





LOTUS- Preparing Ocean and Land SAR Altimetry Processing for Sentinel-3

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LOTUS General Info


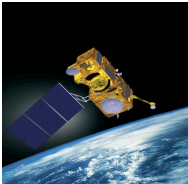
LOTUS- Preparing Ocean and Land Take Up from Sentinel-3

The overall objective of the LOTUS project is to support the development of Copernicus by developing applications of Sentinel-3 to complete the space observation infrastructure that are designed for land and ocean monitoring for Copernicus.


Supported by EU FP7.

Partners: DTU, STARLAB, U. Newcastle, CLS, and DHI


Duration: 1 Jan 2013 – 31 Dec 2015



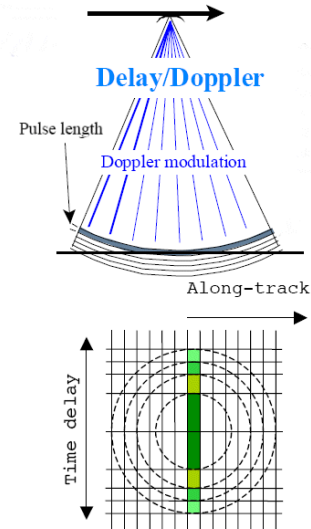
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Motivation - New instrumentation




- The SRAL instrument onboard Sentinel-3 is a new generation of radar altimeter featuring a SAR mode.
- The SAR capability is a new feature and no data products based on this SAR mode data are provided or used operationally.
- Therefore, new methodologies, data processing, and applications need to be developed to prepare the take-up of the Copernicus Sentinel-3 data.




From: <http://www.altimetry.info>
(Credits R.K. Raney, Johns Hopkins University APL)



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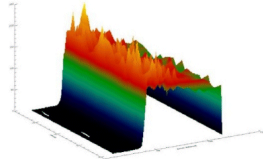


LOTUS Objectives

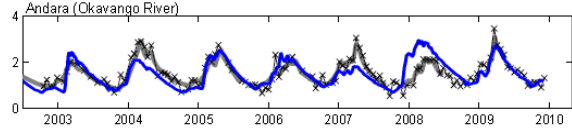


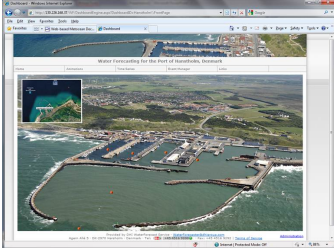
Objectives:


- 1: Processing of SRAL SAR mode waveforms over **ocean and land**
- 2: Definition of new data products and processing chains
- 3: Production of demo data and assessment
- 4: Applications in value-adding **ocean services** and **land services**
- 5: Dissemination and exploitation.




From: <http://www.altimetry.info>
(Credits CNES)








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LOTUS R&D



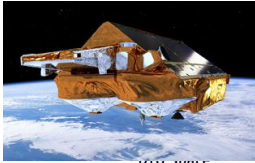
Processing of SRAL SAR mode waveforms over ocean.
 Extraction of high-resolution sea surface heights, wave heights and wind speeds from SAR mode data:

- Open ocean
- Polar ocean
- Coastal zone


Processing of SRAL SAR mode waveforms over land.
 Extraction of high-resolution information:


- River and lake levels
- Soil moisture
- Snow depths

Carry out RTD using CRYOSAT-2 altimetry




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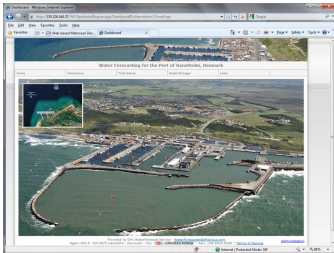



LOTUS R&D




Scientific Requirements Consolidation [CLS and DHI]
 Defining a consolidated list of scientific requirements to adapt current algorithms (defined for Cryosat-2) to be applied to Sentinel-3.

- Copernicus services – Ocean, Land, Climate
- Down-stream services:
 - Coastal monitoring and forecasting systems for
 - Offshore wind mill farms
 - Ports
 - Arctic ocean services
 - River monitoring and forecasting systems
 - Hydrological modeling
 - ..






