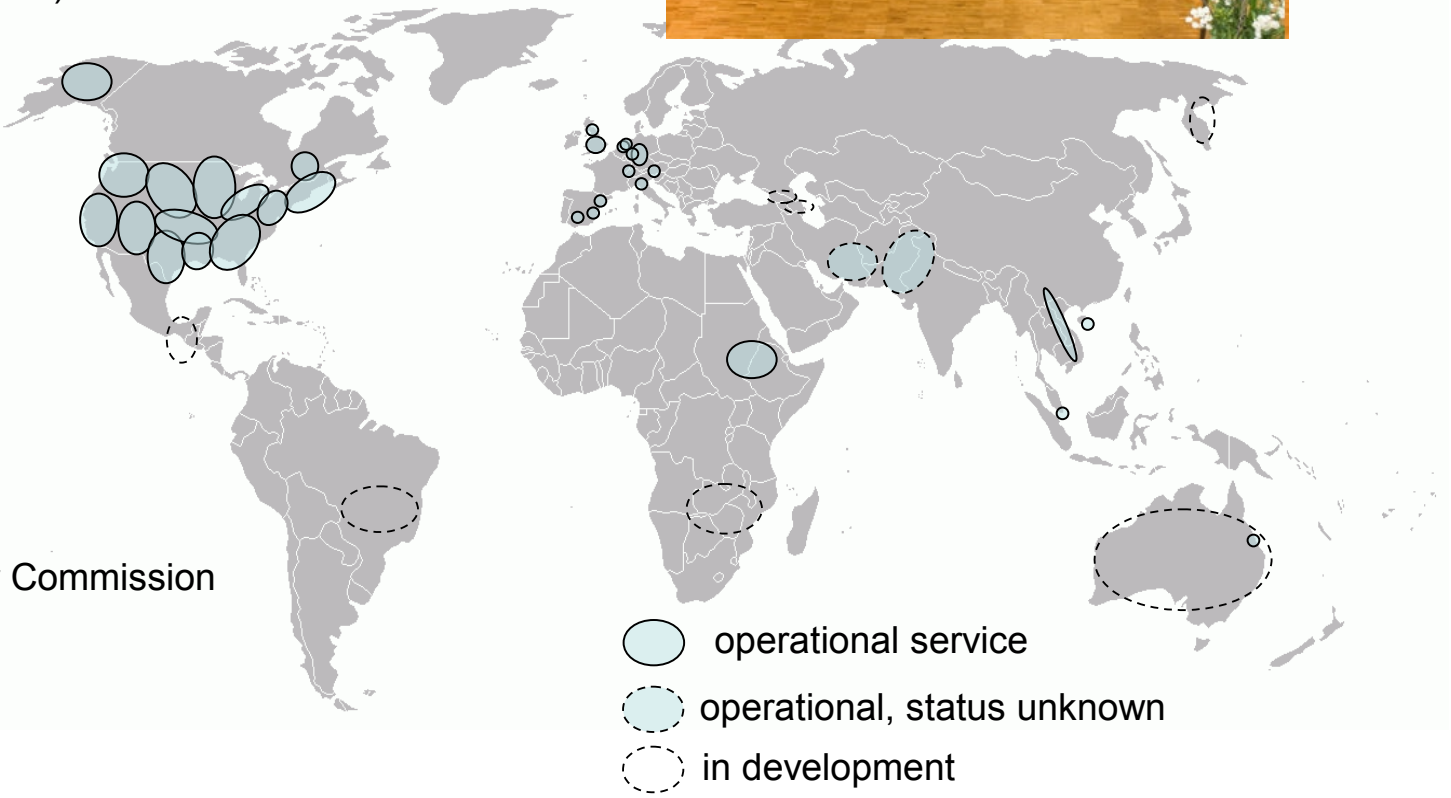
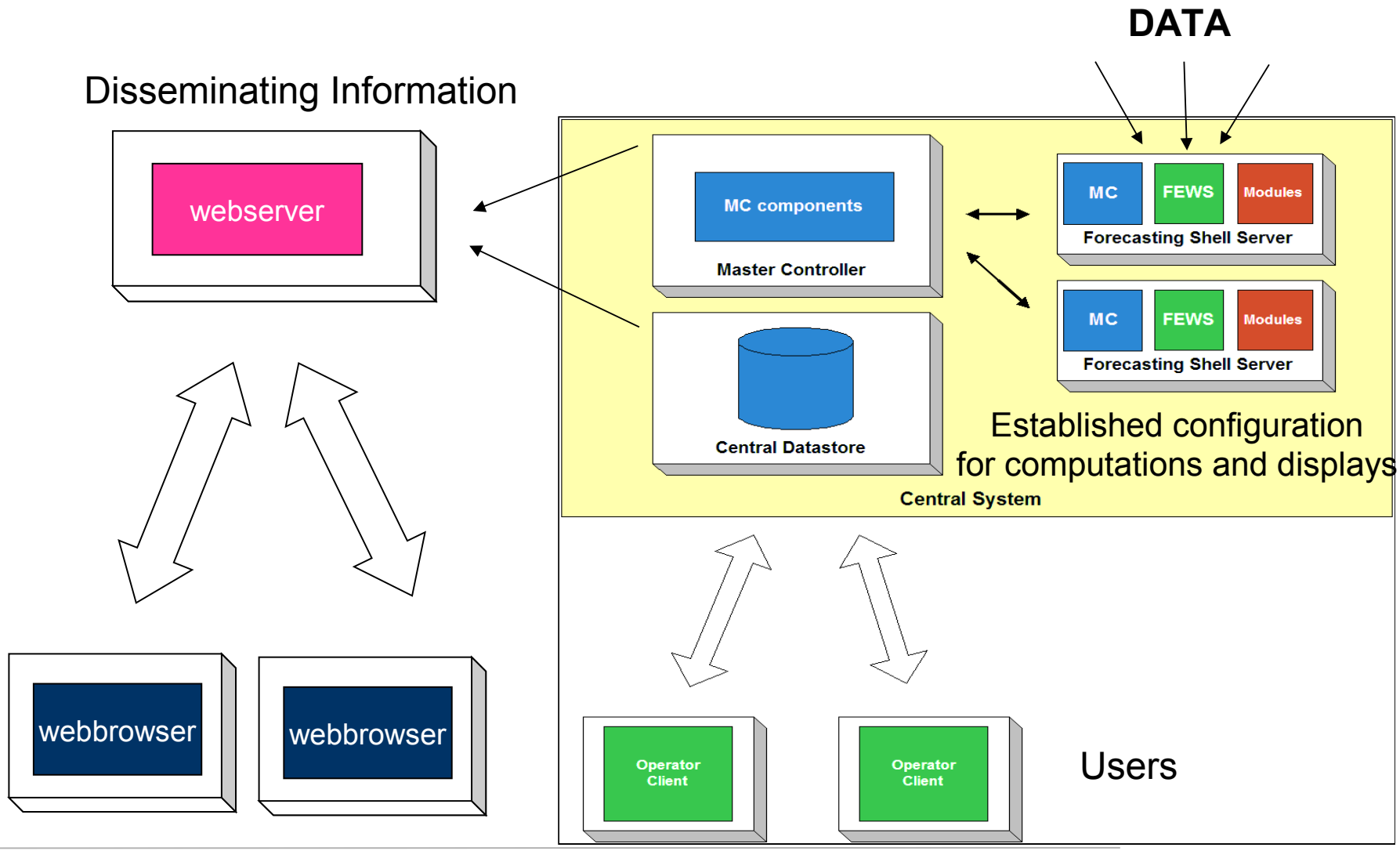
Delft FEWS

User Community

- USA (BPA, NWS)
- Canada
- UK
- Netherlands
- Germany
- Switzerland
- Italy
- Austria
- Spain
- Singapore
- Taiwan
- Mekong River Commission
- Korea
- Australia
- Sudan
- Zambezi
- Mexico
- Brazil



