Deltares

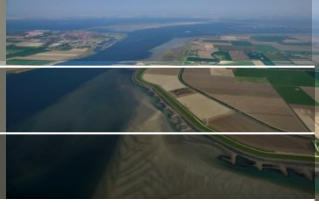
Enabling Delta Life

October 26 2016

GLOSSIS

Martin.verlaan@deltares.nl

Outline



- A Global Tide and Surge Model (GTSM)
- Real-time environment in FEWS
- Archive
- Web-viewer
- Example – Hurricane Matthew
- Satellite observations

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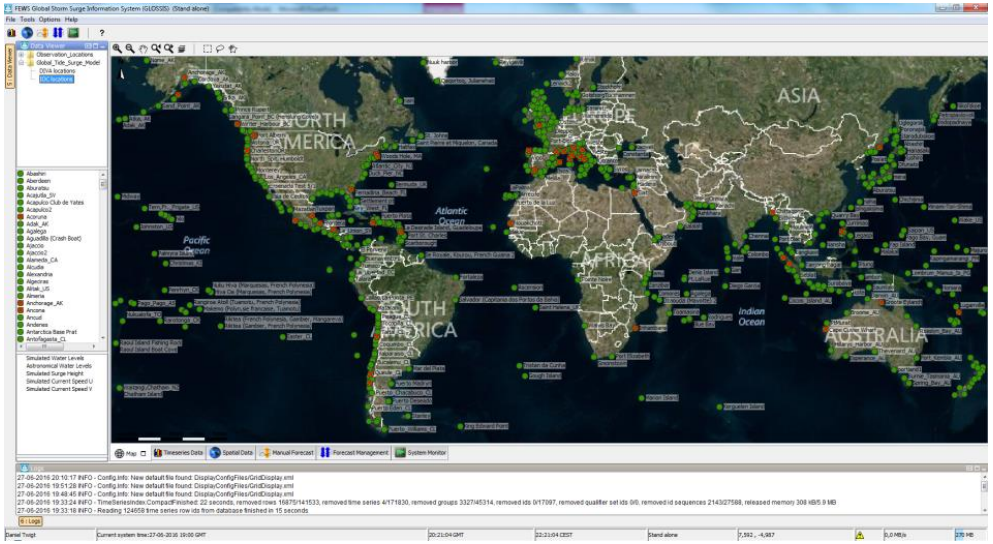
GLOSSIS – operational information system

- Operational system based on Delft-FEWS and GTSM model, running at Deltares.
- Generates a 10 day forecast 4 times per day.
- Provides hindcasts and forecasts of water level (tide and surge), which can be used for various applications:
    - Operational forecasting and warning
    - Boundary conditions regional models
    - Bathymetry estimation



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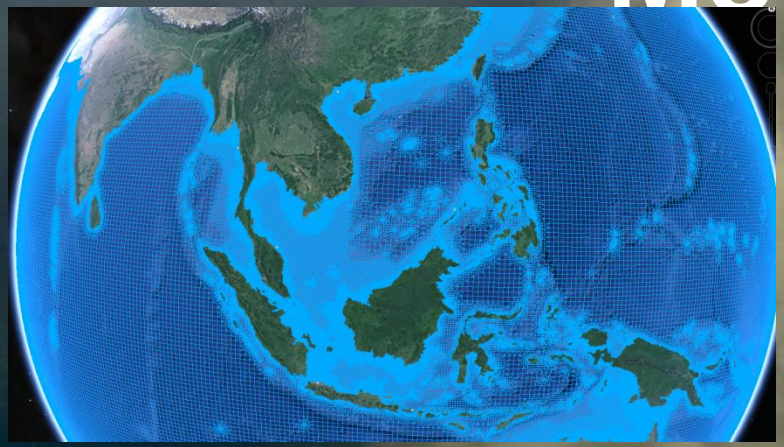
A Global Tide and Surge Model



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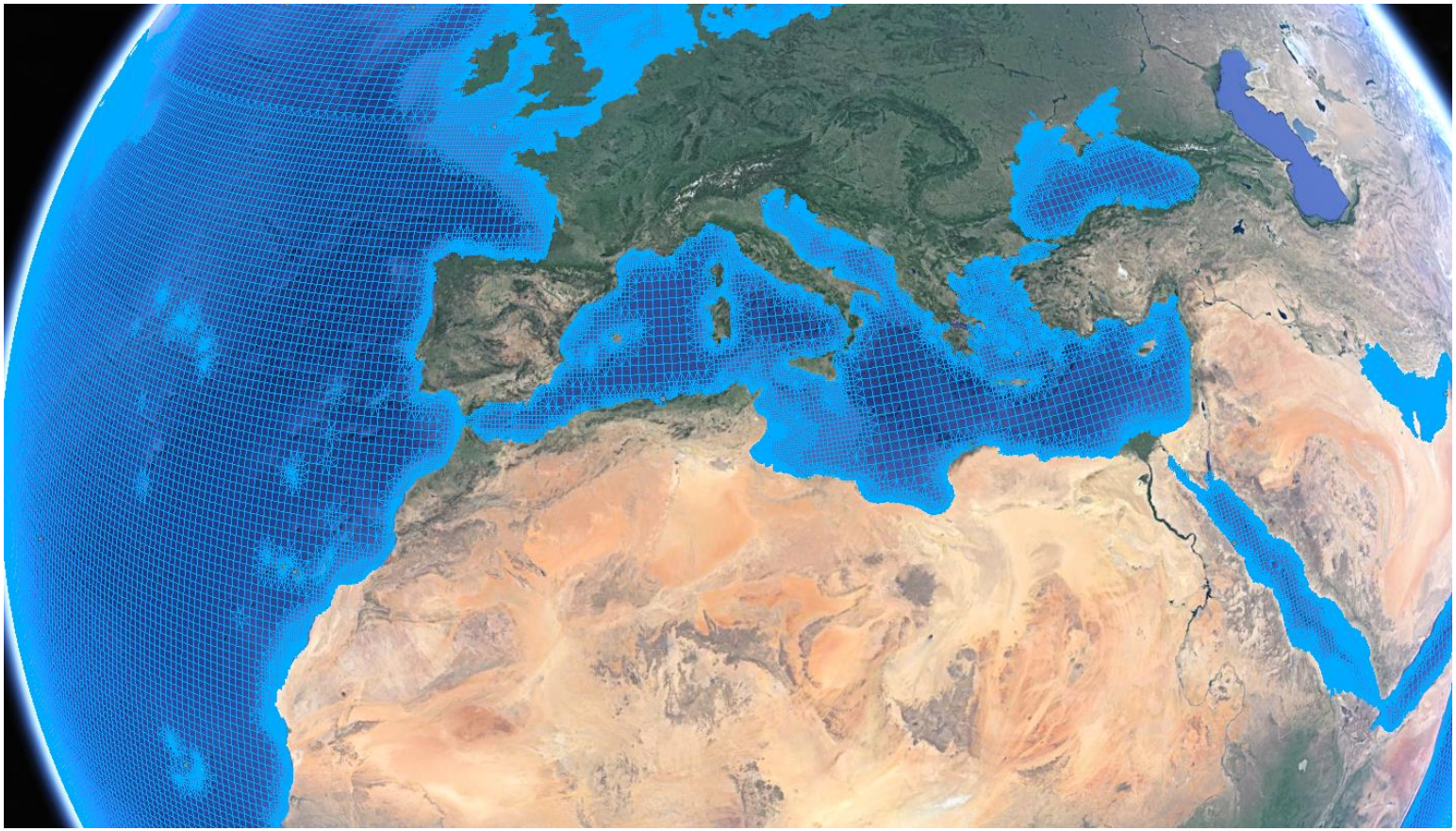
Grid in Dflow-FM

Unstructured approach - with grid refinement in shallow areas



This Dflow-FM grid uses triangles and rectangles
for local grid refinement. Resolution is based on Courant number.