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State of the Art




Definition of new data products and processing chains


- Definition and design of ocean data products
- Definition and design of land data

Production of demo data and assessment


- Processing of CryoSat-2 ocean data.
- Processing of CryoSat-2 land data.
- Development of Multi – satellite and in-situ validation and long term referencing data sets



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Conventional (LRM) vs SAR altimetry

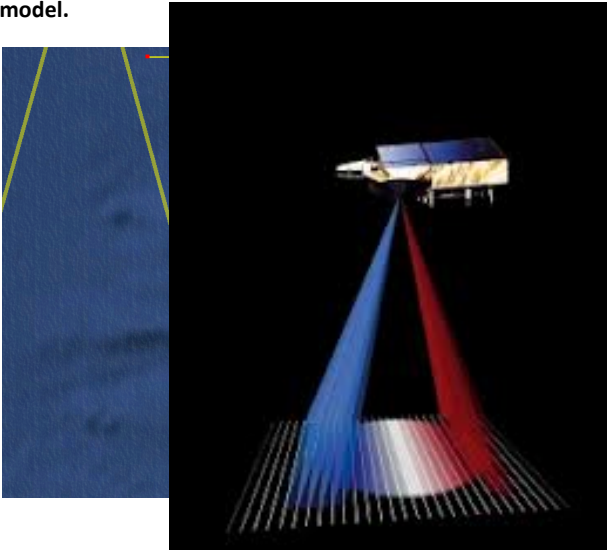



LRM/Conventional ocean retracker uses the Brown model
SAR altimetry uses i.e. SAMOSA model.

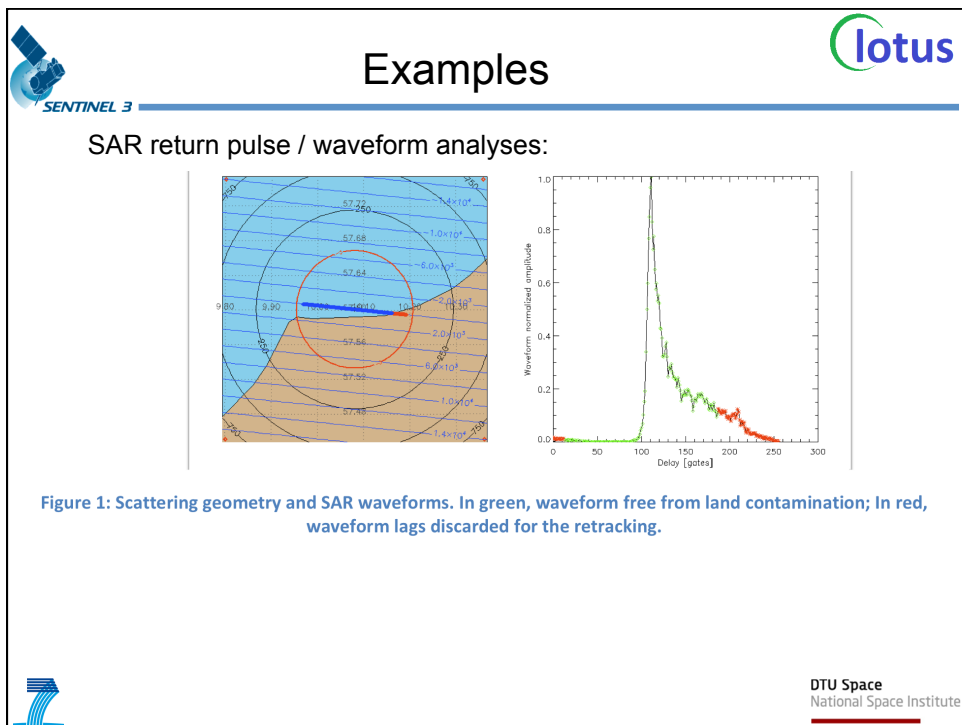
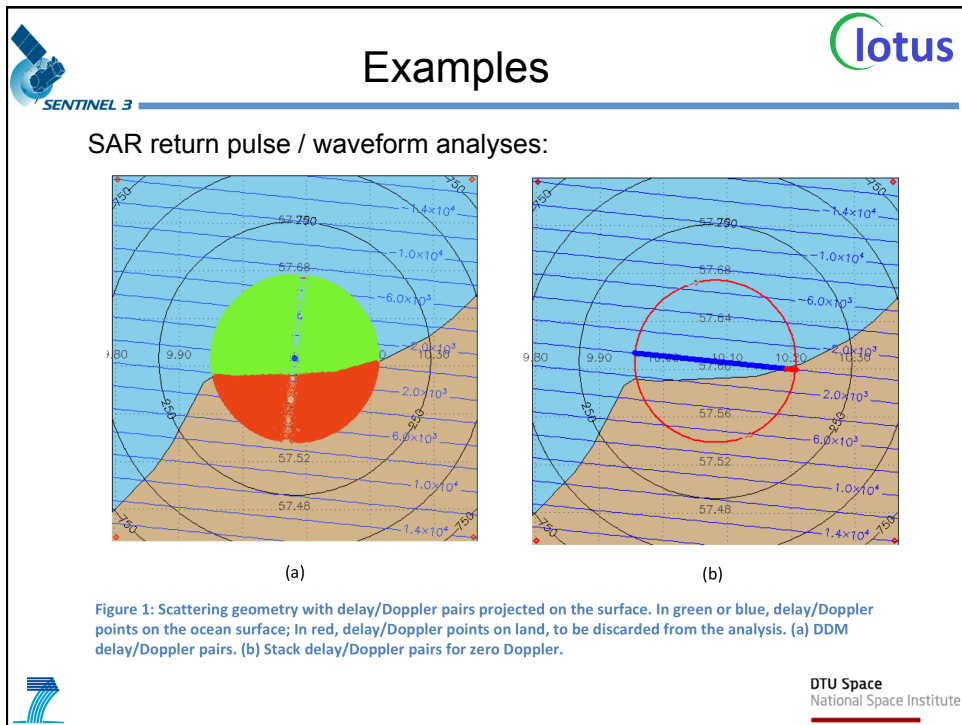
WF = FSSR * PTR * PDF