Schematic Overview of FEWS



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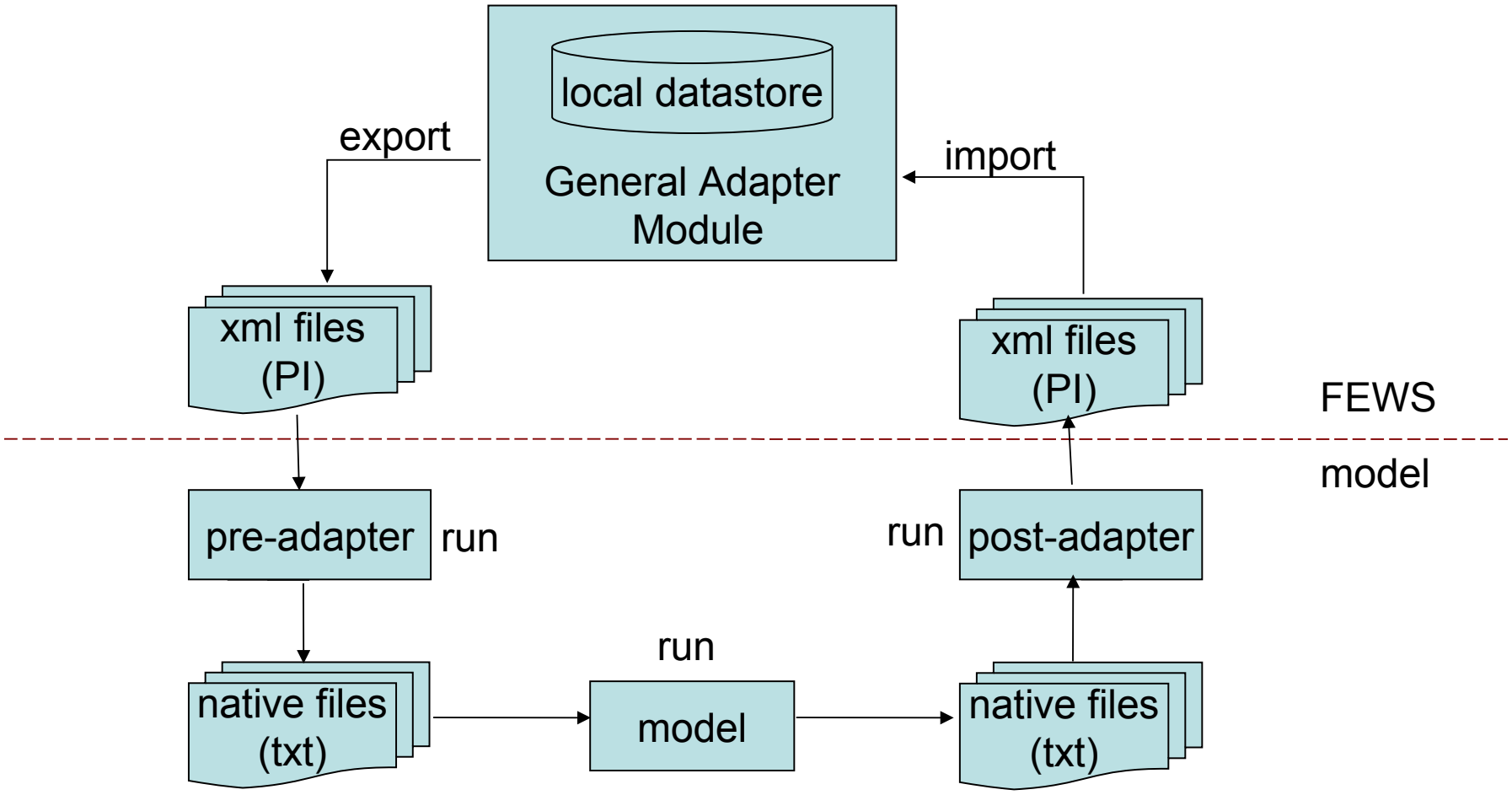
Running models – how does it work



FEWS: Model Control

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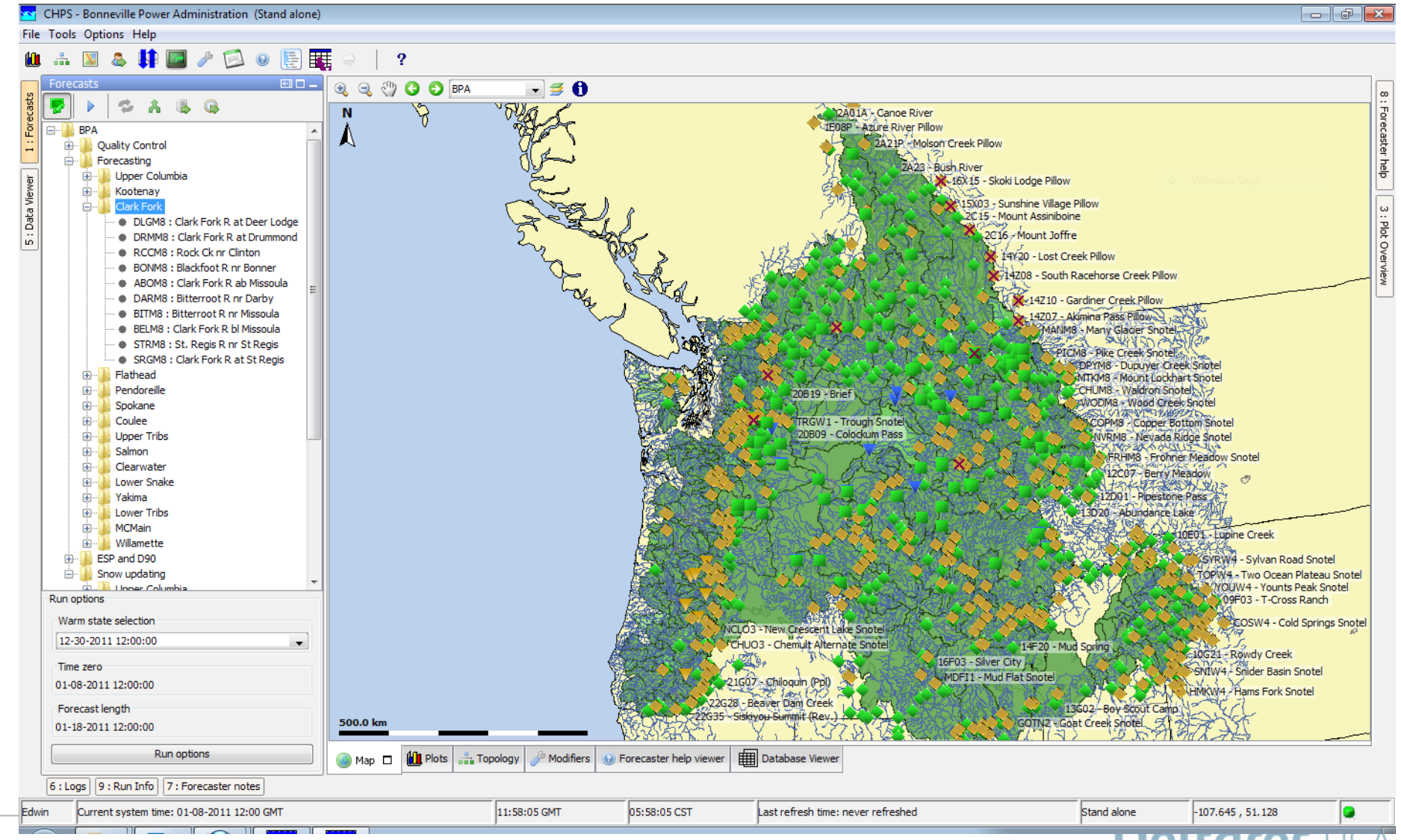
Situational Awareness



