D7.3 New LOTUS products and their potential use in value-adding applications

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D7.3 New LOTUS products and their potential use in value-adding applications

- Value-adding applications for ocean
  - Wave and wind design data
  - Characterization of coastal scale hydrodynamics
  - Data assimilation in coastal-ocean models

- Value-adding applications for land
  - River model calibration
 - Data assimilation in hydrological-hydrodynamic models

Wave and wind design data

Value-adding applications

- Fast assessment of wave and wind conditions
- Spatial validation of wave and wind model data

Achievements and recommendations

- CryoSat-2 SAR data support and improve wave and wind design data, especially in areas with low data coverage.
- Important contribution to metocean databases and design methods, e.g. for offshore wind, marine infrastructure, etc.
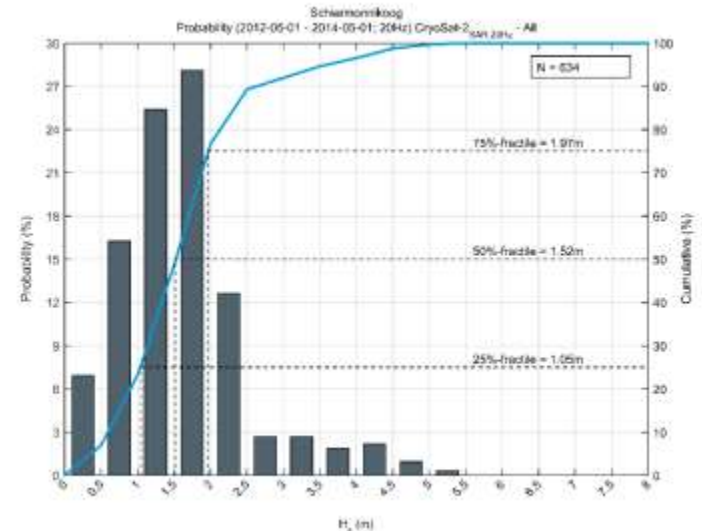
Characterization of coastal scale hydrodynamics

Value-adding applications

- Flood forecasting (Venice)
- Safe navigation and operation (Hanstholm Harbour)

Achievements and recommendations

- High-resolution SAR data provide important information for coastal processes
- Temporal resolution of the SAR data does not allow resolving coastal processes
- Large potential in combining SAR data with coastal-ocean modelling
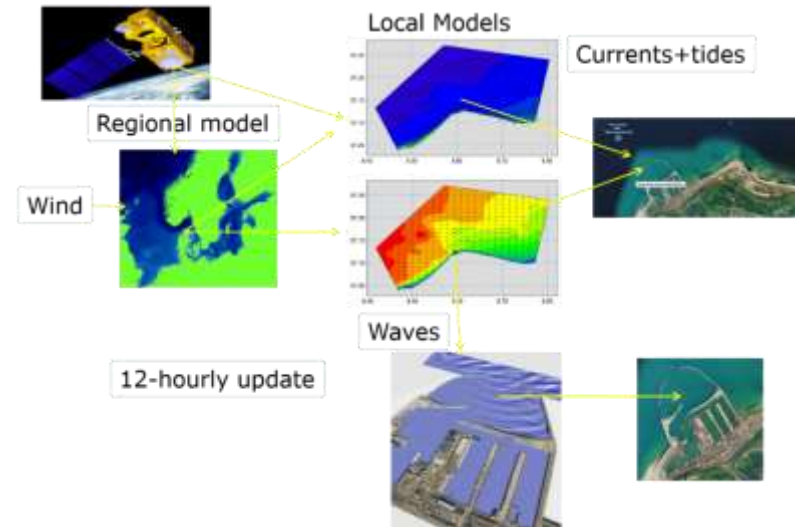
Data assimilation in coastal-ocean models

Value-adding applications

- Improved coastal-ocean design data
- Improved prediction skills of operational forecasting systems

Achievements and recommendations

- General data assimilation methodology developed
- First test shows no value of assimilation of SAR-derived SLA data
- Further analysis required

Northern Adriatic with CryoSat-2 tracks November 2013
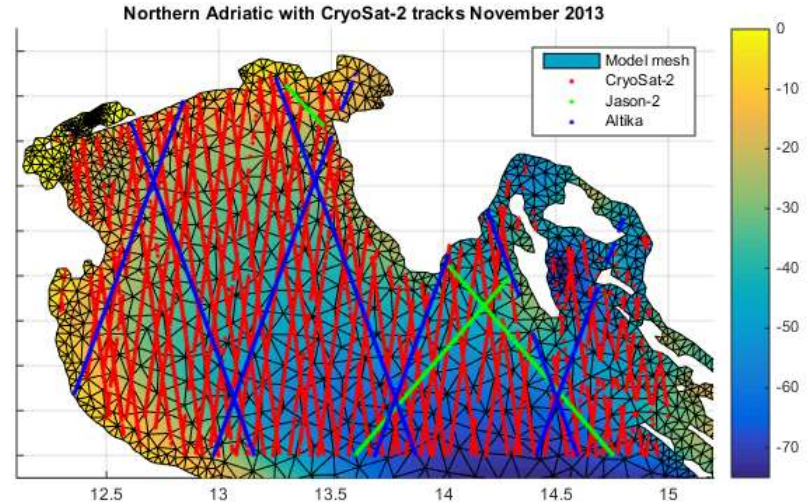
River model calibration