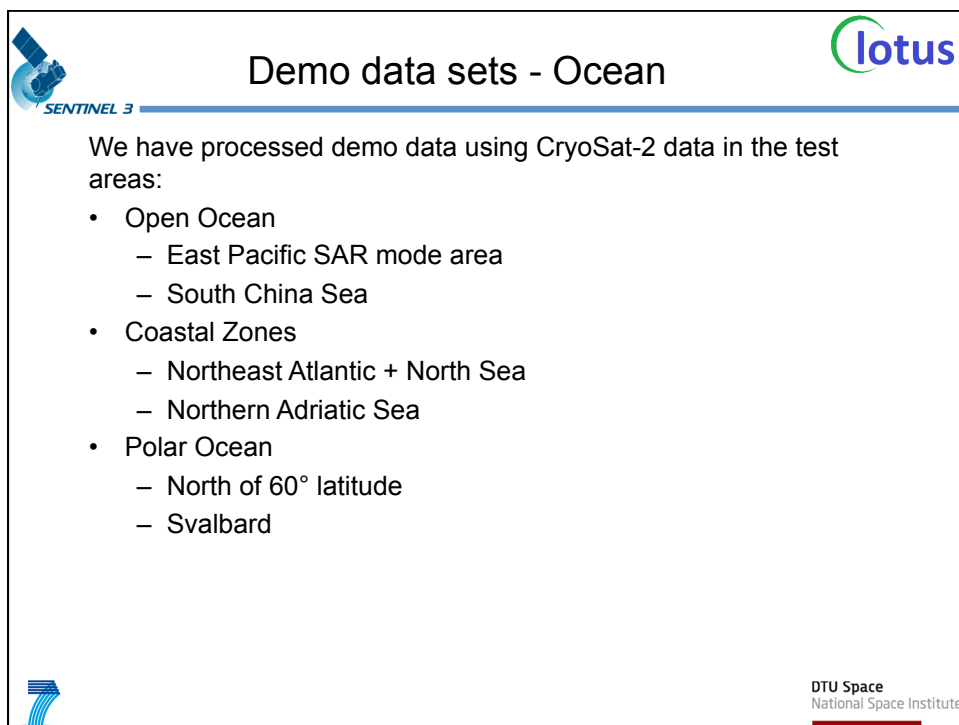
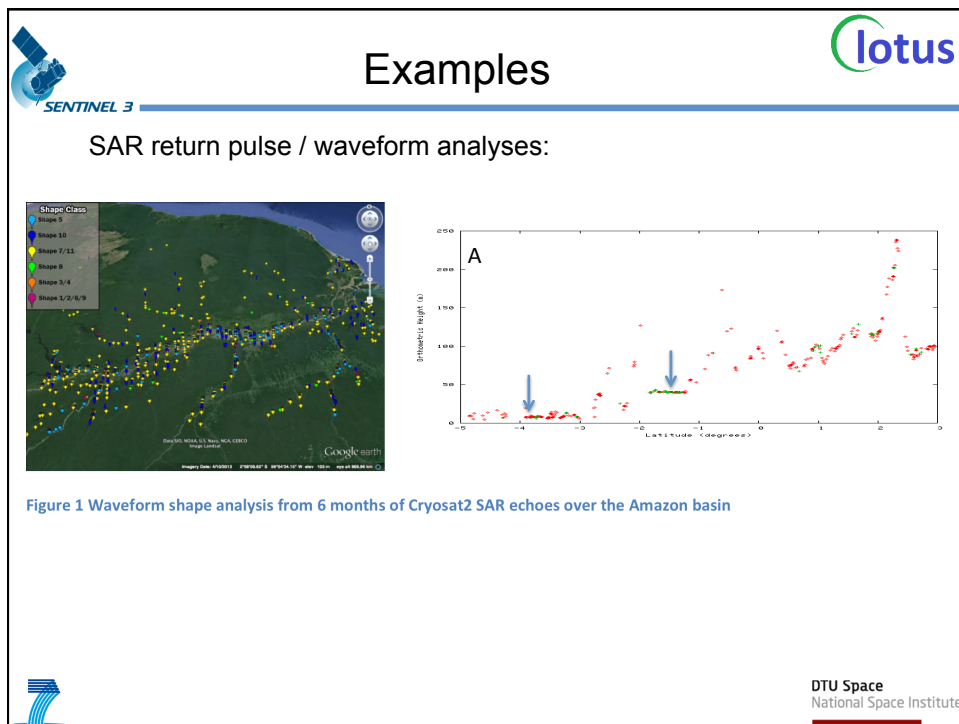
WF : Waveform
 FSSR : Flat Sea Surface Response
 PTR : Point Target Response
 PDF : Probability Density Function
 of wave heights