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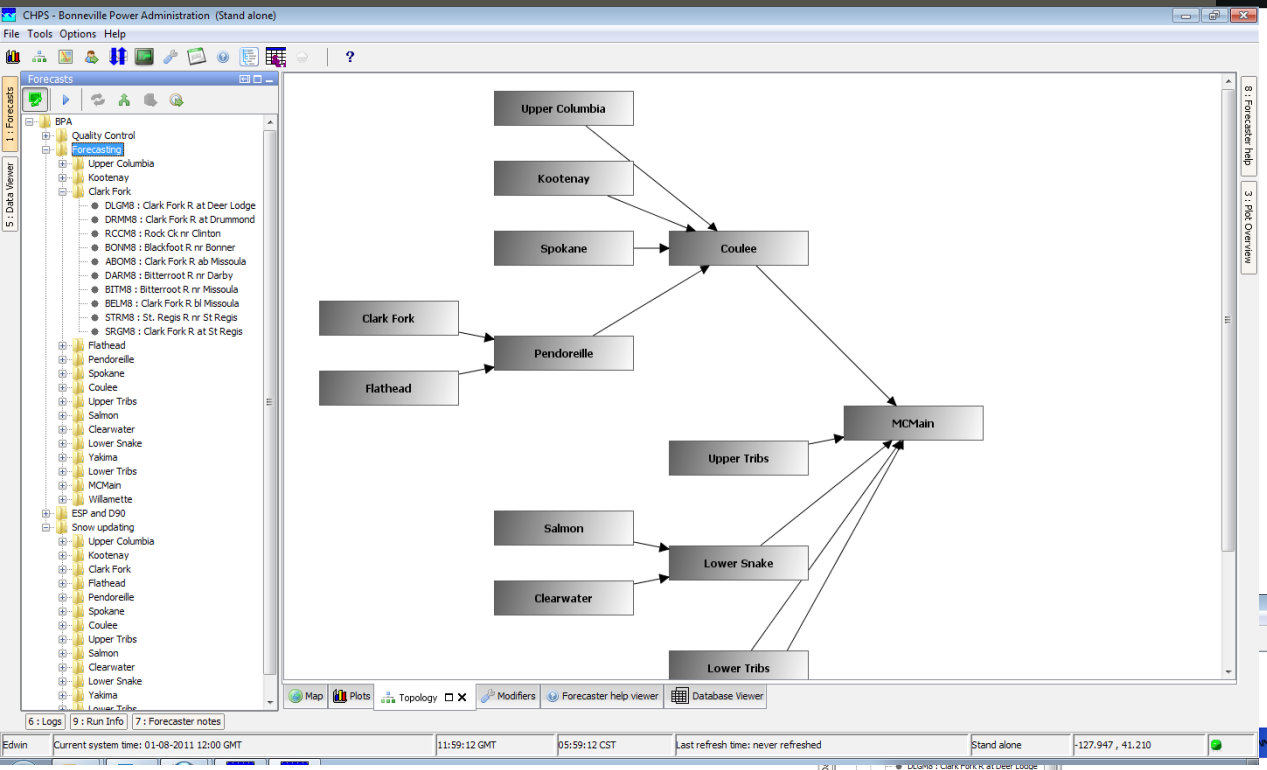
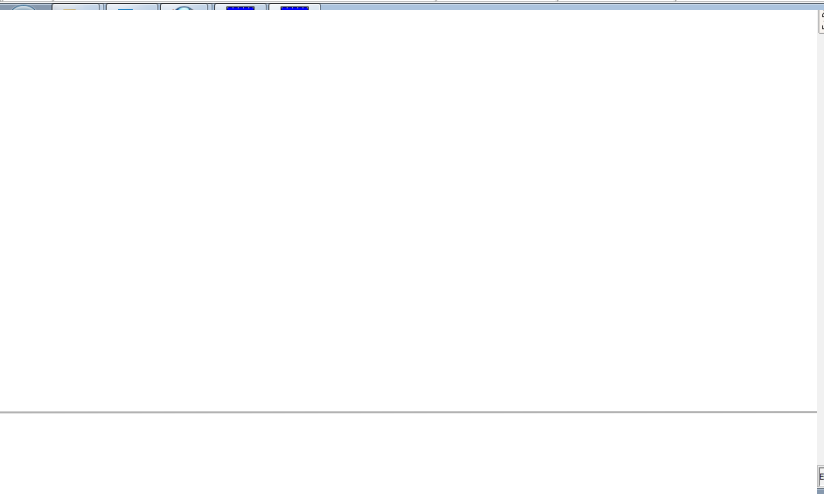
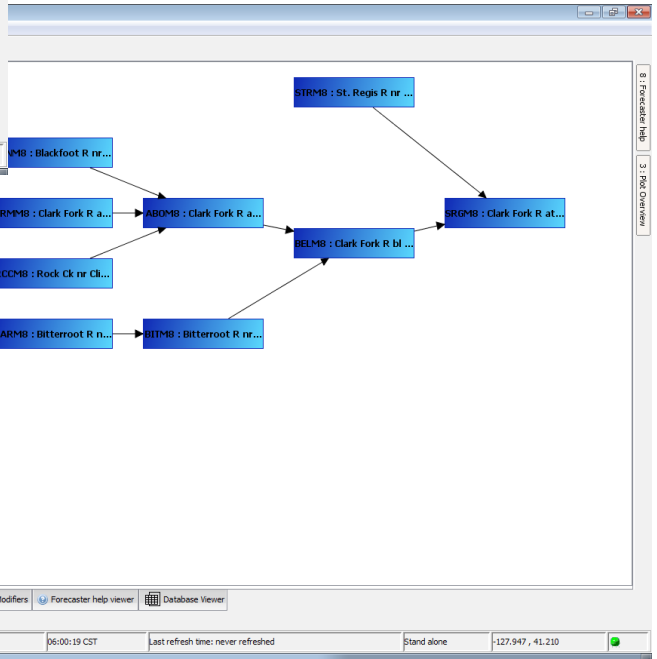
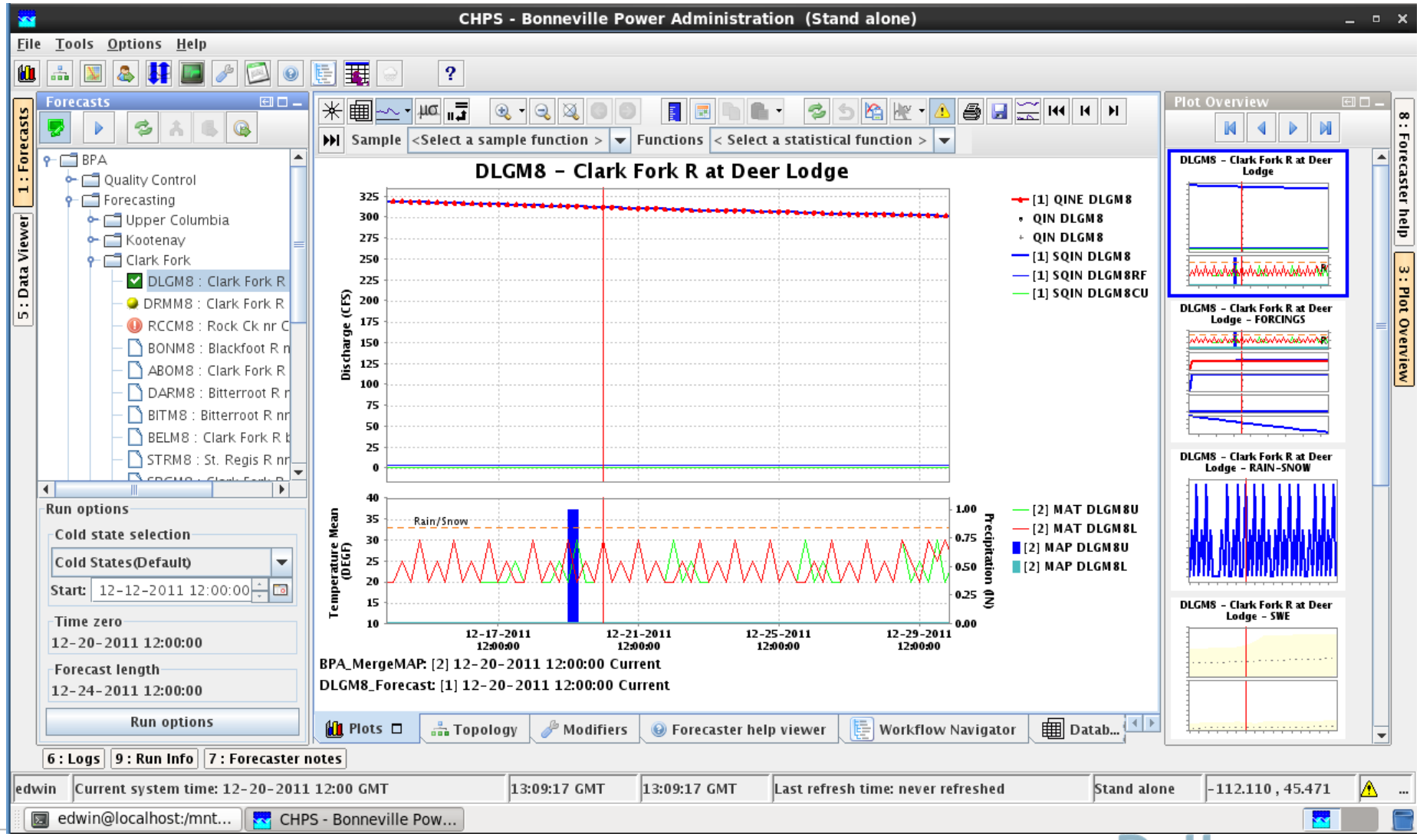
Model Connectivity







