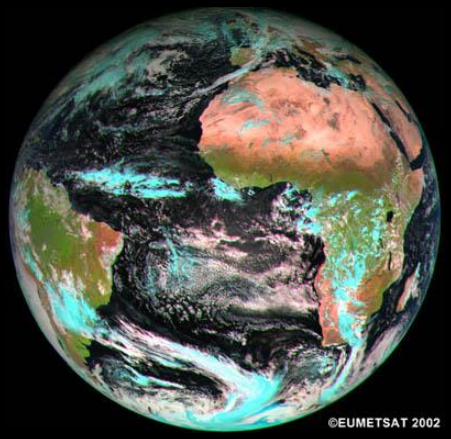

Norwegian preparations for the National Ground Segment

Anja Strømme

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Senior Advisor

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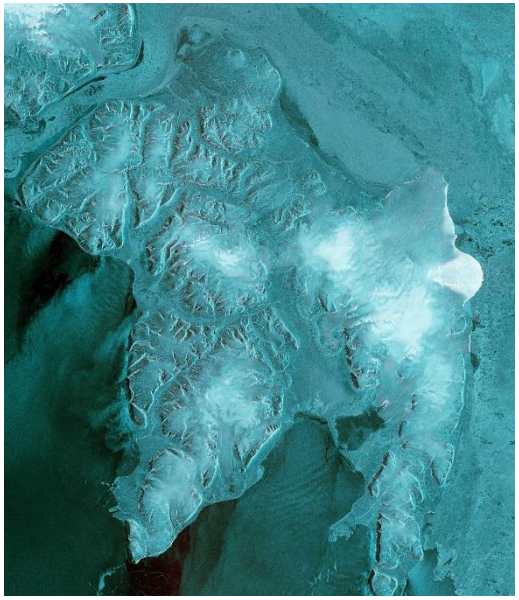
Initial activities for a Copernicus ground segment in Norway

- Initial test phase of Collaborative ground segment for Sentinel-1 data with KSAT for easier data access for Norwegian users
- Early testing of Sentinel 1 data for established services for
  - Oil detection (for the costal service)
  - Ship detection (for the Norwegian defence agency)
  - Data collection for interferometric land slide mapping (for NGU)
- Signed direct downlink agreement with ESA and EU and established a NRT/QRT chain for Sentinel-1 data
- Investigated use cases and national needs for Sentinel 2 resulting in 2 reports



Copernicus Sentinel data (2015, 2016)

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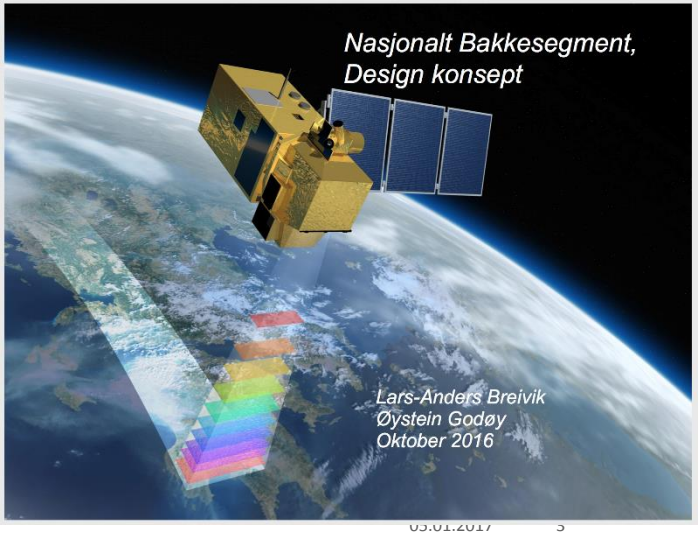
Satellittdata.no
National ground segment for Copernicus data

We are now establishing Satellittdata.no with the meteorological institute – a permanent portal for Copernicus data and products in Norway. In its initial phase it will:

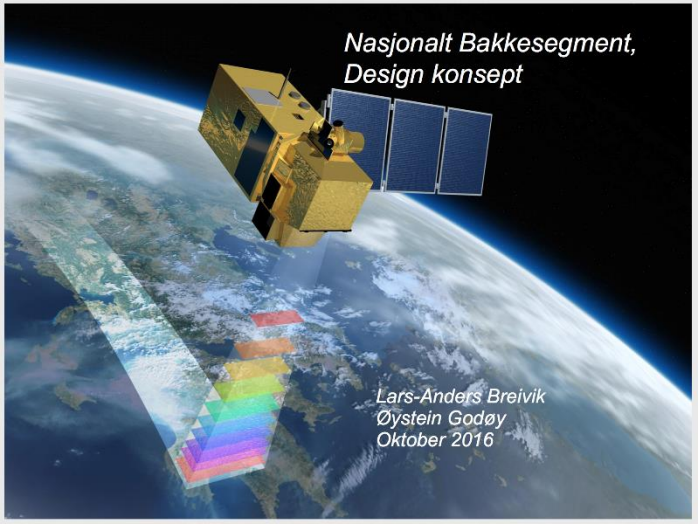
- Ensure that Sentinel-1 and Sentinel-2 (and very soon Sentinel-3) data gets available to Norwegian users with as short time delay as possible
- Designing a portal and a distributed infrastructure that can provide and incorporate special and higher level products in an efficient and user friendly manner including
  - Common grids
  - Efficient area and band selection
  - Time series/change detection
- Development of services specifically tailored to national needs
  - Sentinel-1 QRT data
  - Orthocorrected Sentinel-1 data
  - Sentinel-2 level 1CN with Norwegian 10m DEM etc



Satellittdata.no
National ground segment for Copernicus data

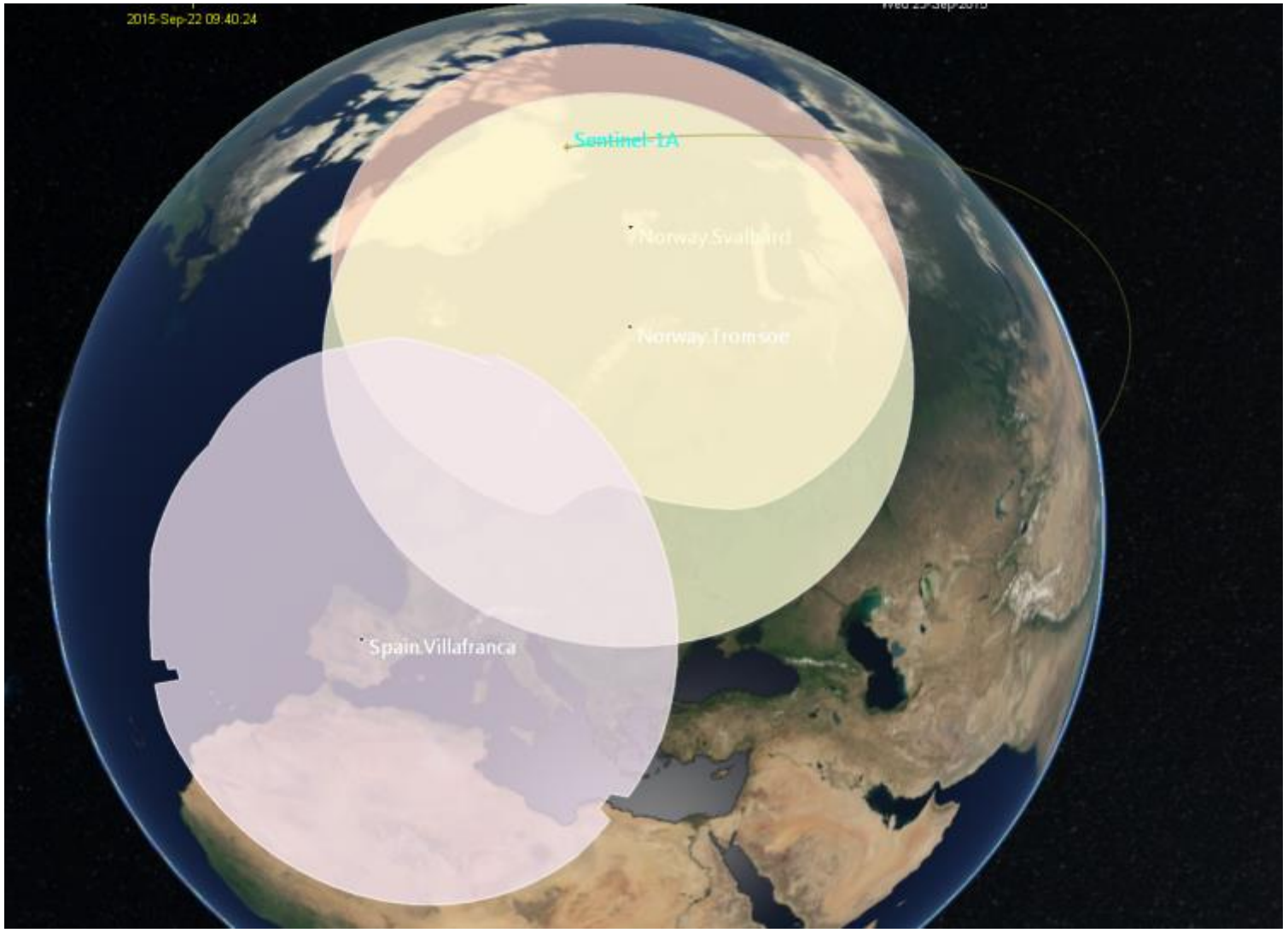
We are now establishing Satellittdata.no with the meteorological institute – a permanent portal for Copernicus data and products in Norway. In its initial phase it will:

- Save and store data from from the entire world for 4-6 weeks, and for Norwegian areas of interest forever
- Provide data in SAFE format in a DHuS environment to allow a seamless integration of routines and scripts from other Copernicus hubs (Scihub etc)
- Provide data from
  - The Copernicus Data Relay Hub
  - Directly downloaded QRT Sentinel-1 data
  - Sentinel-2 data with the Norwegian 10m DEM from ESA



Open to test users now – official opening 18. October 2016!

Potential Direct Downlink Coverage



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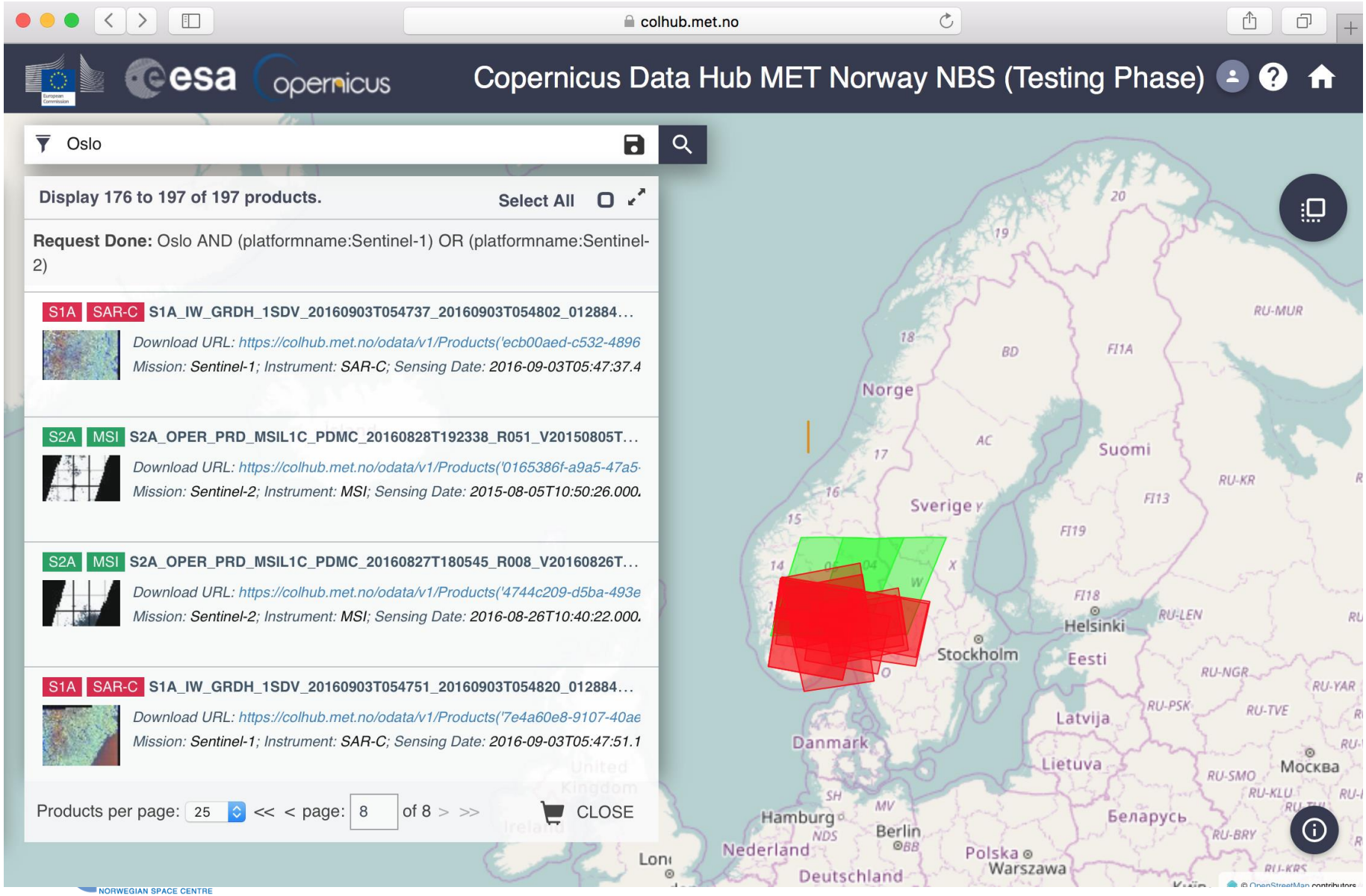
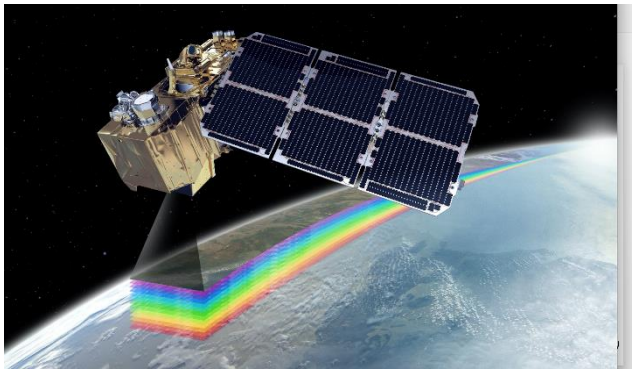
KSAT: Jan Petter Pedersen