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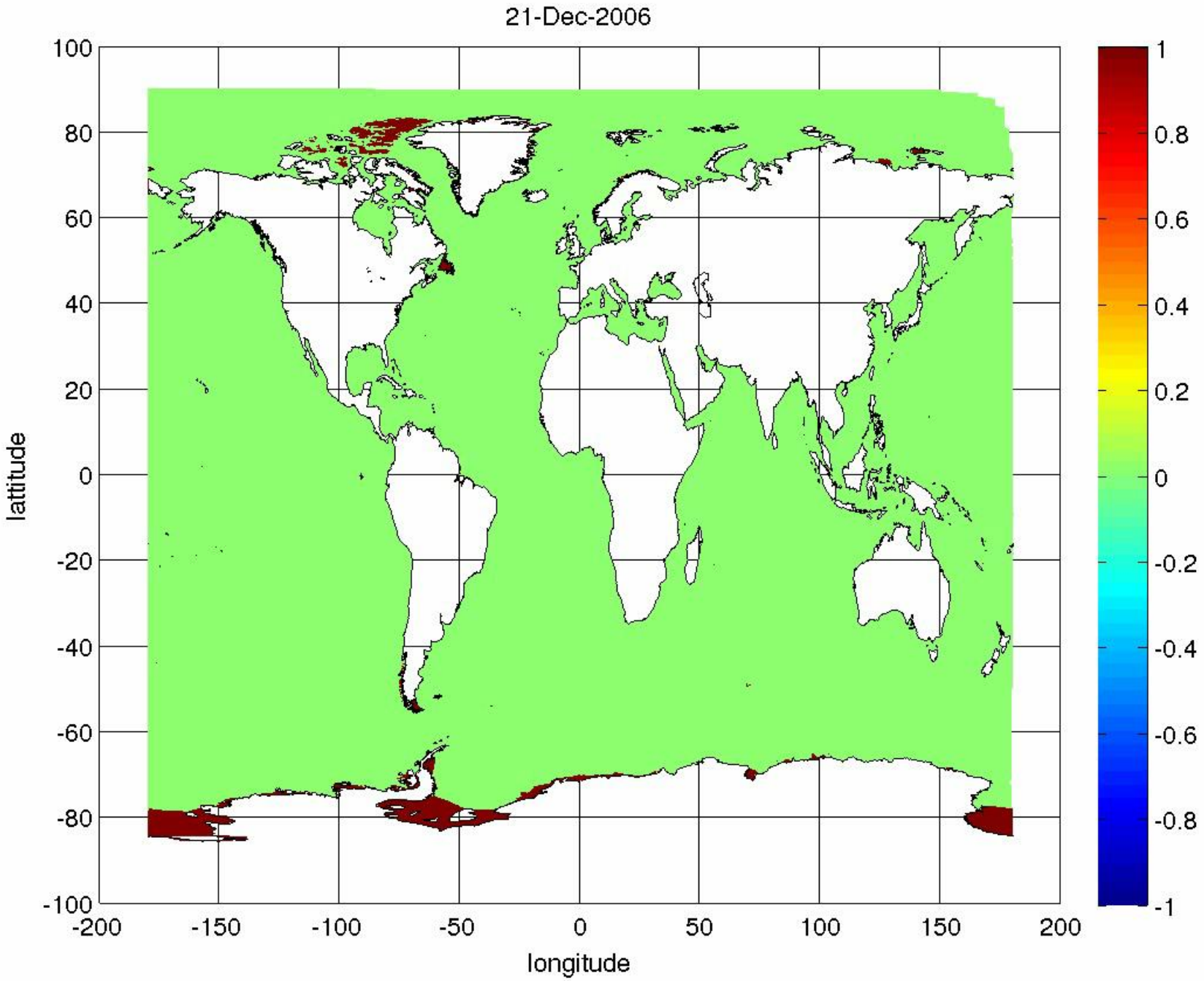
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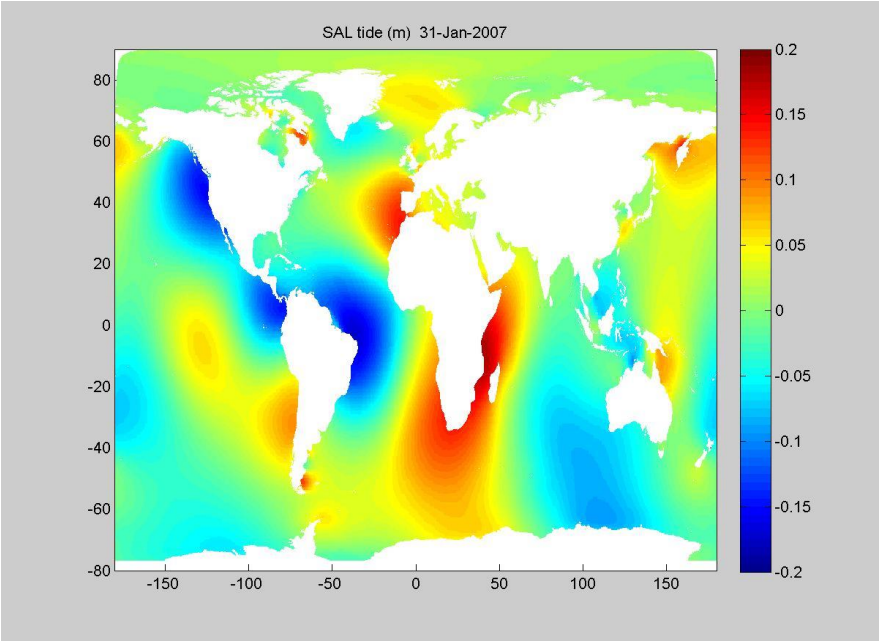
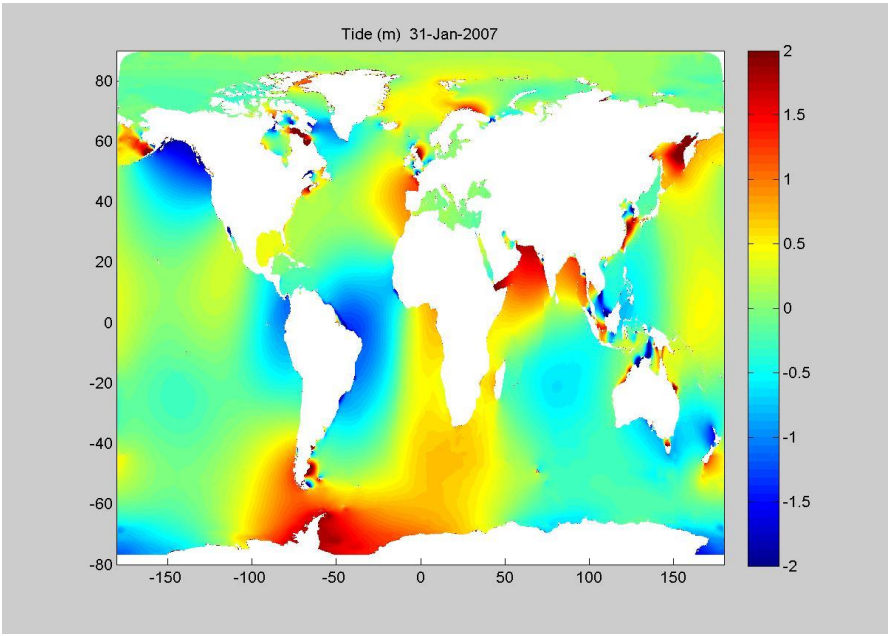
SAL results – SAL tide spatial distribution

SAL tide



Tide



10% approximation too simplistic

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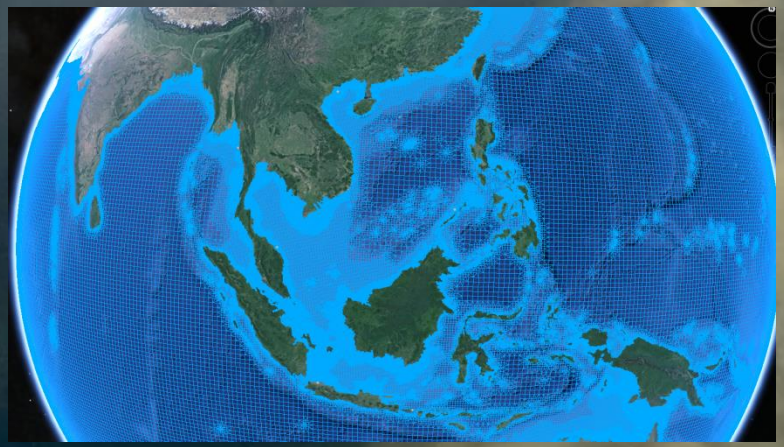
Real-time sea level



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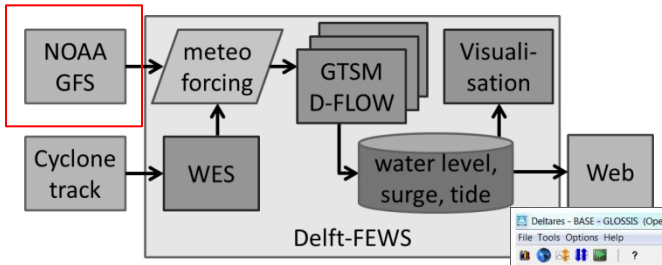
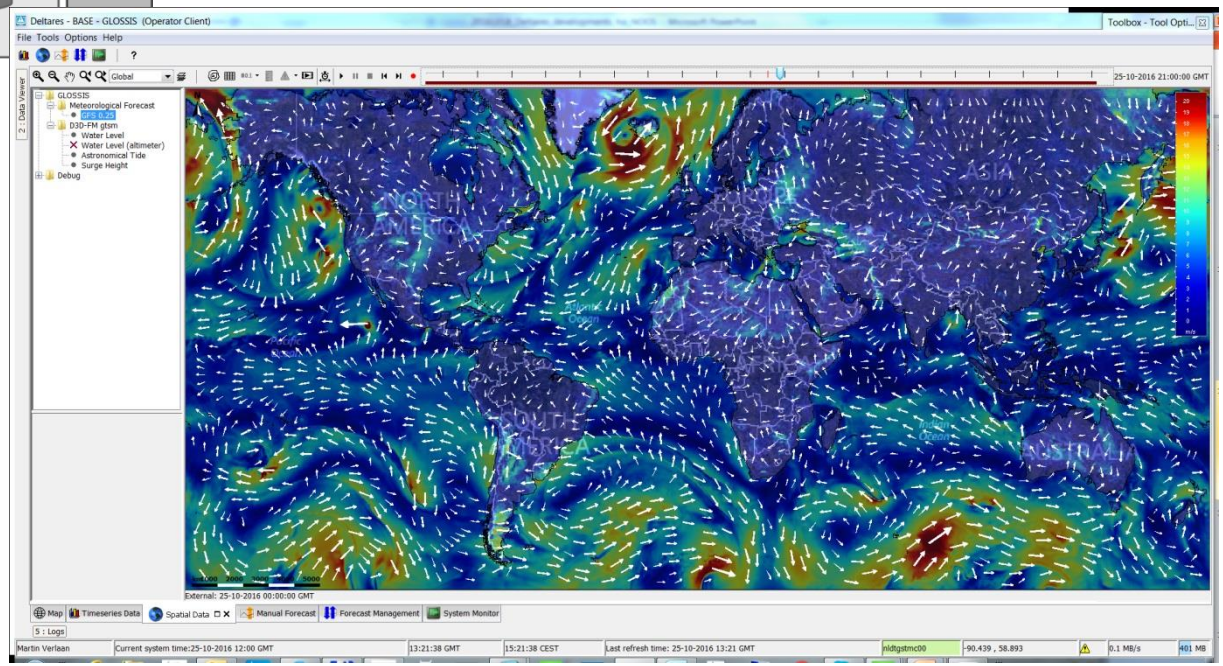
GLOSSIS – meteo forcing





- Default meteorological forcing comes from NOAA GFS (1/4º resolution, 3 hrs timestep, 10 day forecast)
- System will also be setup to use ECMWF forecasts
- NWP models generally do well in capturing large extra-tropical storms

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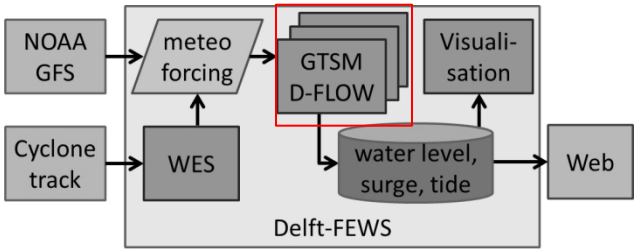
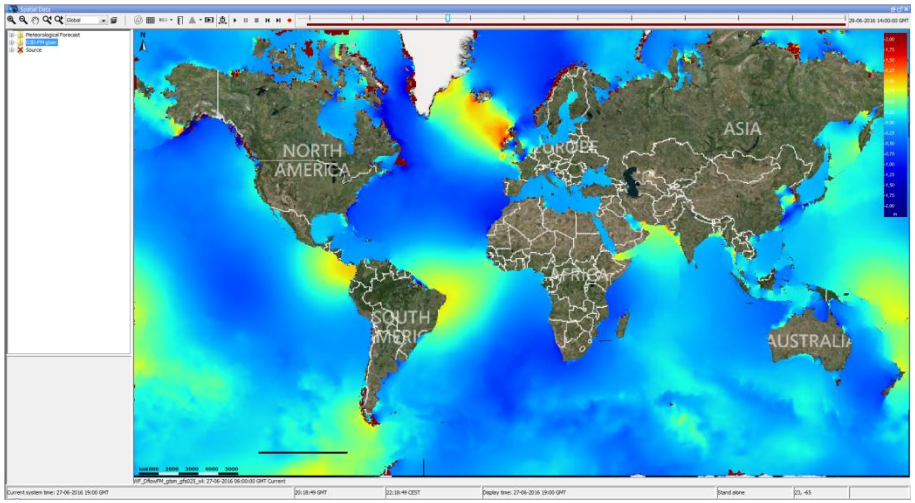
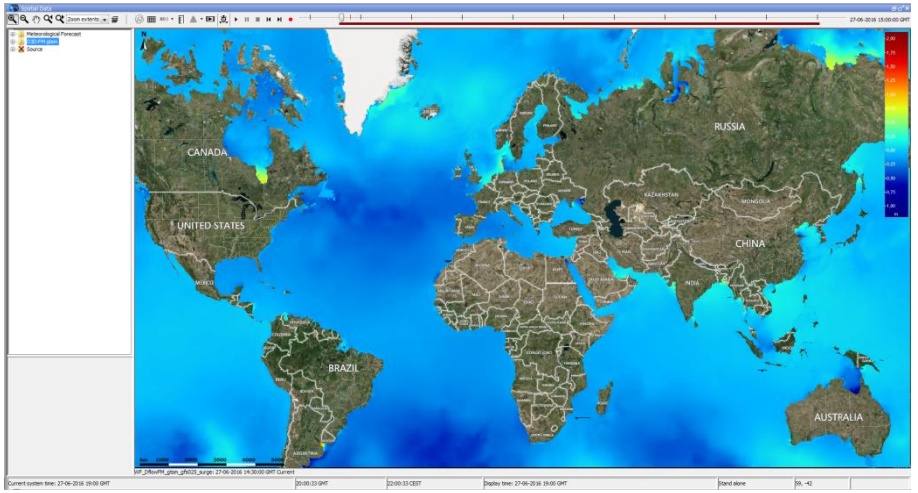
GLOSSIS – GTSM