Model Execution and Display



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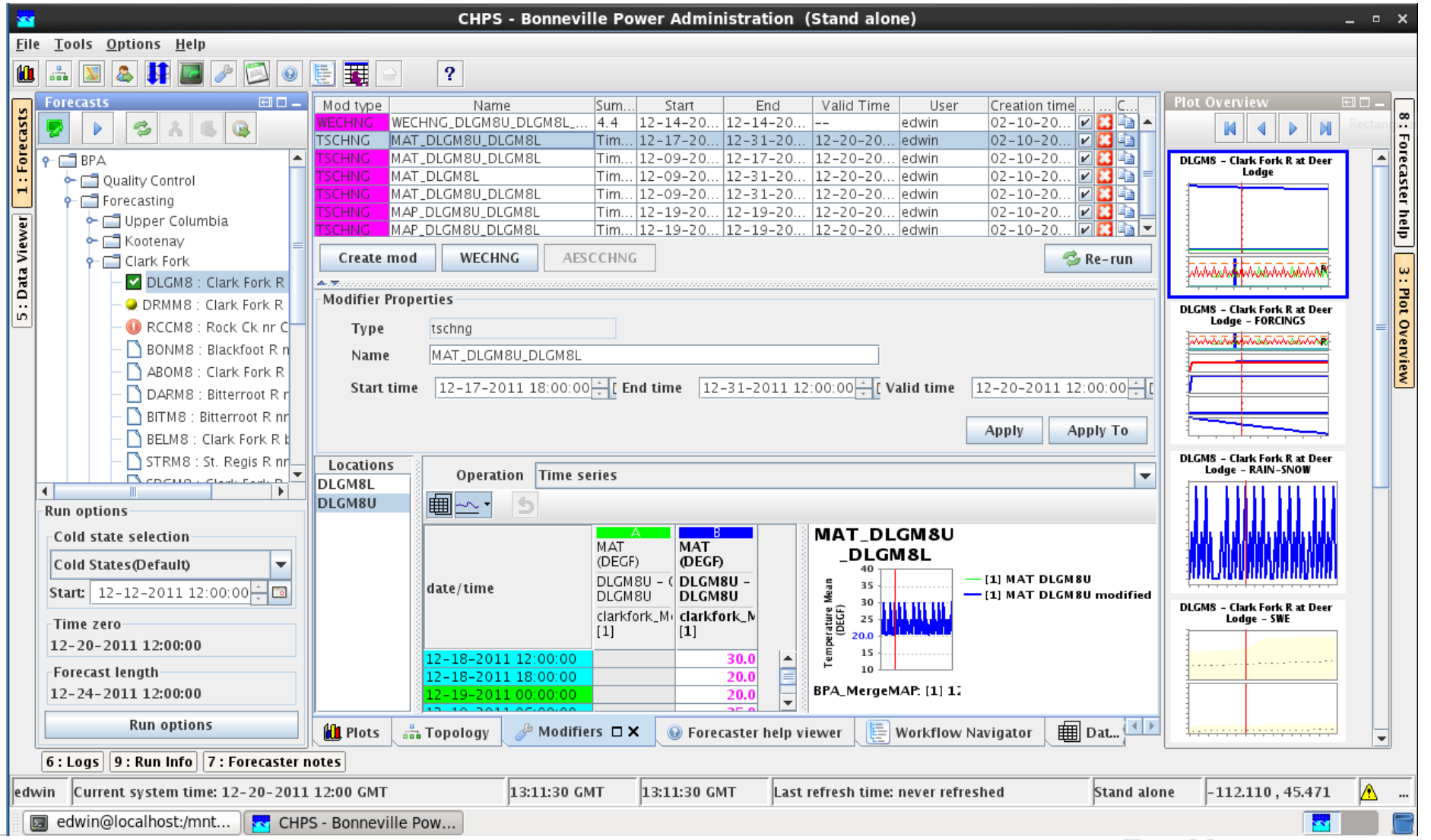
Control of Model Input, States, Options



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FEWS: Displays

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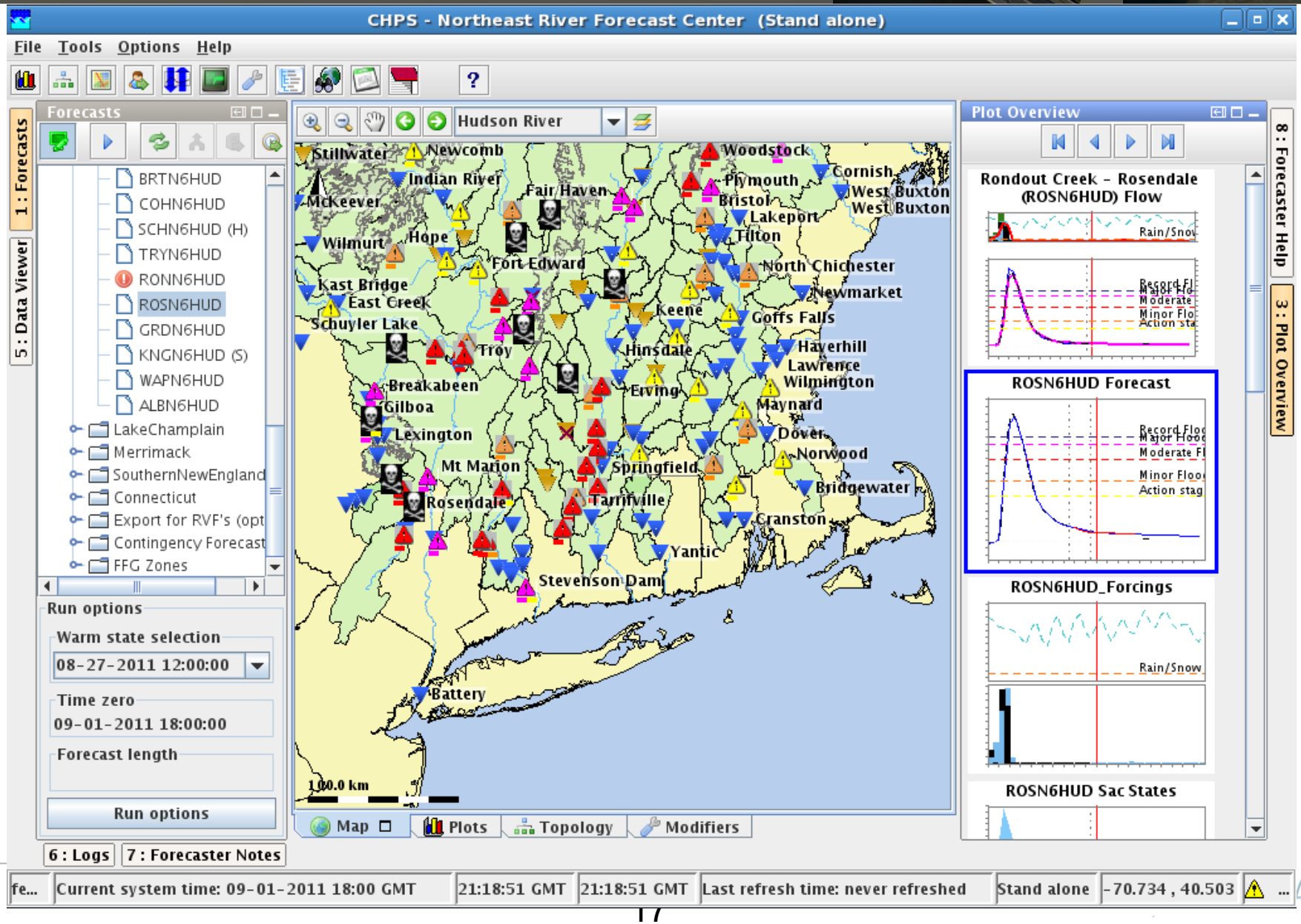
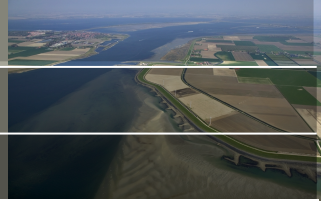
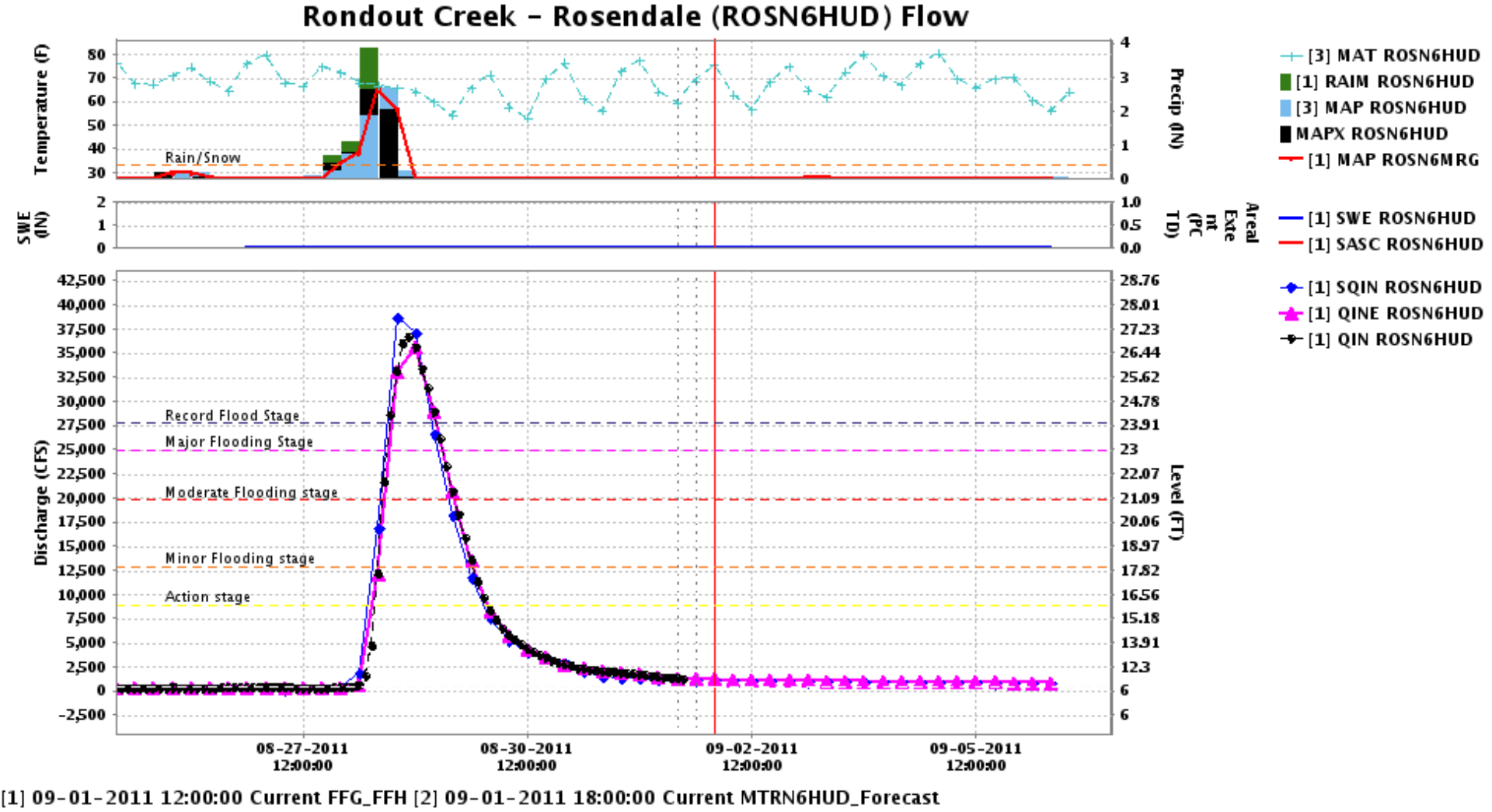
Customized Icons for the New England flood