Satellittdata.no



Sentinel-2 preparations



- Close collaboration with Norway Digital – on use cases and preparation for Sentinel-2
- Followed up by a user survey spring 2016 to identify a wider range of user needs and challenges
- Resulted on both high and low level user requests:

- Archiving of S-2 level 1B and 1C data
- Metadata – INSPIRE/Geodataloven
- S-2 level 1C with national DEM (1CN)
- Common grid S-1 and S-2
- Time series
- Change detection
- AOI larger than Norway
- …

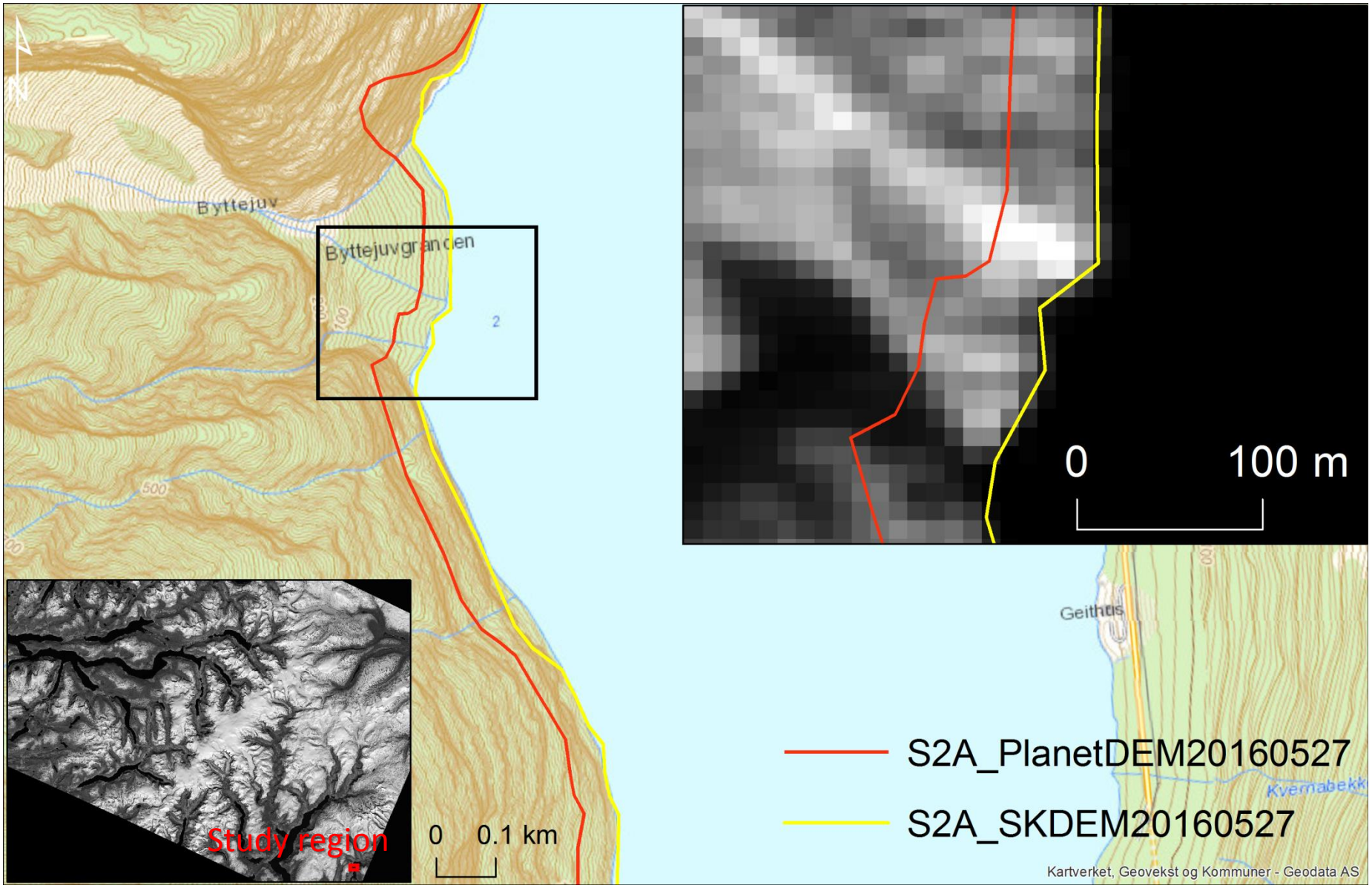
- Frequent national mosaic
- Habitat modelling
- Forest monitoring
- Lichen monitoring
- Sea water quality
- …