In coastal region this assumption is violated as the PDF is not homogeneous within the footprint













Demo data sets - Land

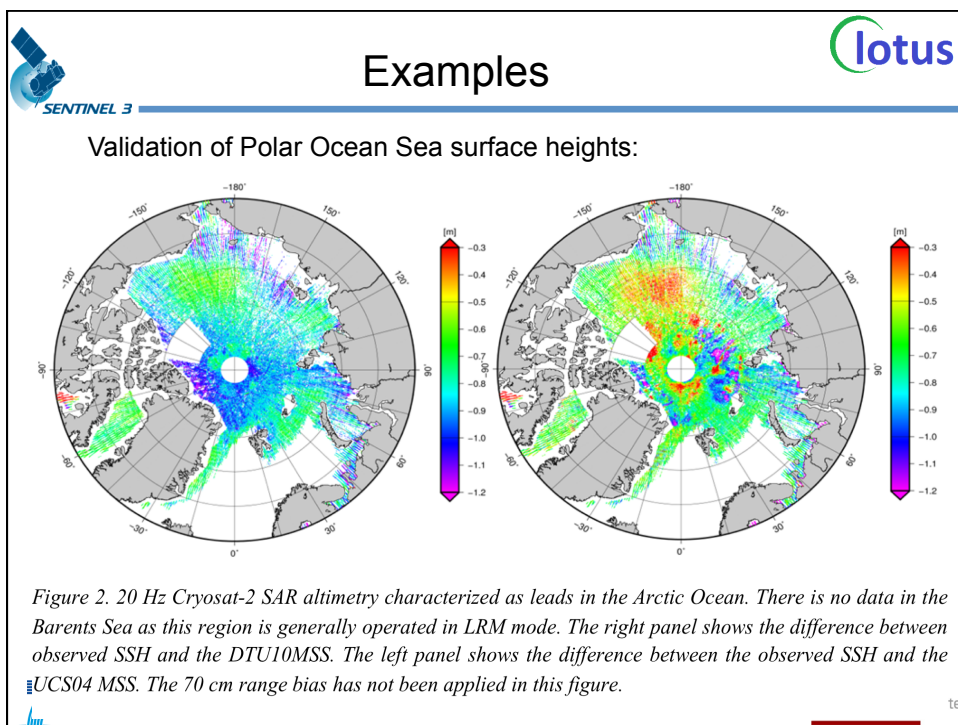