Tide



Surge

Surge $= (\text{tide} + \text{surge})_{gtsm} - \text{tide}_{gtsm}$

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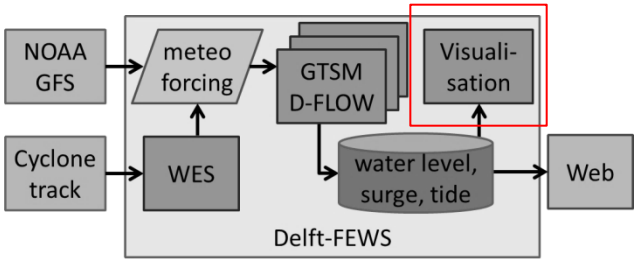
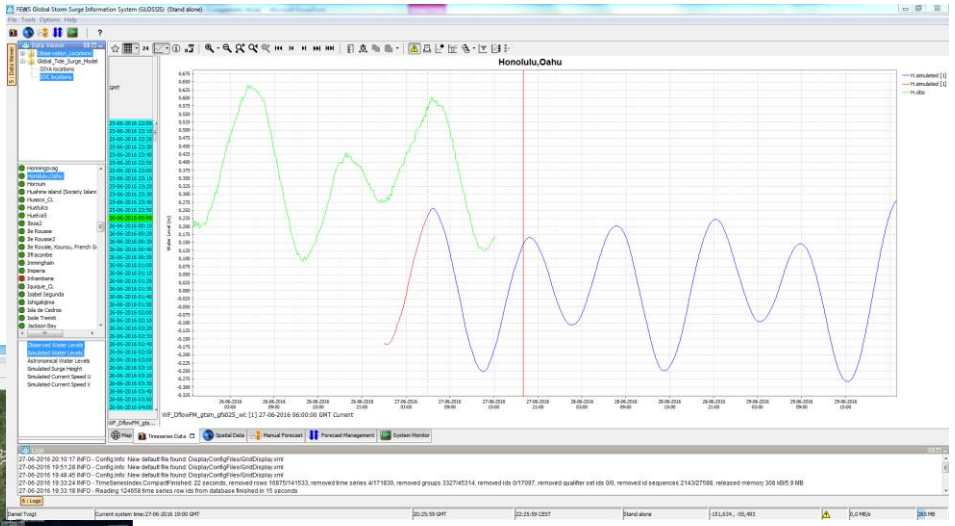
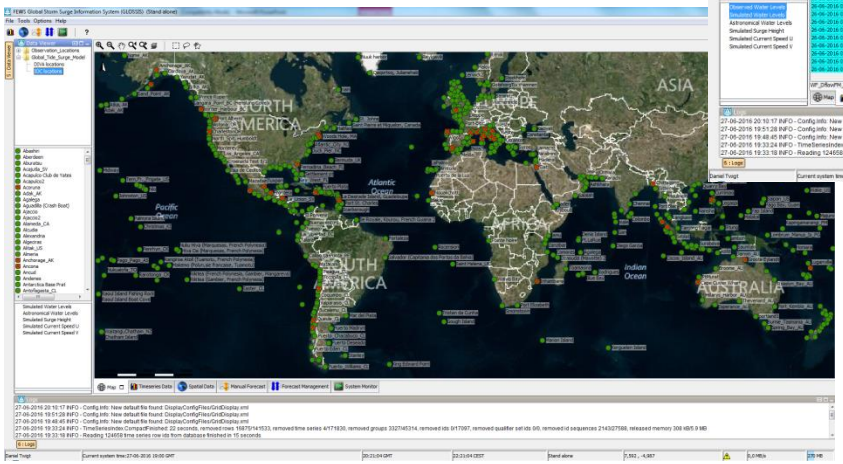
GLOSSIS – validation against in-situ data







- On-the-fly validation against in-situ data from IOC Sea Level Station Monitoring Facility (675 locations total)
- Available real-time at high resolution (10 minutes)
- Data requires further cleaning and referencing

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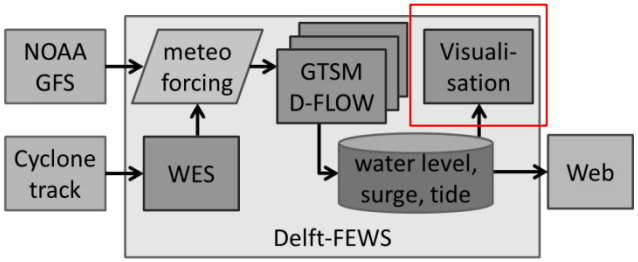
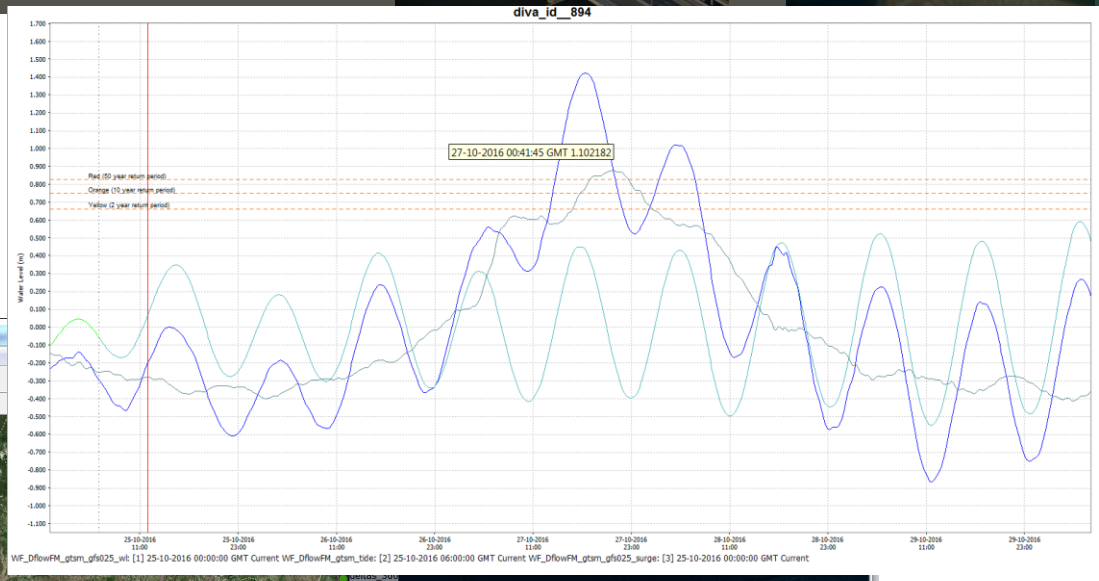
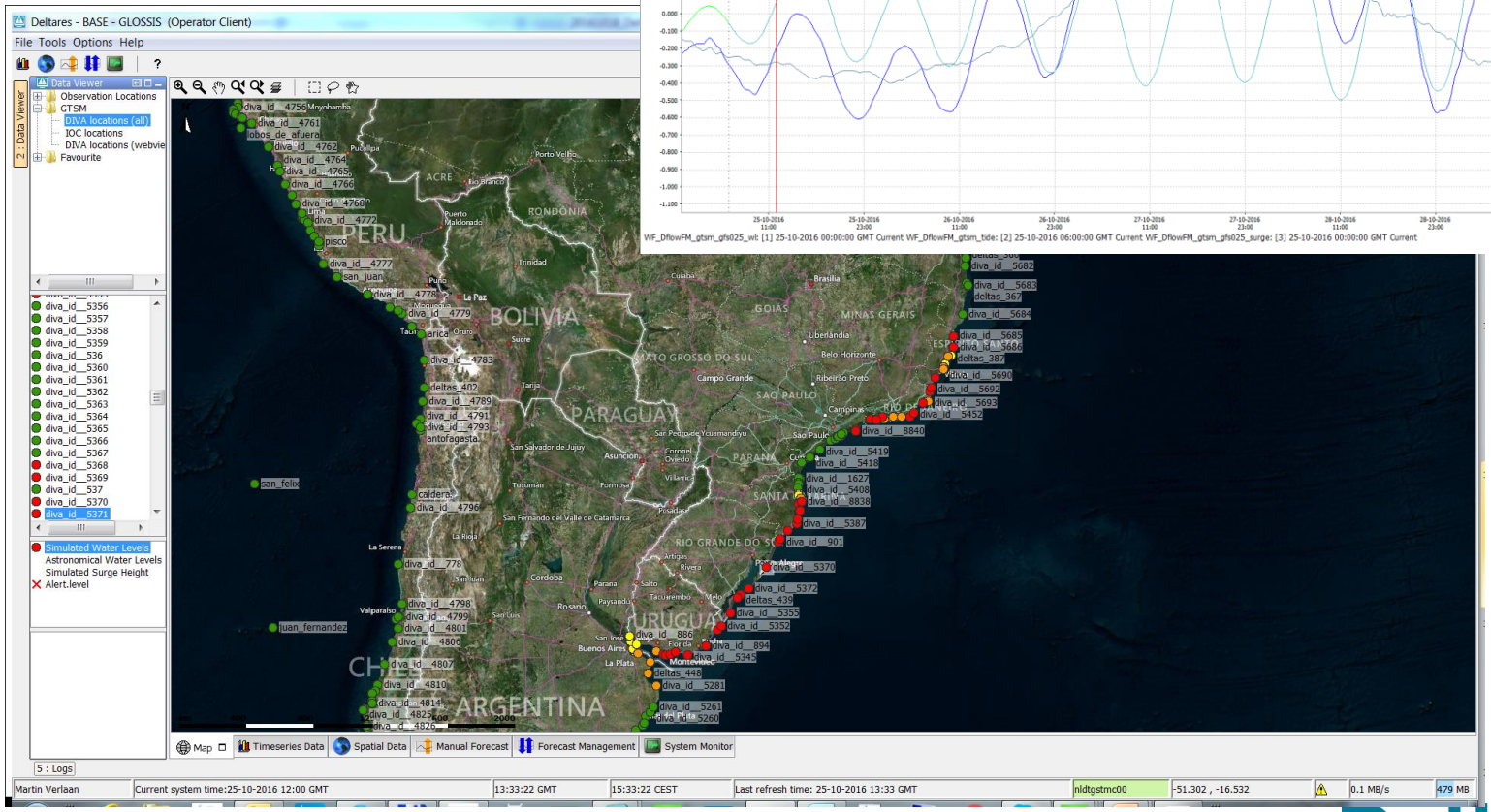
Warning thresholds