Sentinel-2 Nasjonal DEM Project

- For best quality of data over Norwegian Areas of interest we have launched a pilot project with ESA to get all Sentinel-2 data over Norway (and Svalbard) processed with a national open 10m DEM
- These ”Norwegian” Sentinel-2 level 1C data (1CN) will be distributed trough Satellittdata.no.
- Initial work has been done to compare the data – a more thorough study will be performed this fall/next spring to quantify the performance.
- Next step – coordination between neighbouring countries to ensure continuity across borders for the higher resolution National DEMs

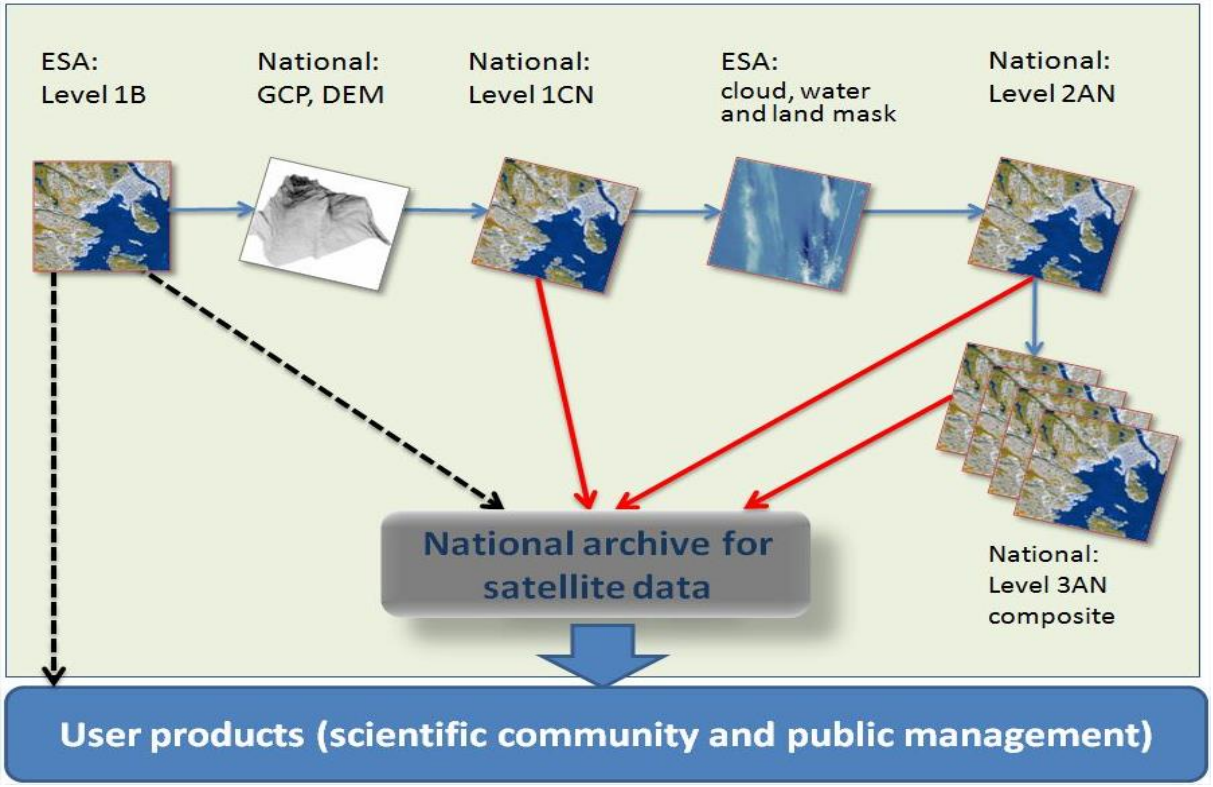
2) Høydefeil i PlanetDEM90 terrengmodell