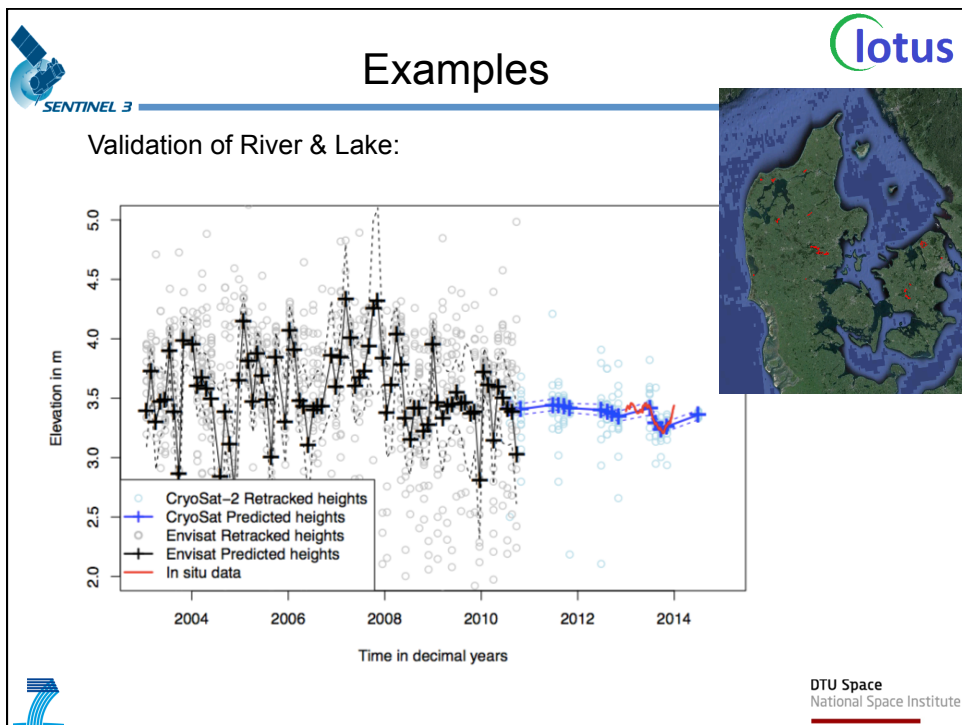
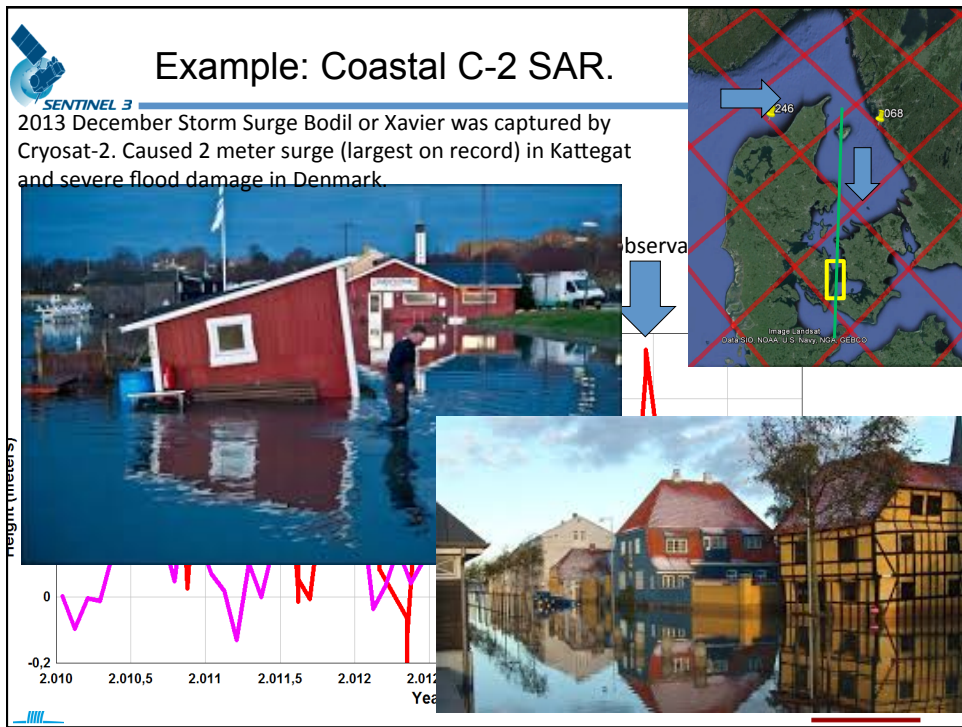
We have processed demo data using CryoSat-2 data in the test areas:

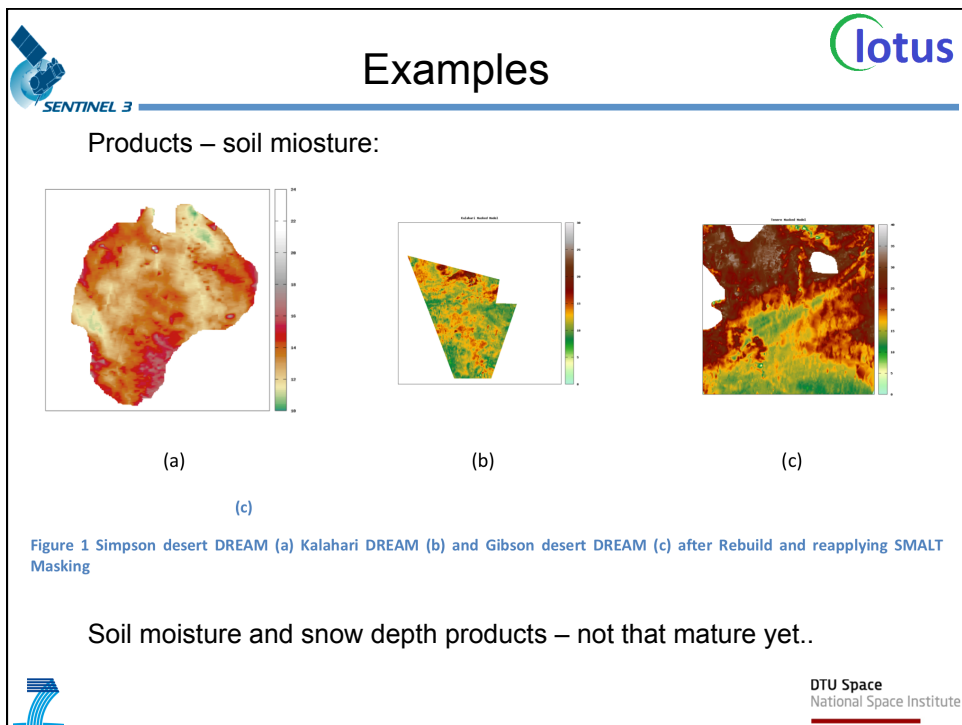
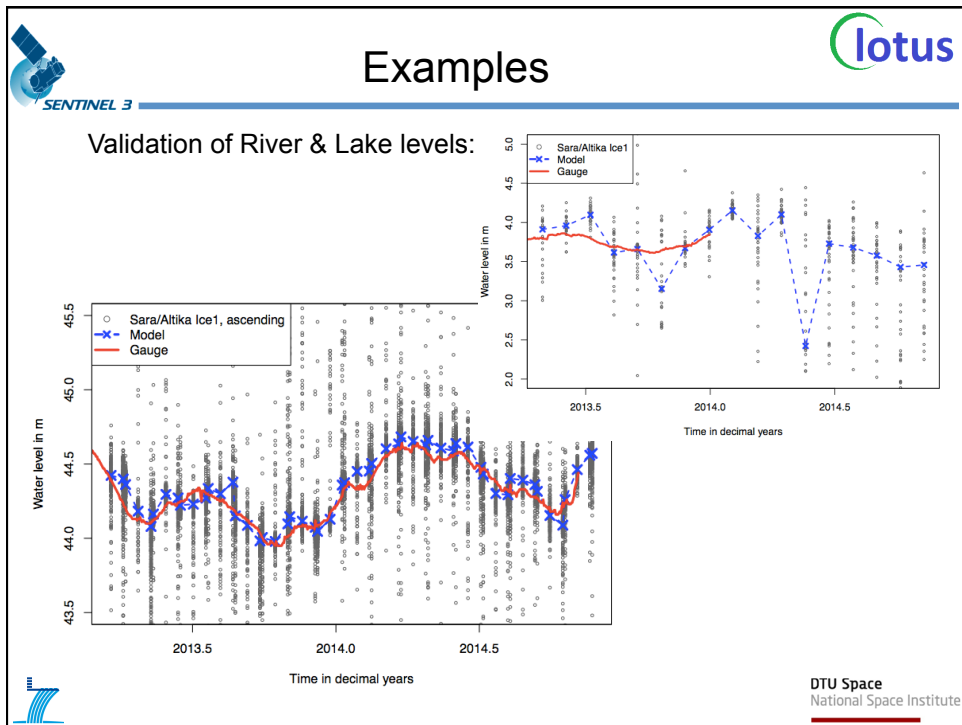
- River and Lakes
 - Denmark
 - Thailand
 - Brahmaputra river
 - Amazon river
- Soil Moisture
 - Simpson desert
 - Tenere desert
 - Kalahari desert
- Snow Depth
 - 3 areas in N America