Value-adding applications

- Calibration of river cross sections that combines data from CryoSat-2 and Envisat
- Offers a way to calibrate a hydrodynamic river model without precise knowledge of topography and bathymetry

Achievements and recommendations

- Calibration method applied to Brahmaputra showed improved water level simulation
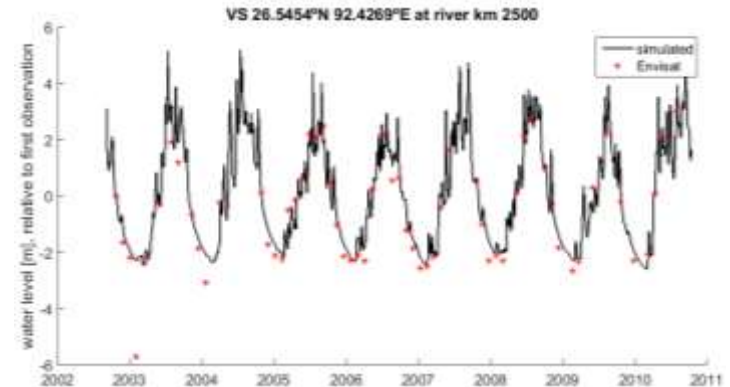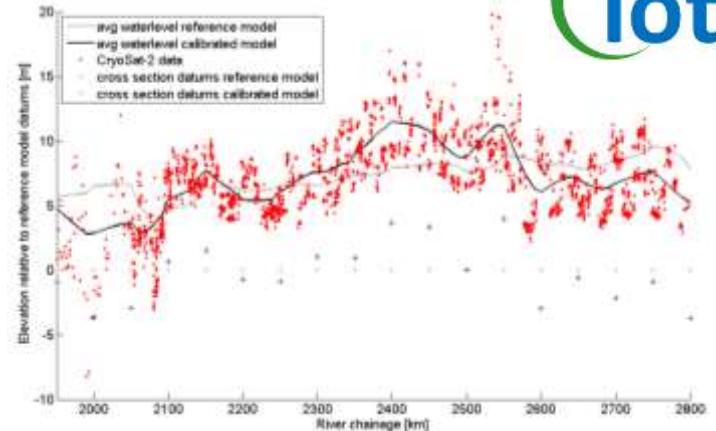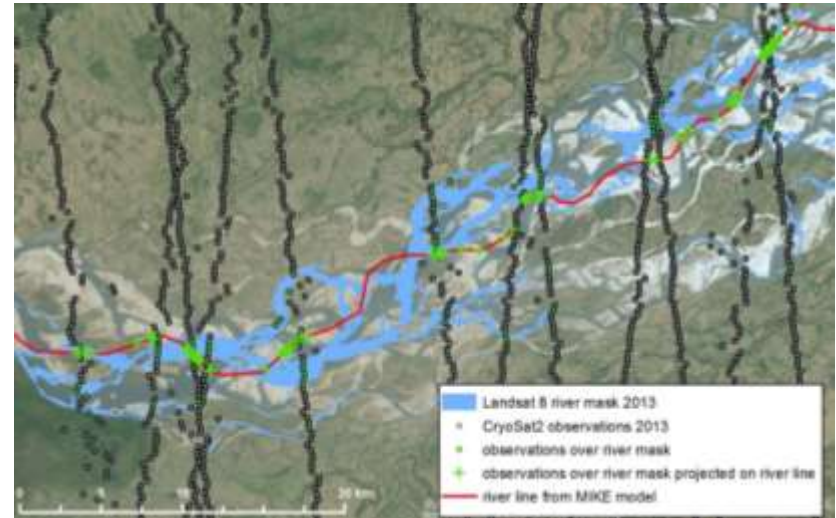
Data assimilation in hydrological-hydrodynamic models

Value-adding applications

- Improved hydrological-hydrodynamic model prediction skills in cases where no or only limited in-situ data are available

Achievements and recommendations

- General data assimilation methodology developed

- First tests with Cryosat-2 data show only marginal improvements in model prediction skills

- Further analysis required

Legend:
- Landsat 8 river mask 2013
- CryoSat2 observations 2013
- observations over river mask
- observations over river mask projected on river line
- river line from MIKE model

Conclusions

- High-resolution SAR altimetry data has shown important value for both ocean and land applications
- Especially, the combination of SAR data with numerical modelling has large potential for improving the estimation and forecasting of ocean and land systems
- General data assimilation capabilities developed for ocean and land system modelling that allows assimilation of different altimetry products and in-situ data
- The value of altimetry data is expected to increase with enhanced spatio-temporal resolution from combination of multiple satellite missions