From S. Winsvold and A. Kaab, UiO



Sentinel-2 next step

- Evaluate atmospheric correction routines and cloud removal for Norwegian Conditions (snow, ice, glaciers…)
- Evaluate ESAs Sentinel-2 level 2A product – Planet DEM versus Norwegian DEM

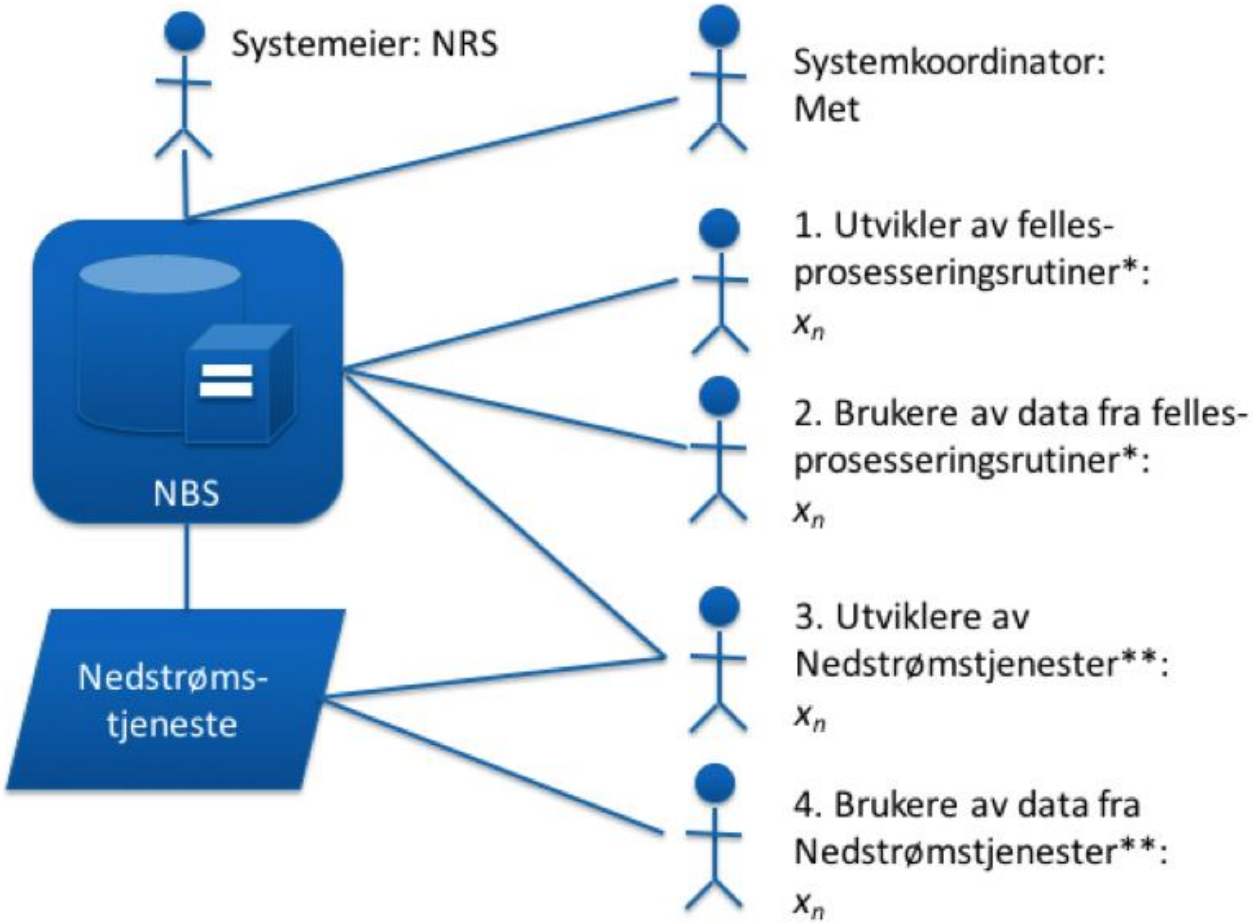


Satellittdata.no – next phase

A second access portal (in addition to the ESA DHuS one) will be opened late this year/early next year with some added functionality