Threshold crossings





[1] 09-01-2011 12:00:00 Current FFG_FFH [2] 09-01-2011 18:00:00 Current MTRN6HUD_Forecast

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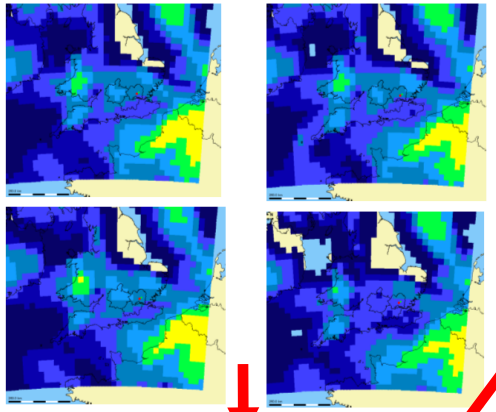
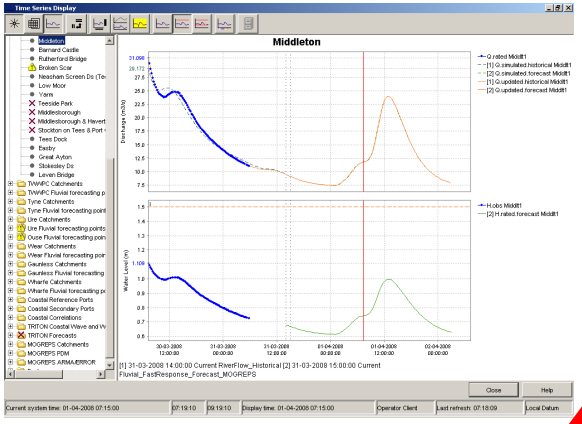
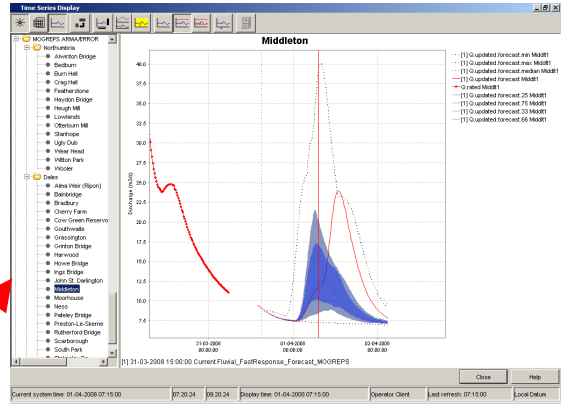
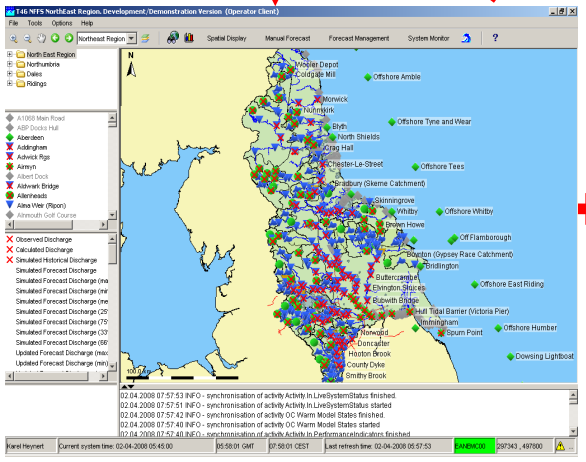
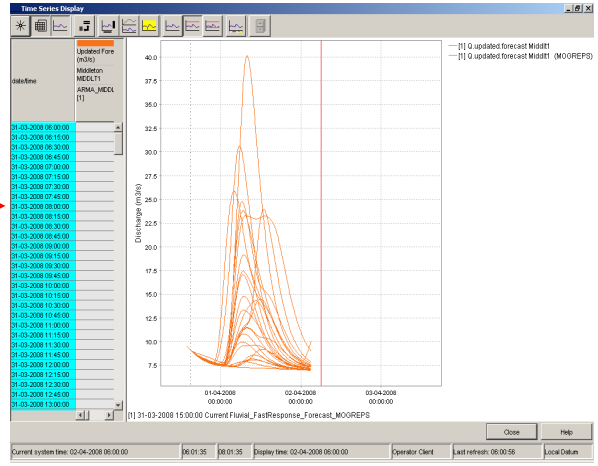
Ensemble forecasting in England & Wales