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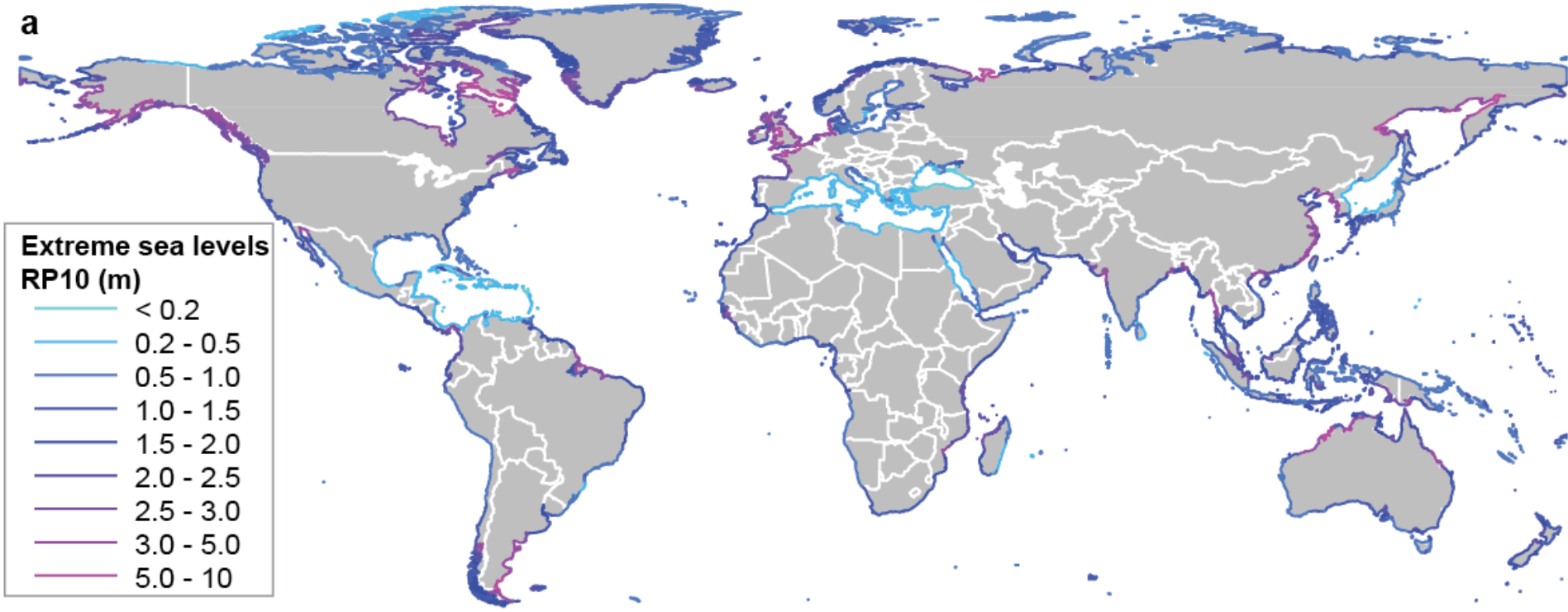
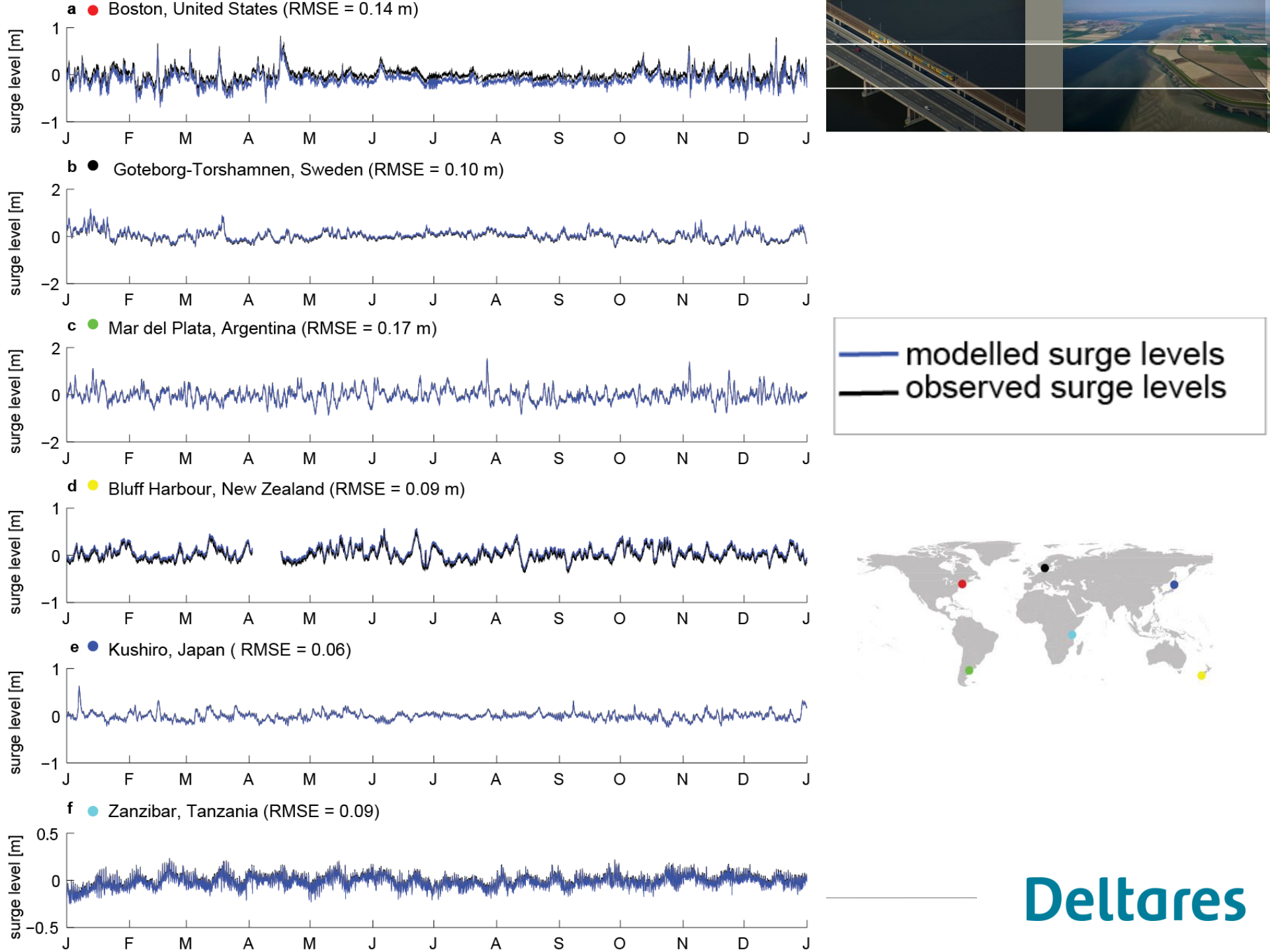
Highwater exceedance estimates

Reanalysis with ERA-interim meteo-forcing (1979-present)



Cooperation:
Sanne Muis


a Boston, United States (RMSE = 0.14 m)
b Goteborg-Torshamnen, Sweden (RMSE = 0.10 m)
c Mar del Plata, Argentina (RMSE = 0.17 m)
d Bluff Harbour, New Zealand (RMSE = 0.09 m)
e Kushiro, Japan (RMSE = 0.06)
f Zanzibar, Tanzania (RMSE = 0.09)
surge level [m]
J F M A M J J A S O N D J
modelled surge levels
observed surge levels

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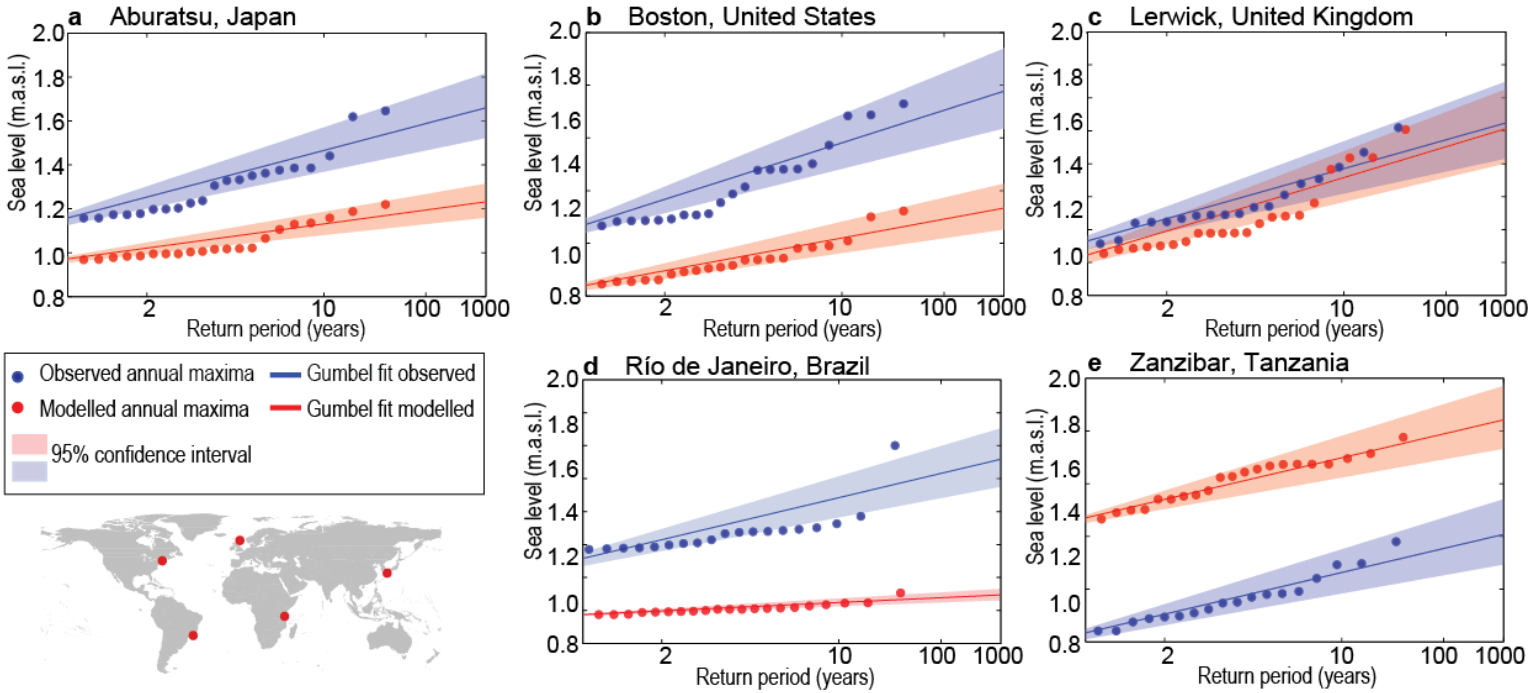
Validation of return periods