- NetCDF file format will ensure easier access to smaller data amounts and enhanced search capabilities in terms or
  - Area
  - Band (for Sentinel-2)
  - Time etc
- Enhanced scripting capabilities including subscription and push service of selected products
- Tools for time series and change detection
- Later - processing on demand, “sandbox”
- Include future satellites (Sentinel-5p….)
- Include higher level products, i.e. some InSAR products

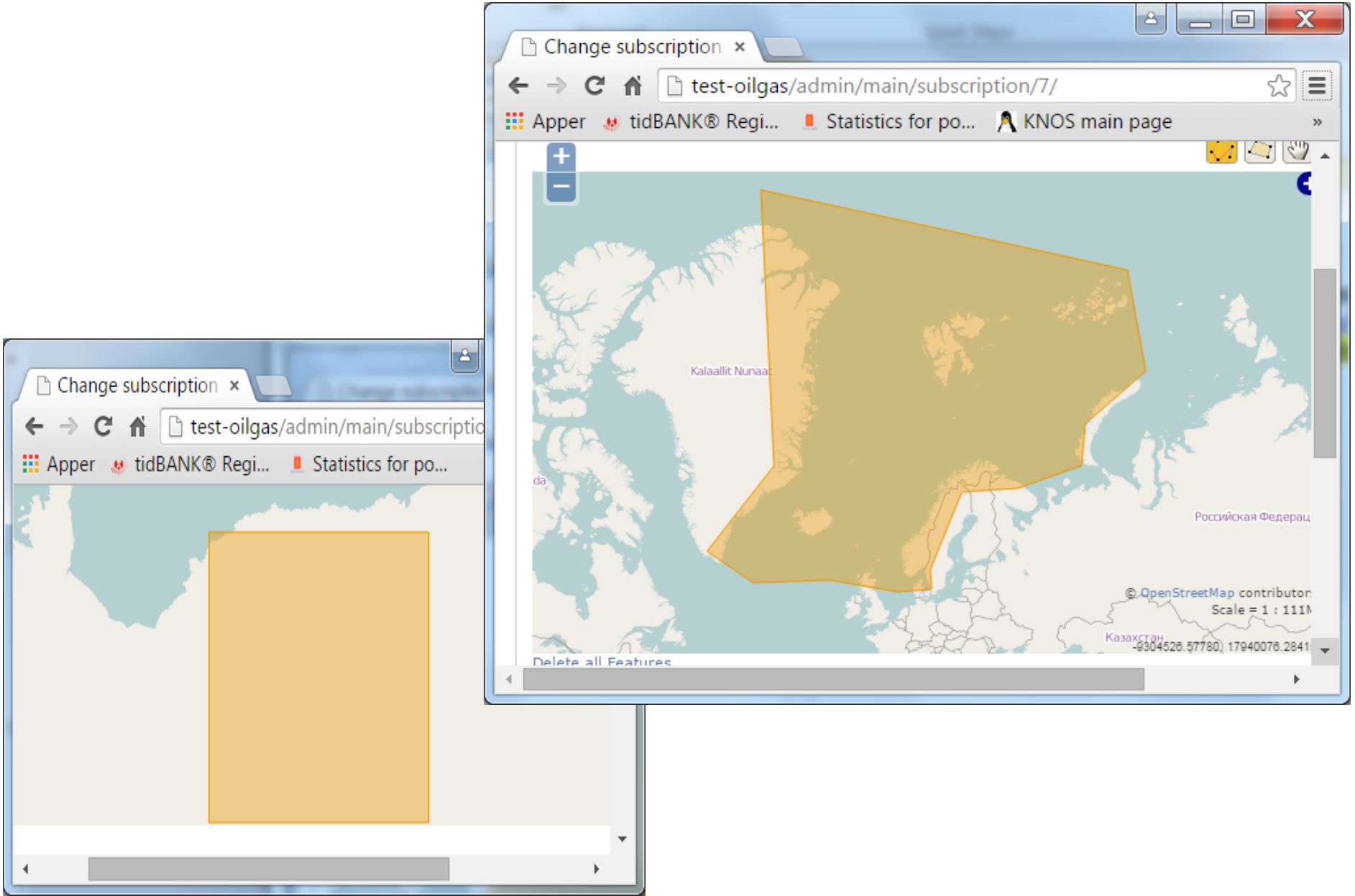
Who does what in Satellittdata.no



*Fellesprosesseringsrutiner: prosessering av data til et definert nivå
**Nedstrømstjenester: tilrettelegging av data for spesifike behov