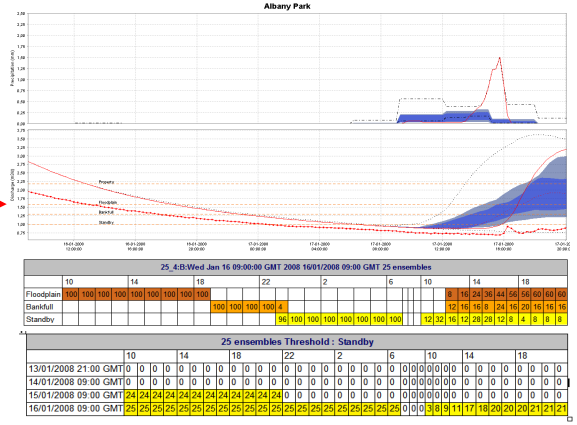












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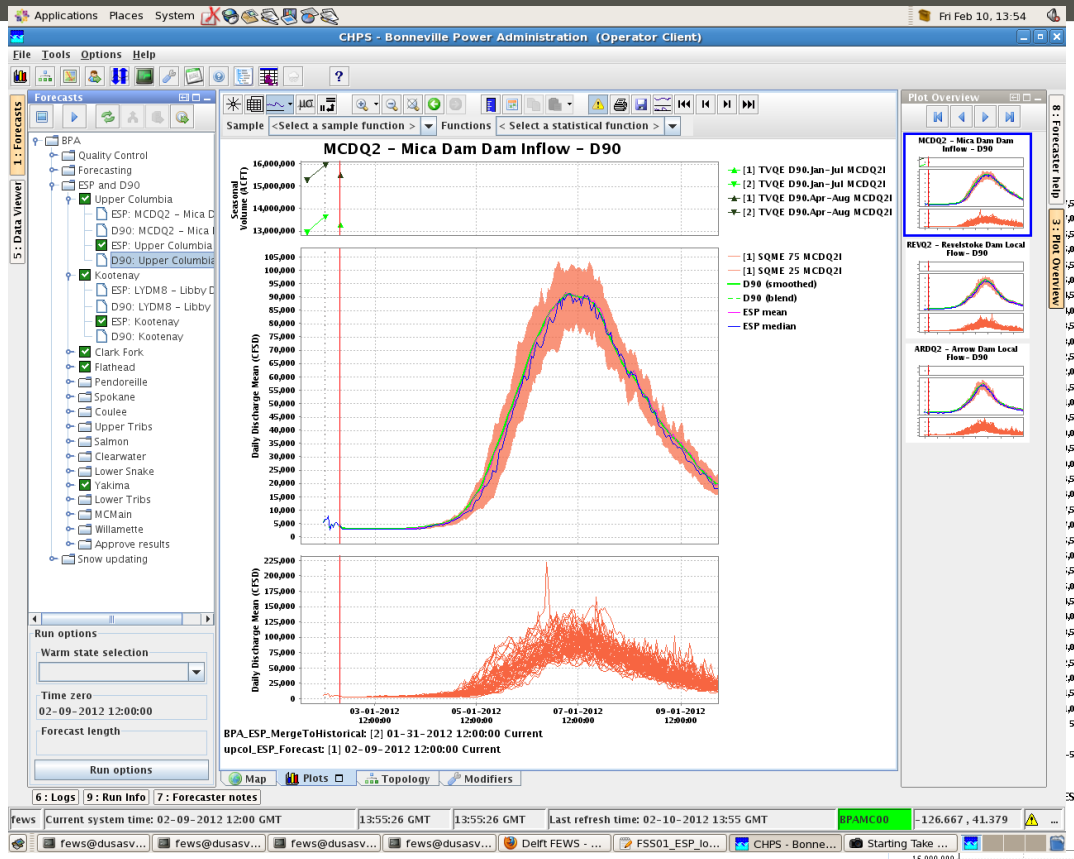
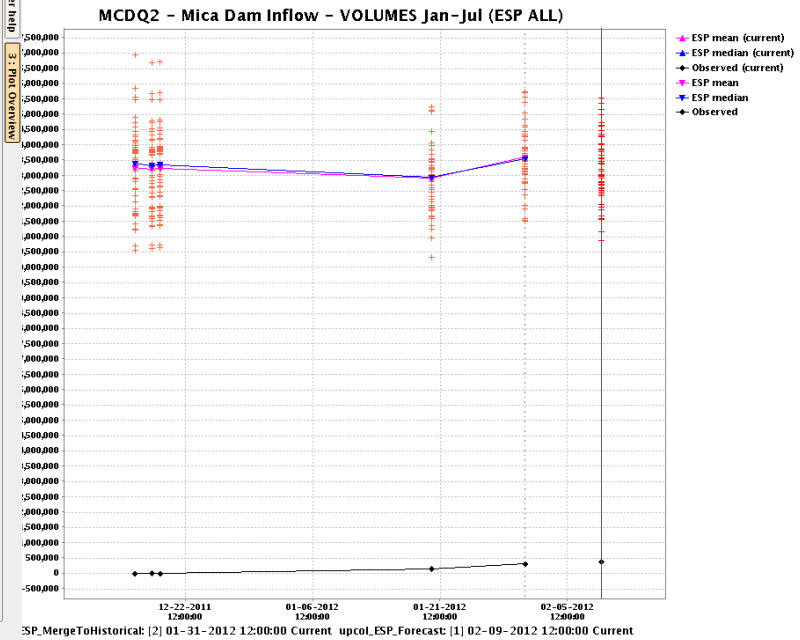
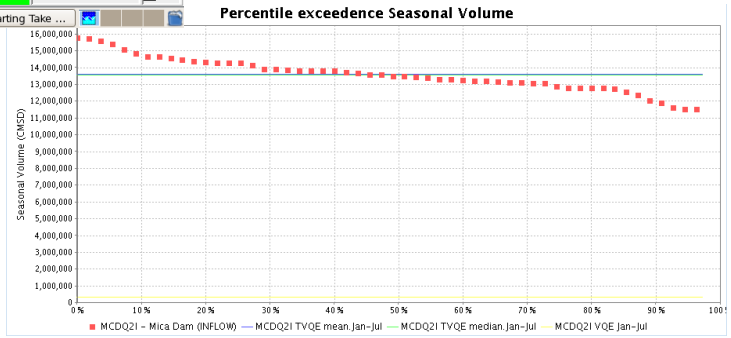
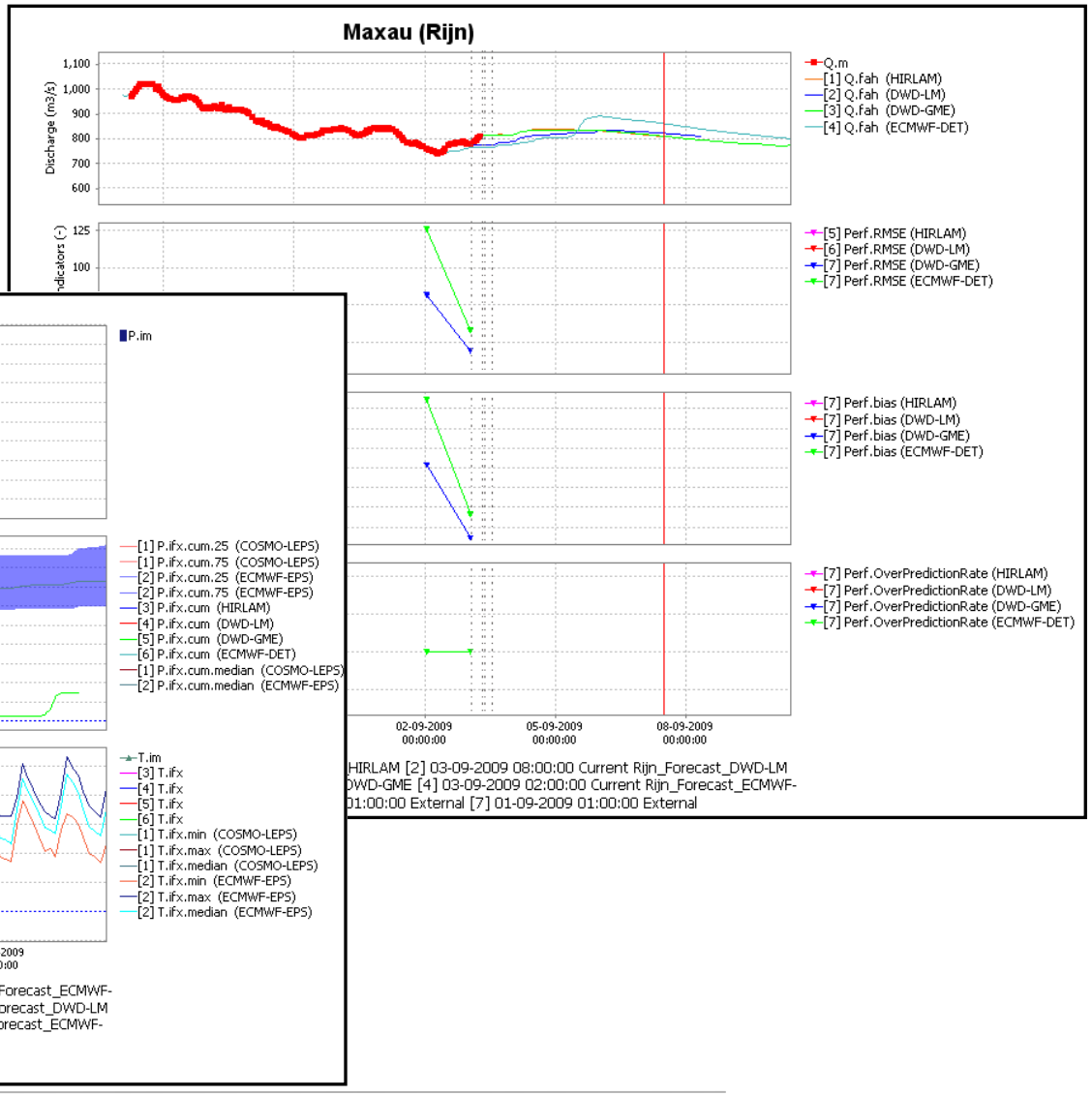
Ensemble streamflow forecasting at BPA