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Archive and Webviewer

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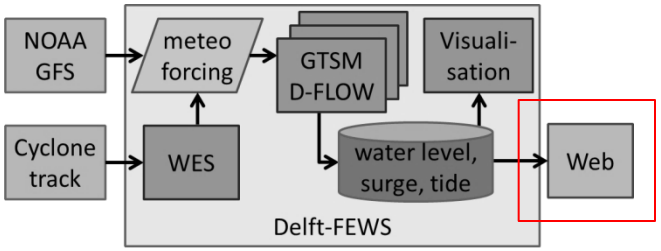
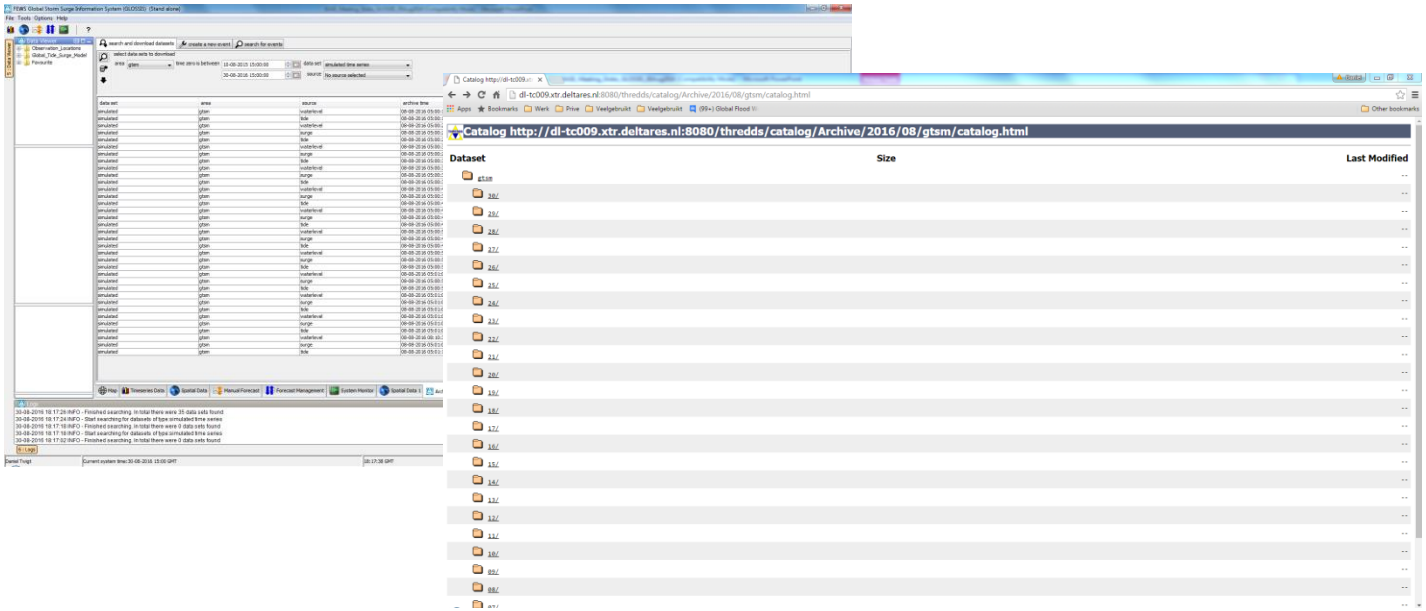
Archiving





- Archiving of results in Deltares Open Archive
- Seamless integration with GLOSSIS client

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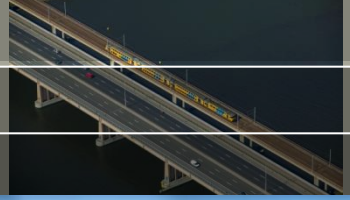
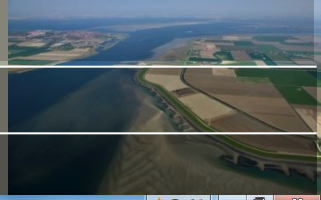
GLOSSIS Web viewer





GLOSSIS

tw-119.xtr.deltares.nl/glossis/index.htm

Apps Bookmarks Werk Prive Veelgebruikt Veelgebruikt Other bookmarks

GLOSSIS LOGIN

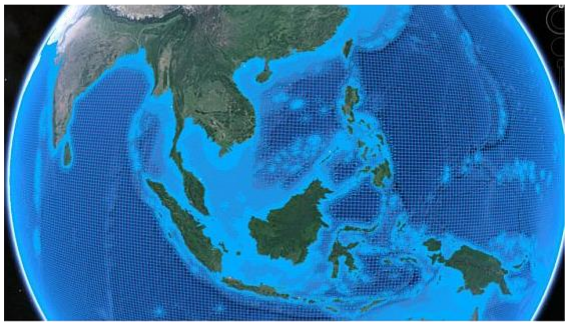
Deltares

Surge

Water level

GLOSSIS Webviewer

Webviewer for GLOSSIS. Add more text...



READ MORE CLOSE

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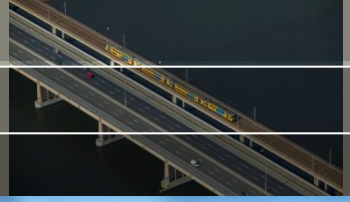
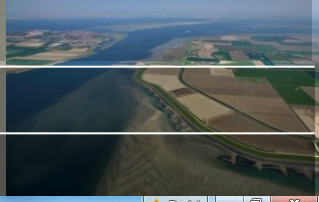
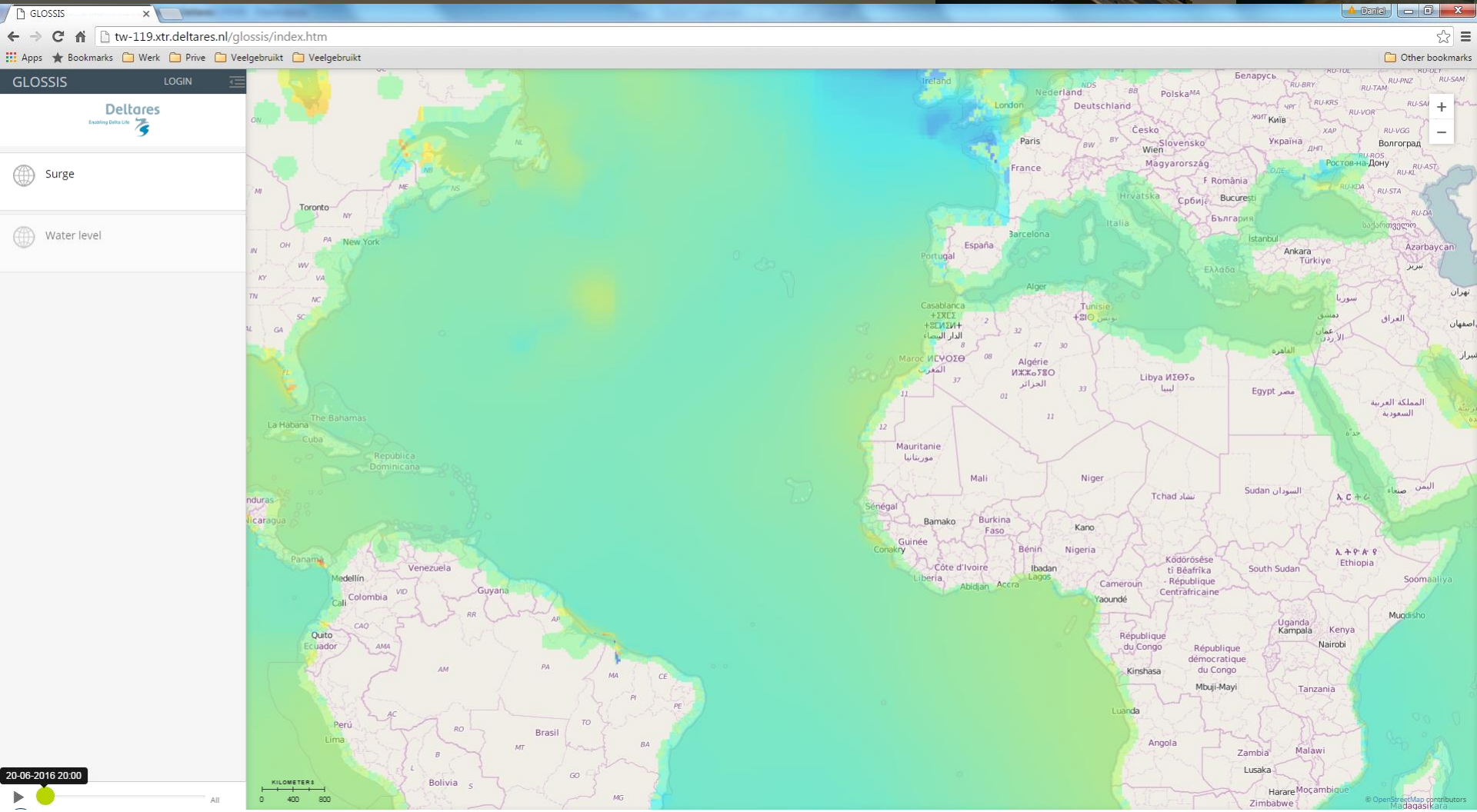
GLOSSIS Web viewer