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SENTINEL 3




Ongoing activities


Applications of new Copernicus data in value-adding ocean services:

The objective is to develop new and improved coastal oceanographic services by utilizing the data features emerging with Sentinel-3. The services will primarily utilize the increased resolution of the SRAL SAR and place emphasis on value adding integration with complementary data such as ocean modelling, in situ data and multiple sensors.


- Improved wave and wind design data
- Characterization of coastal scale hydrodynamics
- New current design and forecast data
- Climate change services



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Ongoing activities


Applications of new Copernicus data in value-adding land services:

The objective of to develop new and improved land services by utilizing the data features emerging with Sentinel-3. The services being developed have a global applicability and will be targeting the following applications:


- Monitoring of river and lake levels
- Monitoring of Snow depths
- Contributions to climate monitoring and soil moisture monitoring
- Integration of the land data products with in-situ data and hydrological modelling using data assimilation



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Ongoing activities

Dissemination and exploitation

- We will disseminate the results on the use of Sentinel-3 SRAL SAR mode data as well as derived new products for Copernicus land and marine services. This includes the
 - setting-up a web site - www.fp7-lotus.eu
 - dissemination actions are directed towards European SMEs.
- We disseminate the results of the LOTUS project to European services and projects contributing to the Climate and Climate Change monitoring.
- Finally, we will disseminate the results of the LOTUS project to Copernicus services for security and emergency management.

More Info at www.fp7-lotus.eu



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