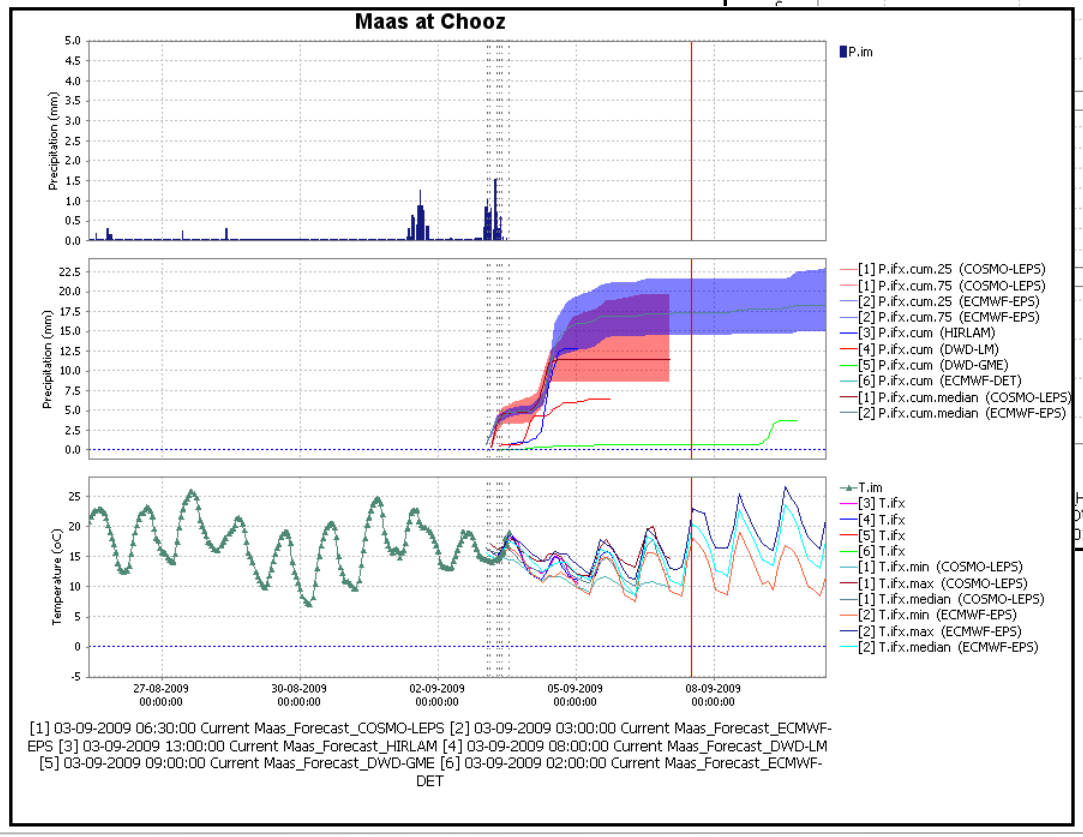






Uncertainty: Performance Indicators





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FEWS: Longitudinal Display

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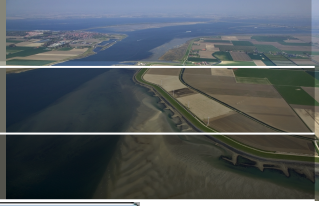
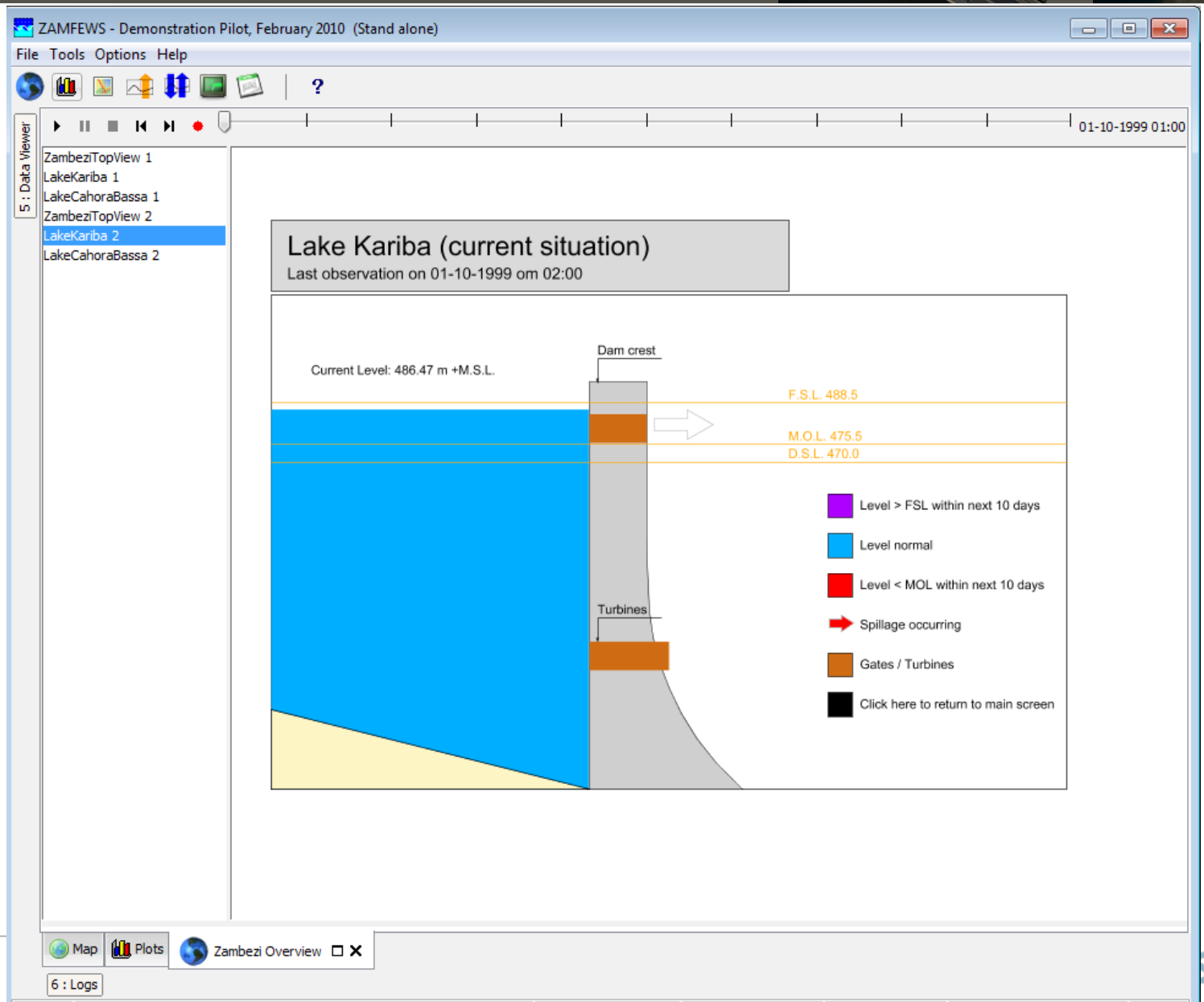
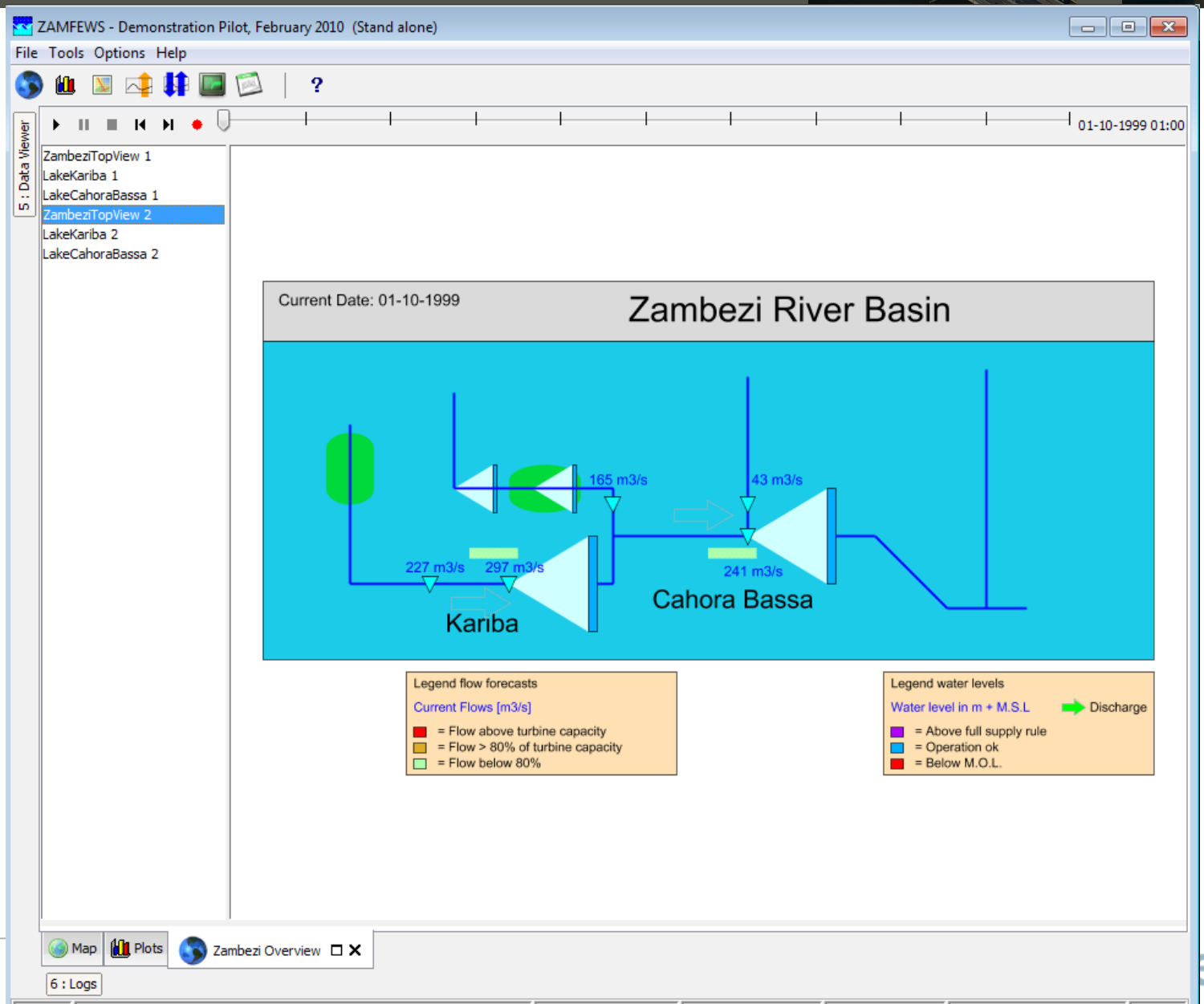
FEWS: System Display (1)