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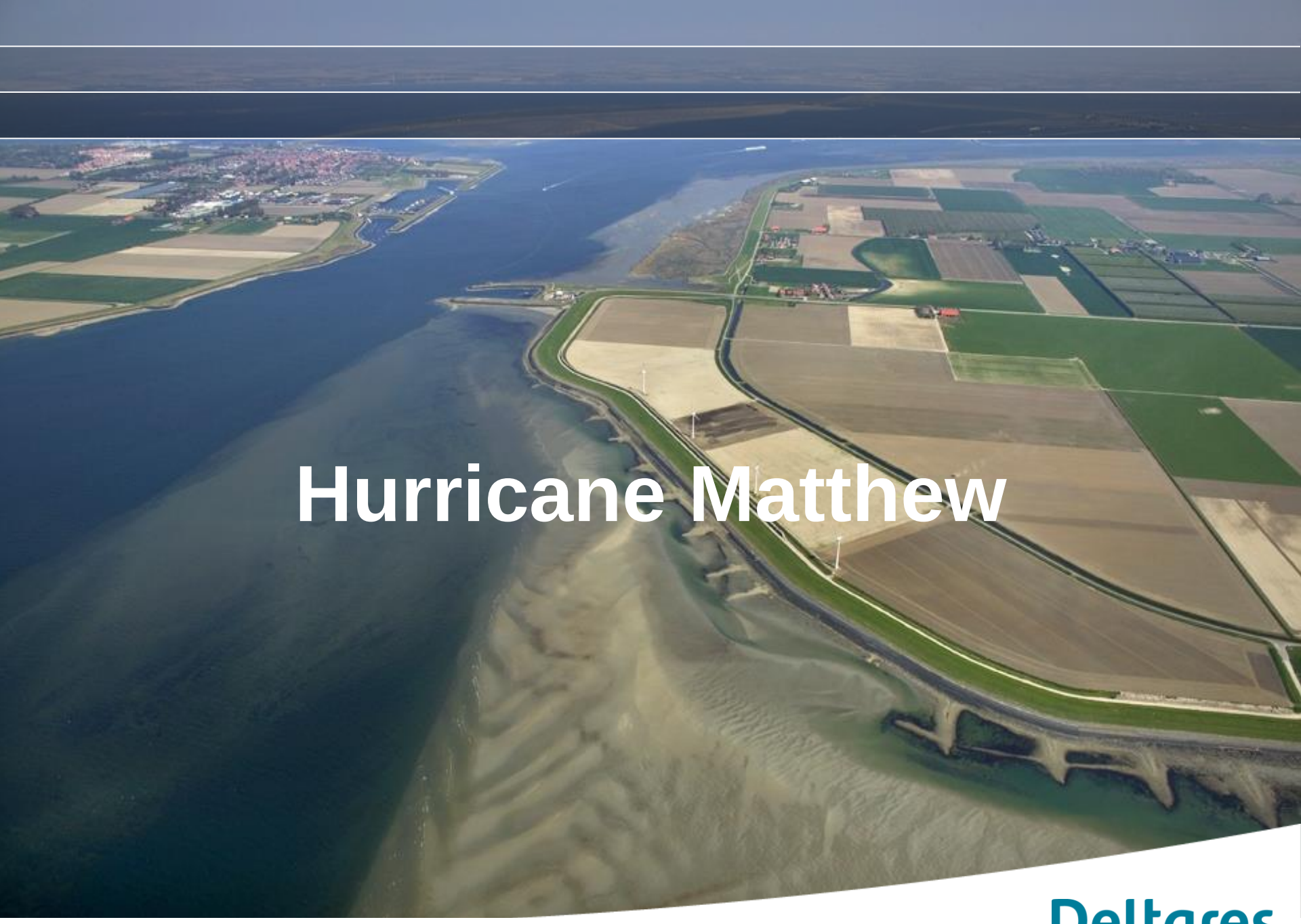
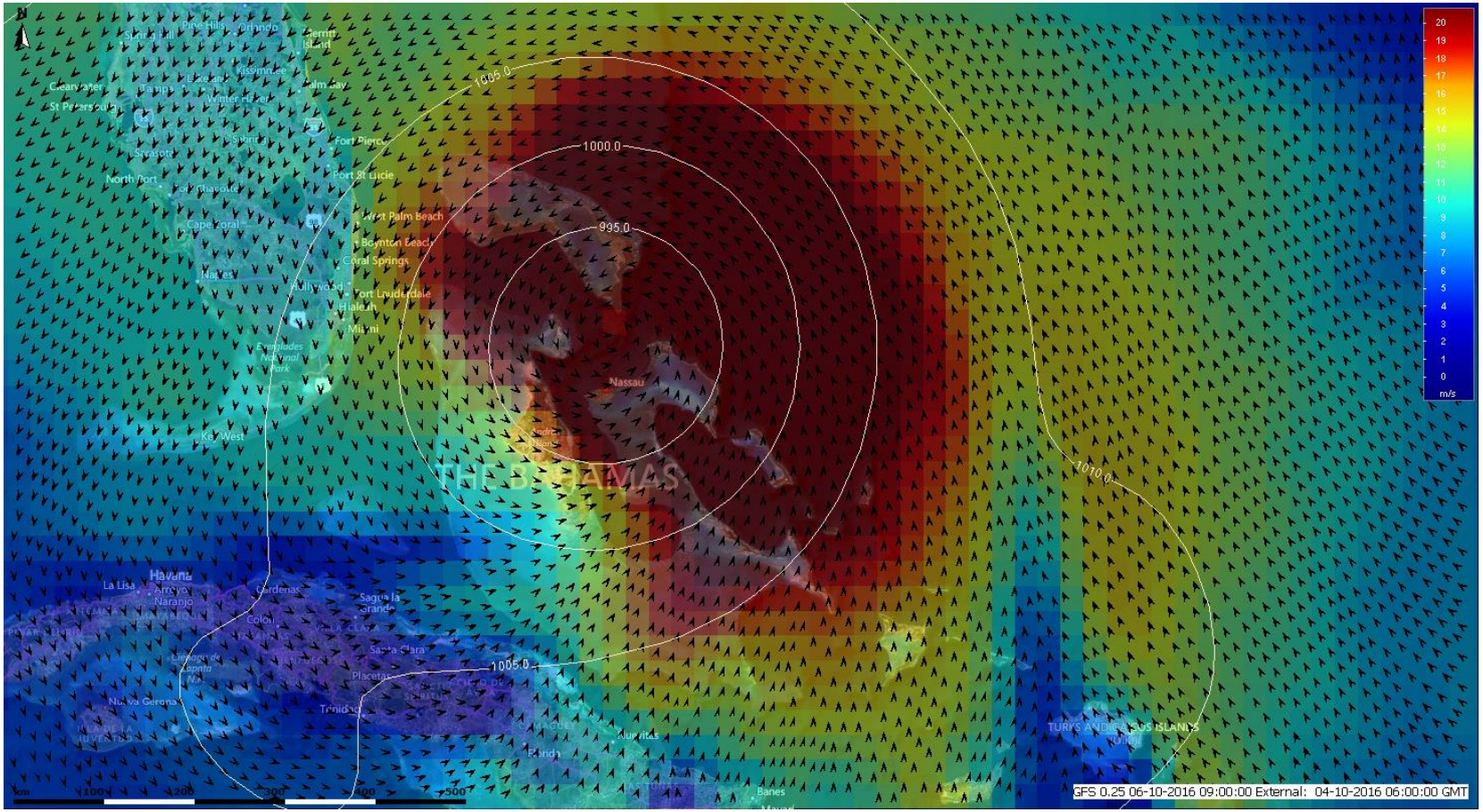


Hurricane Matthew

Deltares



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Fort Pierce
Port St Lucie
West Palm Beach
Boynton Beach
Coral Springs
Fort Lauderdale
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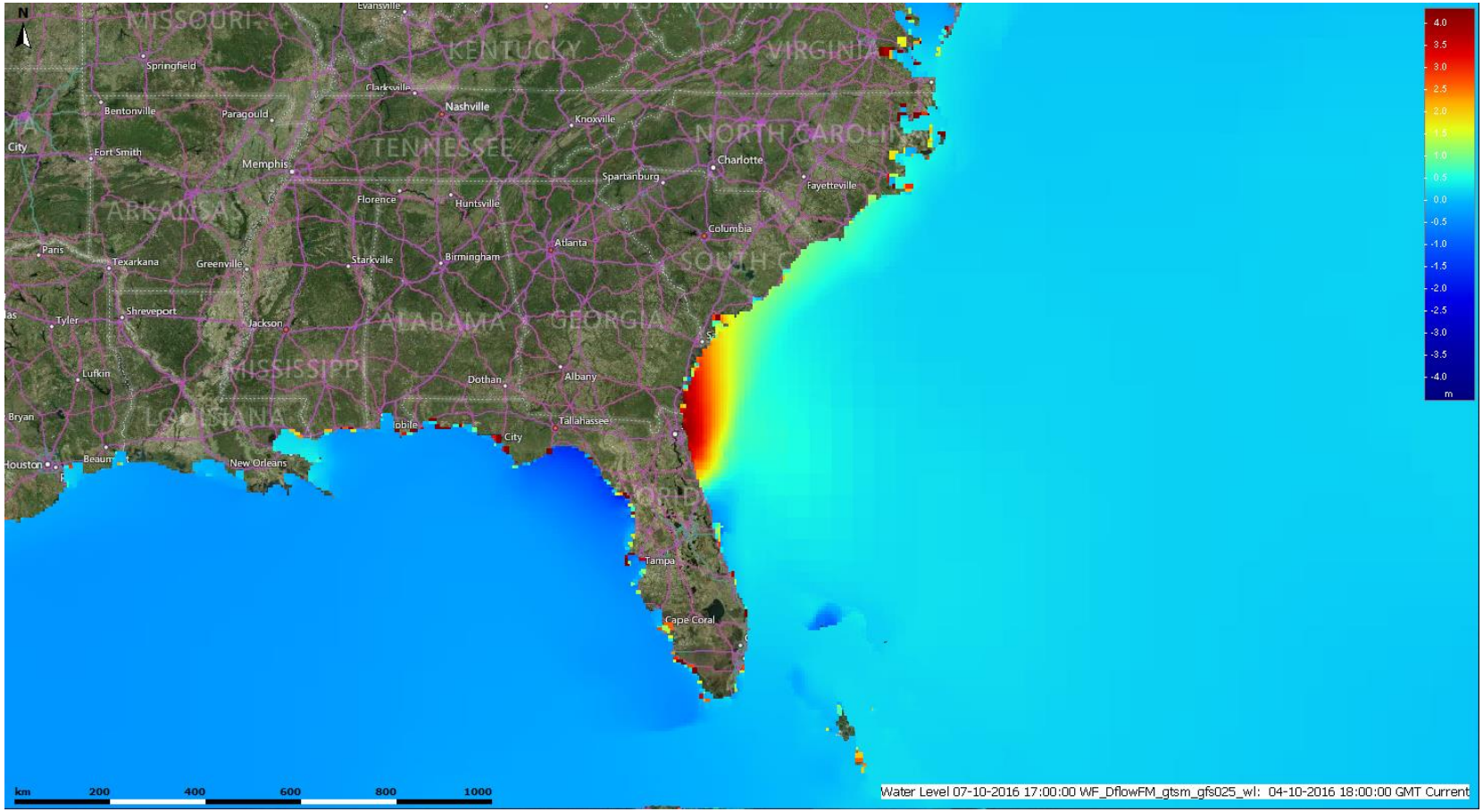
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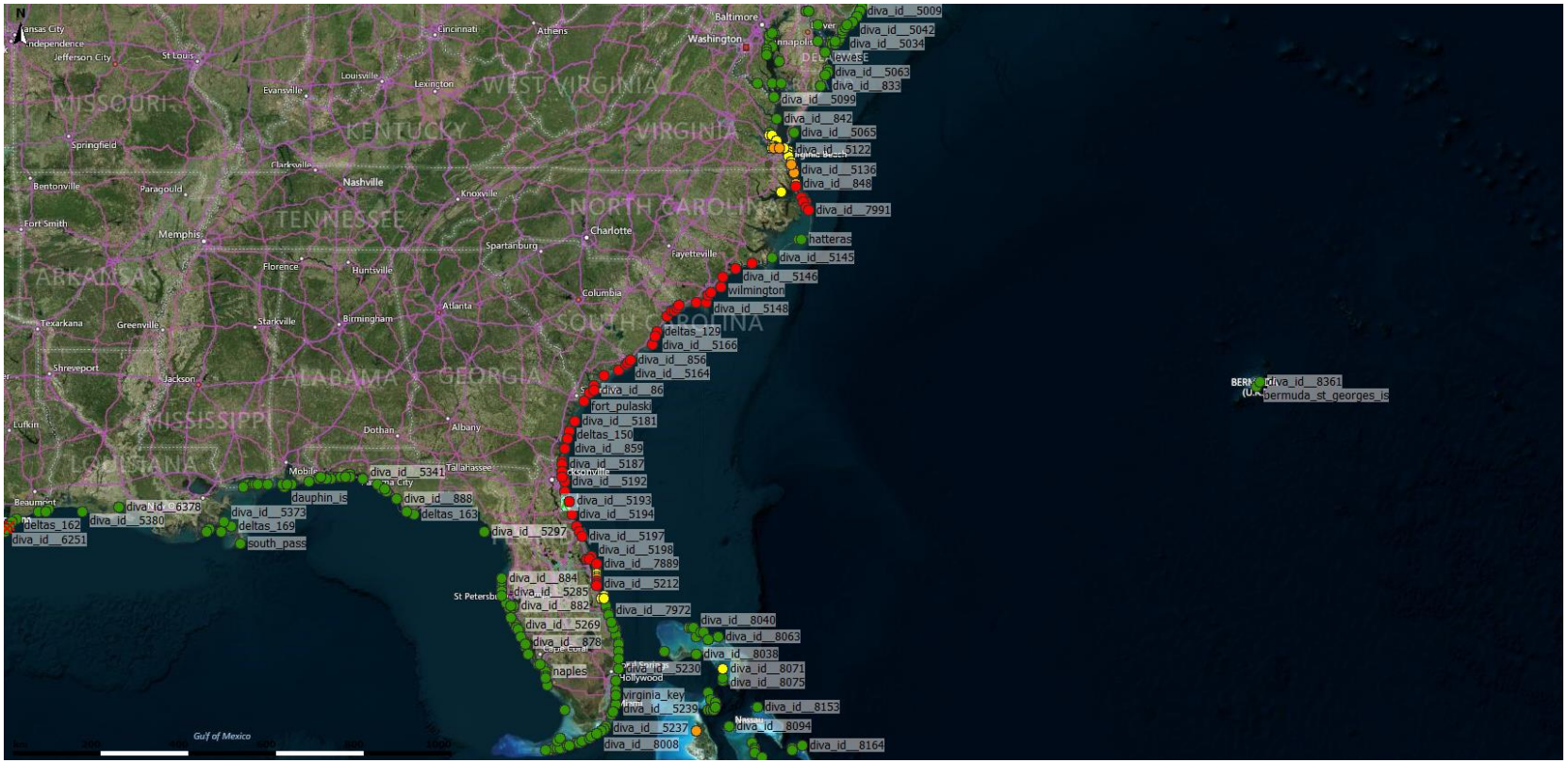
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TENNESSEE
Memphis
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Spartanburg
Fayetteville
Florence
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Columbia
Atlanta
Birmingham
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Satellite Data

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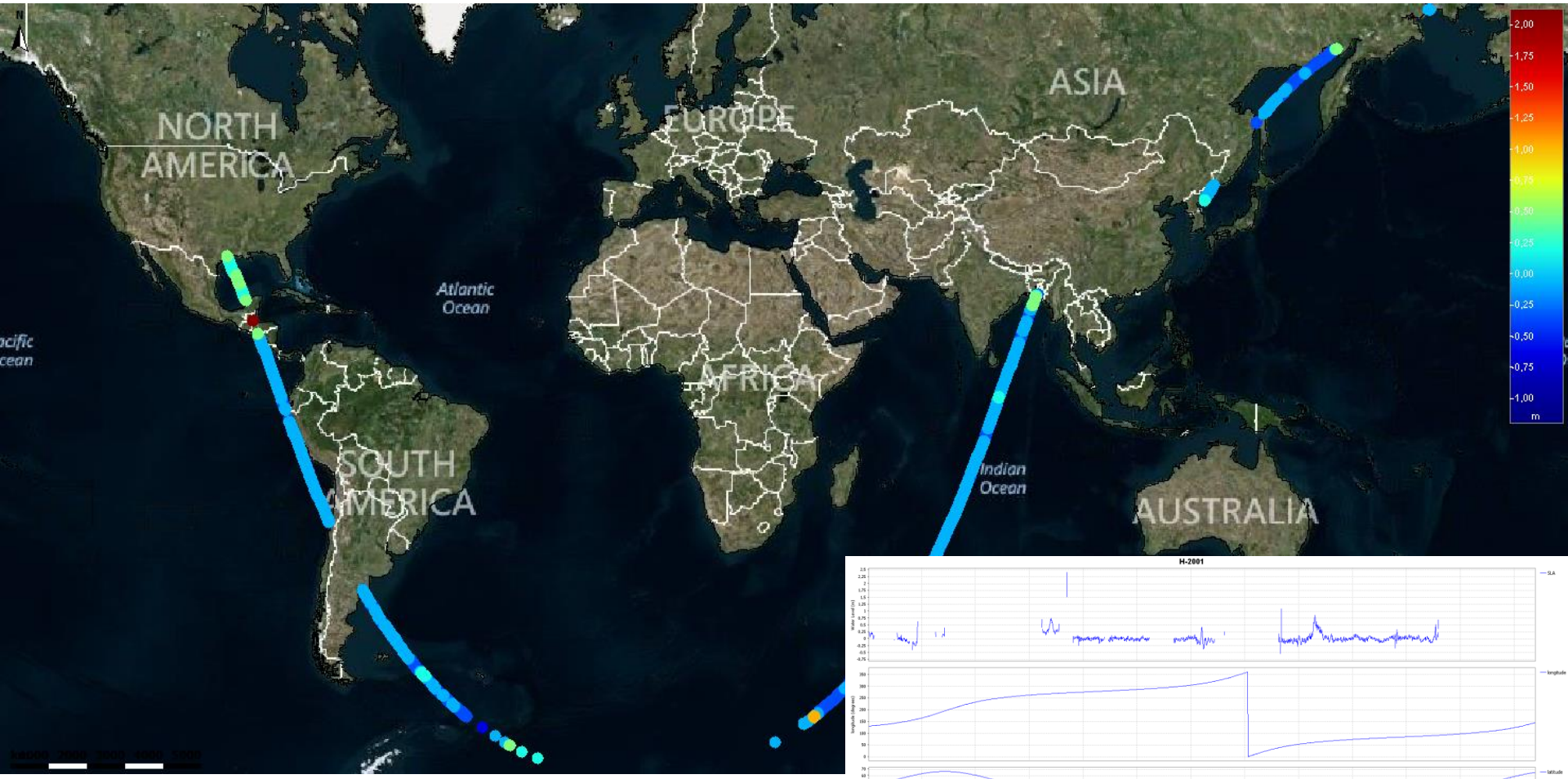
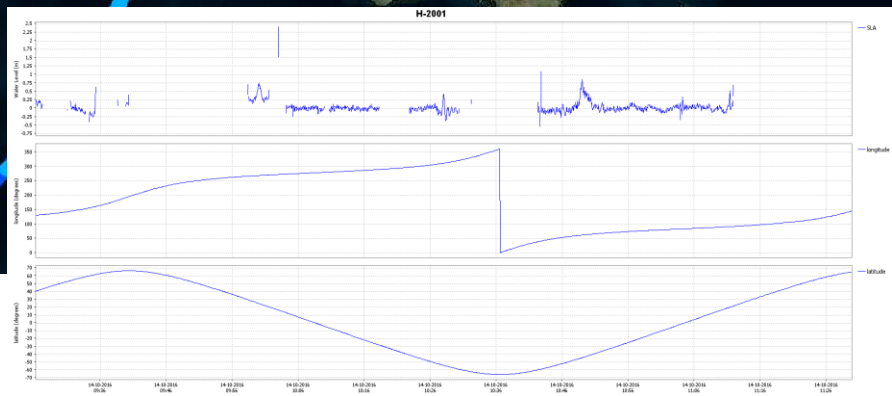
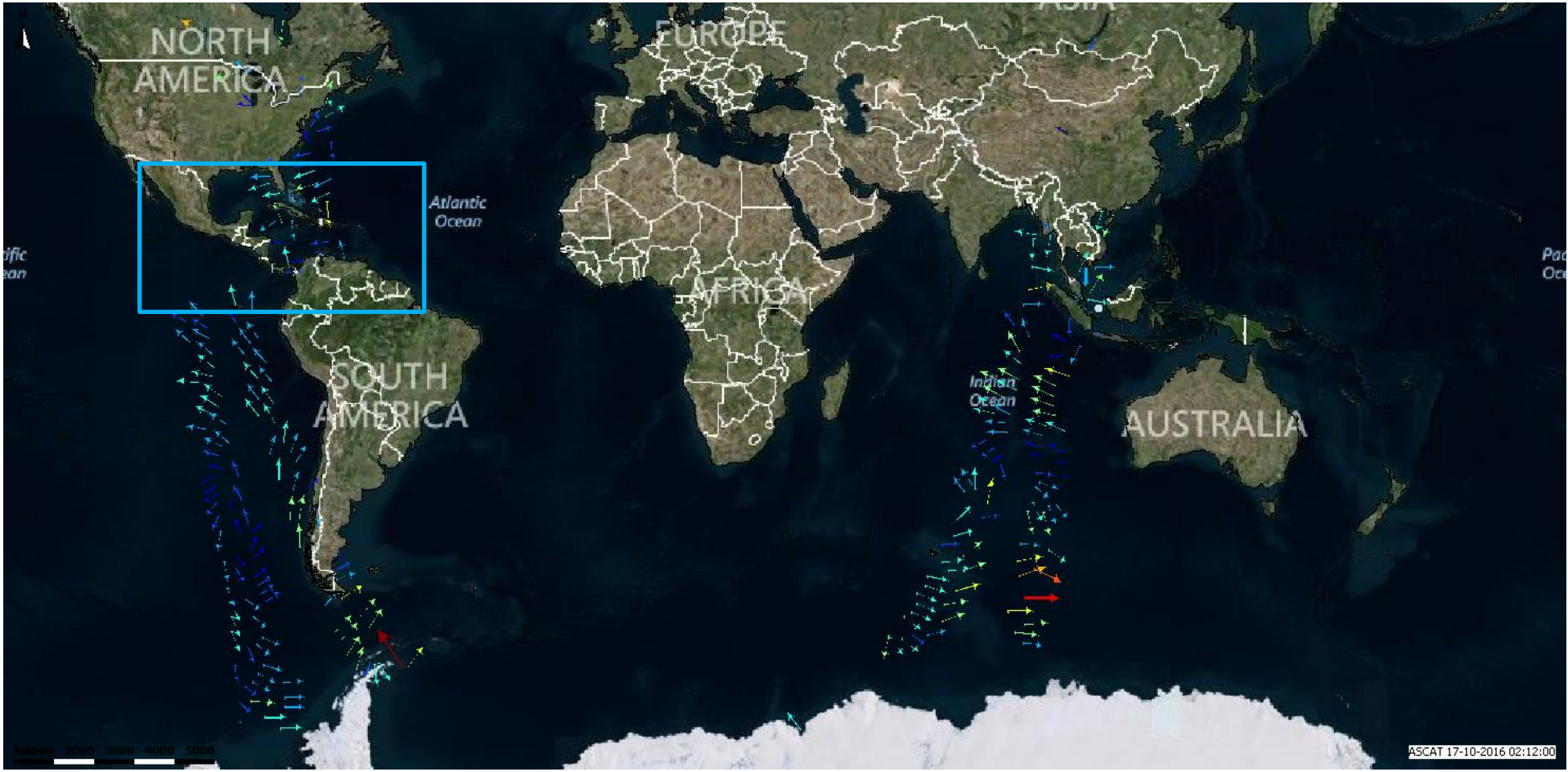
JASON-3 Sealevel example