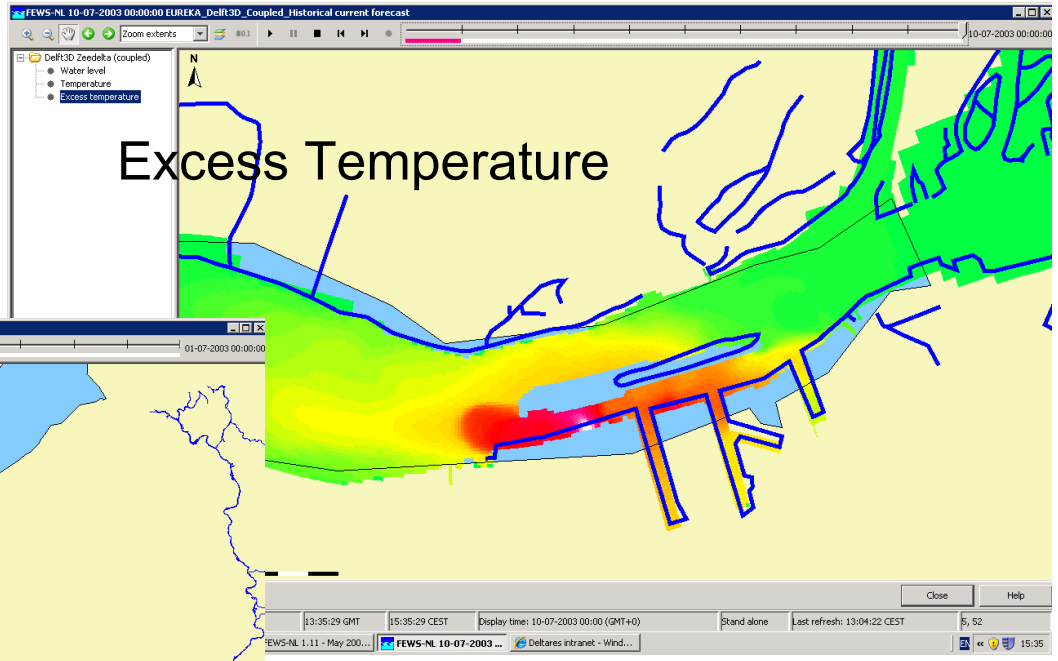


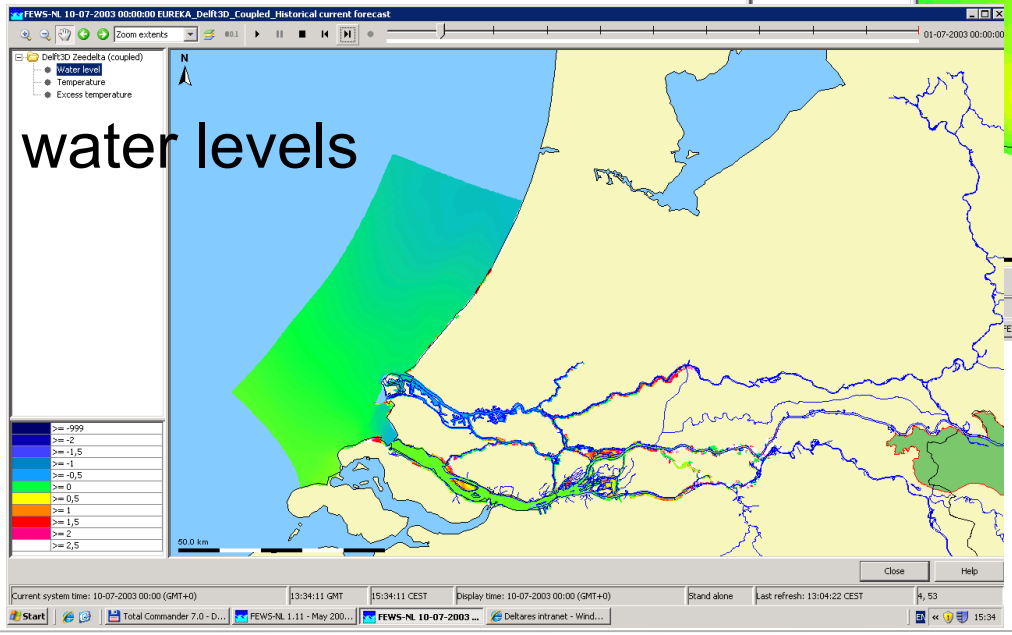
FEWS: System Display (2)



Prototype forecast system for cooling water

- From North Sea to Basel
- 3D in part of Hollandsch Diep estuary
- 2D till Hagestein and Dreumel
- 1D-2D-3D coupling under FEWS!





Can also model salinity with this setup

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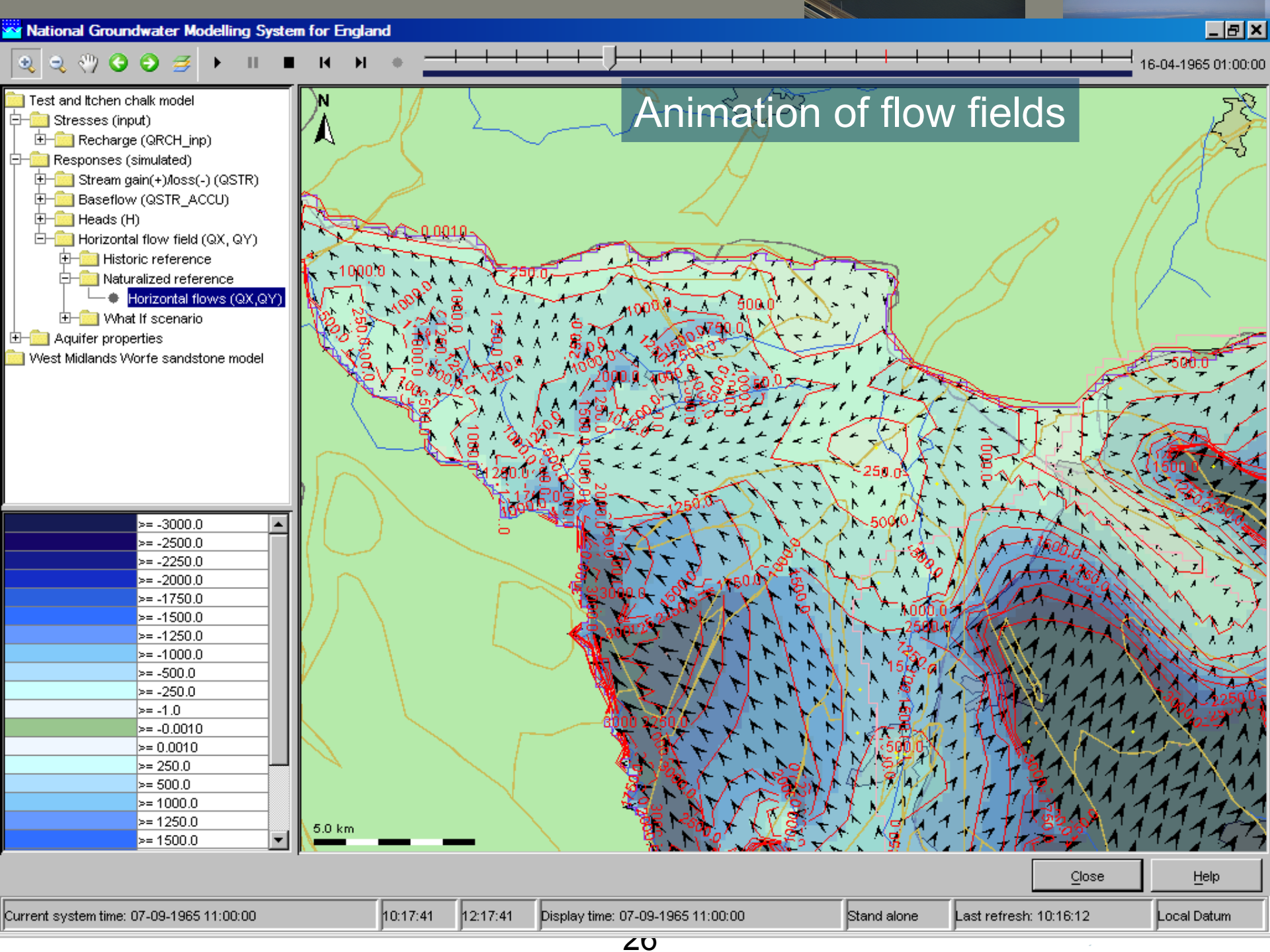
National Groundwater Modelling System for England
16-04-1965 01:00:00
Animation of flow fields
Test and Itchen chalk model
Stresses (input)
Recharge (QRCH_inp)
Responses (simulated)
Stream gain(+)/loss(-) (QSTR)
Baseflow (QSTR_ACCU)
Heads (H)
Horizontal flow field (QX, QY)
Historic reference
Naturalized reference
Horizontal flows (QX,QY)
What If scenario
Aquifer properties
West Midlands Worfe sandstone model
>= -3000.0
>= -2500.0
>= -2250.0
>= -2000.0
>= -1750.0
>= -1500.0
>= -1250.0
>= -1000.0
>= -500.0
>= -250.0
>= -1.0
>= -0.0010
>= 0.0010
>= 250.0
>= 500.0
>= 1000.0
>= 1250.0
>= 1500.0
N
5.0 km
Close
Help
Current system time: 07-09-1965 11:00:00
10:17:41
12:17:41
Display time: 07-09-1965 11:00:00
Stand alone
Last refresh: 10:16:12
Local Datum

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