EUMETSAT Deltares

ASCAT Scatterometer winds



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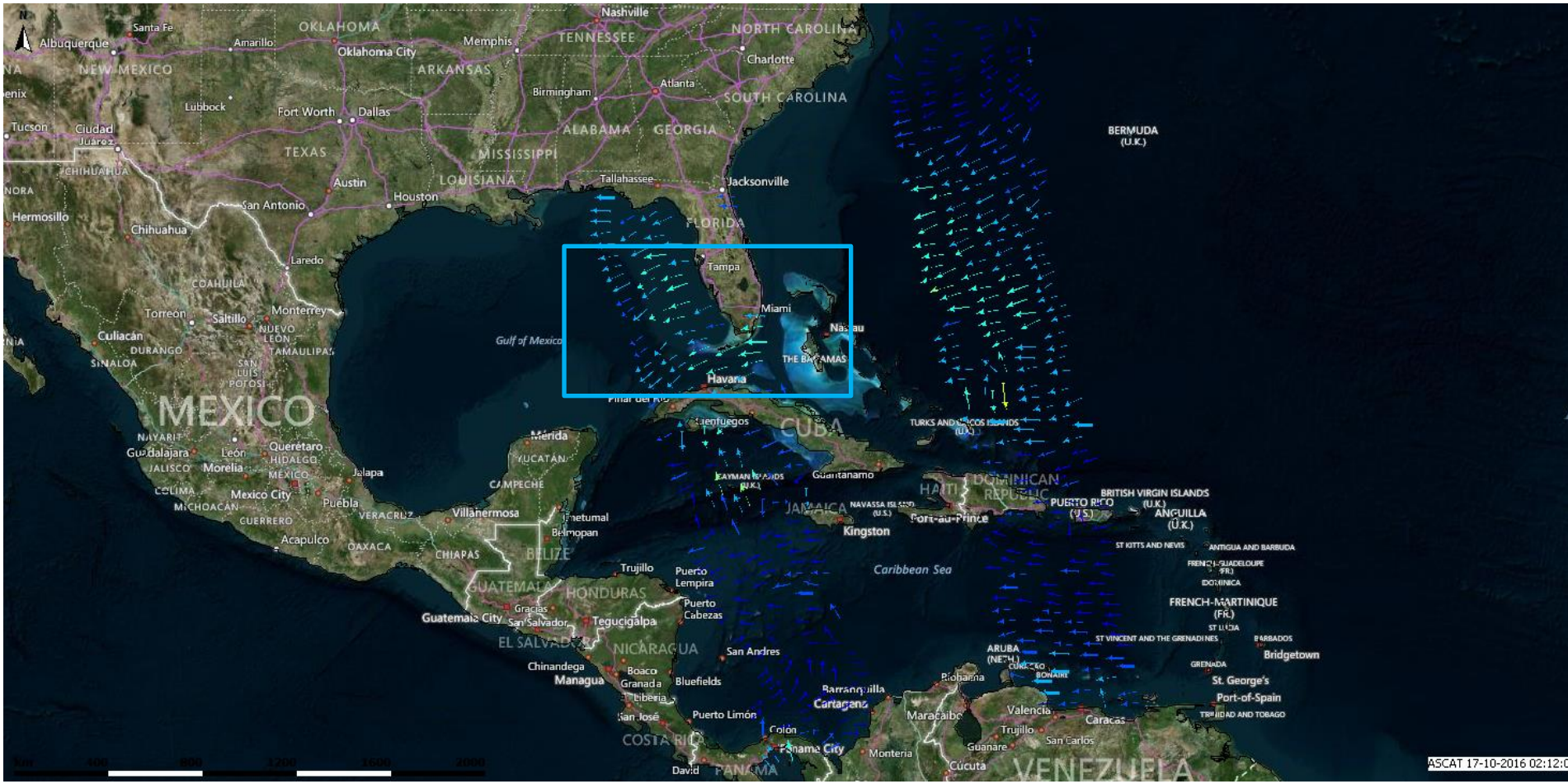
ASCAT Scatterometer winds



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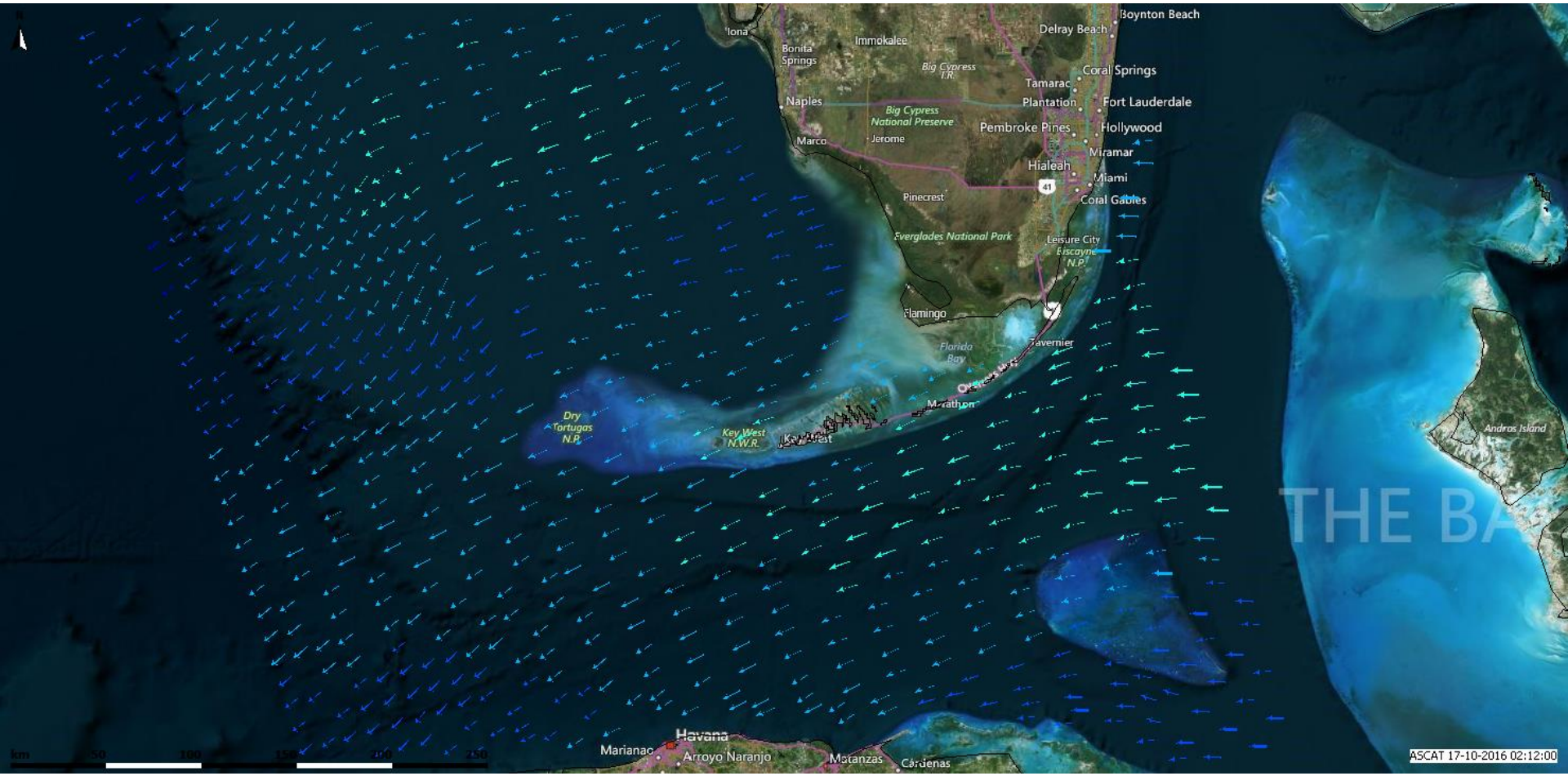
ASCAT Scatterometer winds



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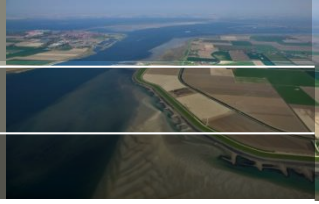
Future plans



- Incorporate real-time satellite observations in FEWS
- Replace GTSM with next version of the model
- Improve web-viewer and make it visible to outside world
- Add data-assimilation
- Study feasibility of an ensemble of forecasts
- Study feasibility of adding coastal processes and inundation estimates

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ASCAT Scatterometer winds

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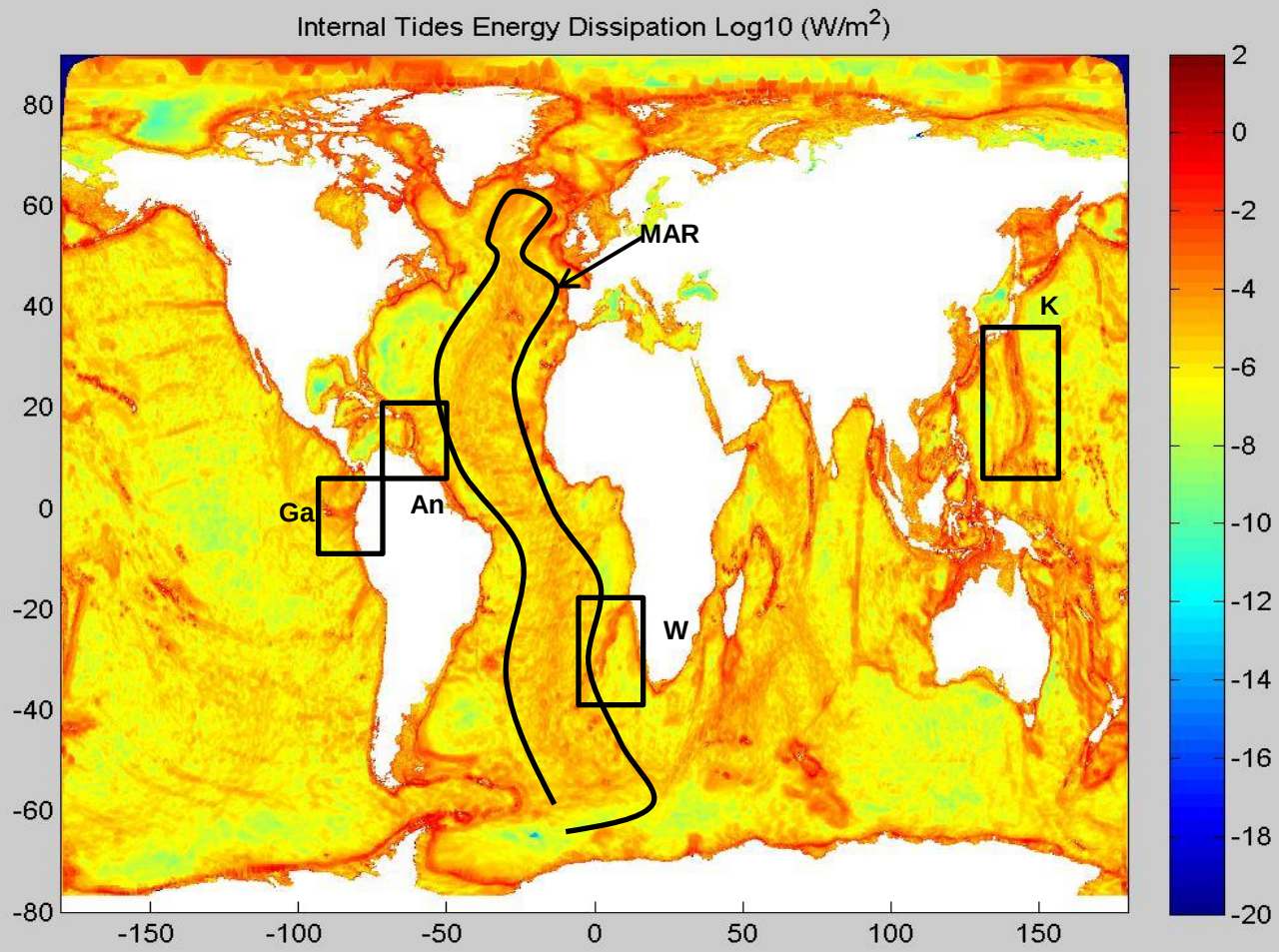
IT dissipation results- Dissipation rates



An Antilles

G:Galapagos

K:Kyushu/Palu Ridge

MAR:Mid-Atlantic ocean ridge

W: Walvis Ridge
Kg: Kerguelan

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