Satellittdata.no

Current National area of interest



Classification of high-risk rockslide objects

Fast landslide in Northern Norway

- Recently classified as high-risk object
- Up to > 10 cm/yr
- 12 day sampling allows InSAR analysis

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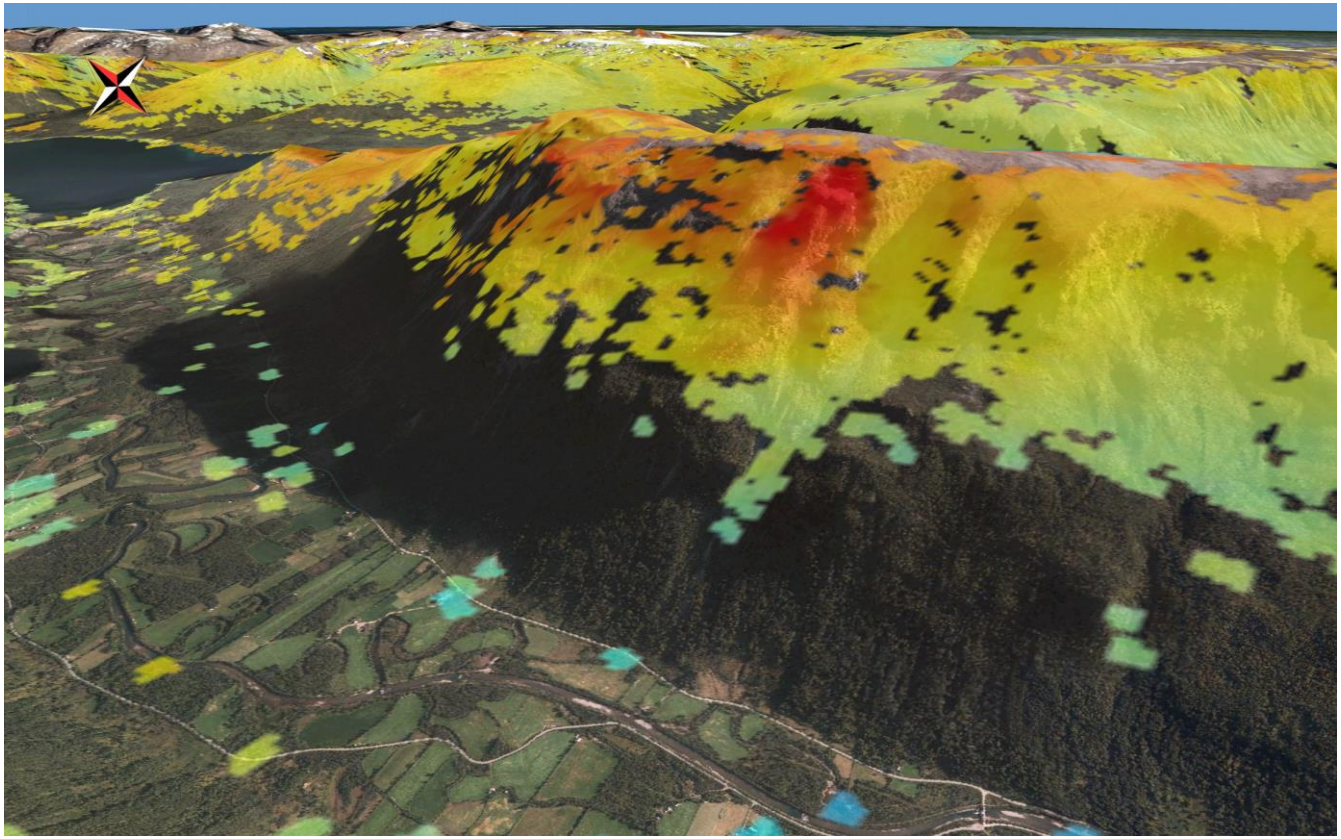
Classification of high-risk rockslide objects



Contains modified Copernicus Sentinel-1A data (2014-2016)

Sentinel-1 D-InSAR analysis

- Average displacement velocity from 30 interferograms
- Observation period, data from snow free period: Jun-Oct 2015

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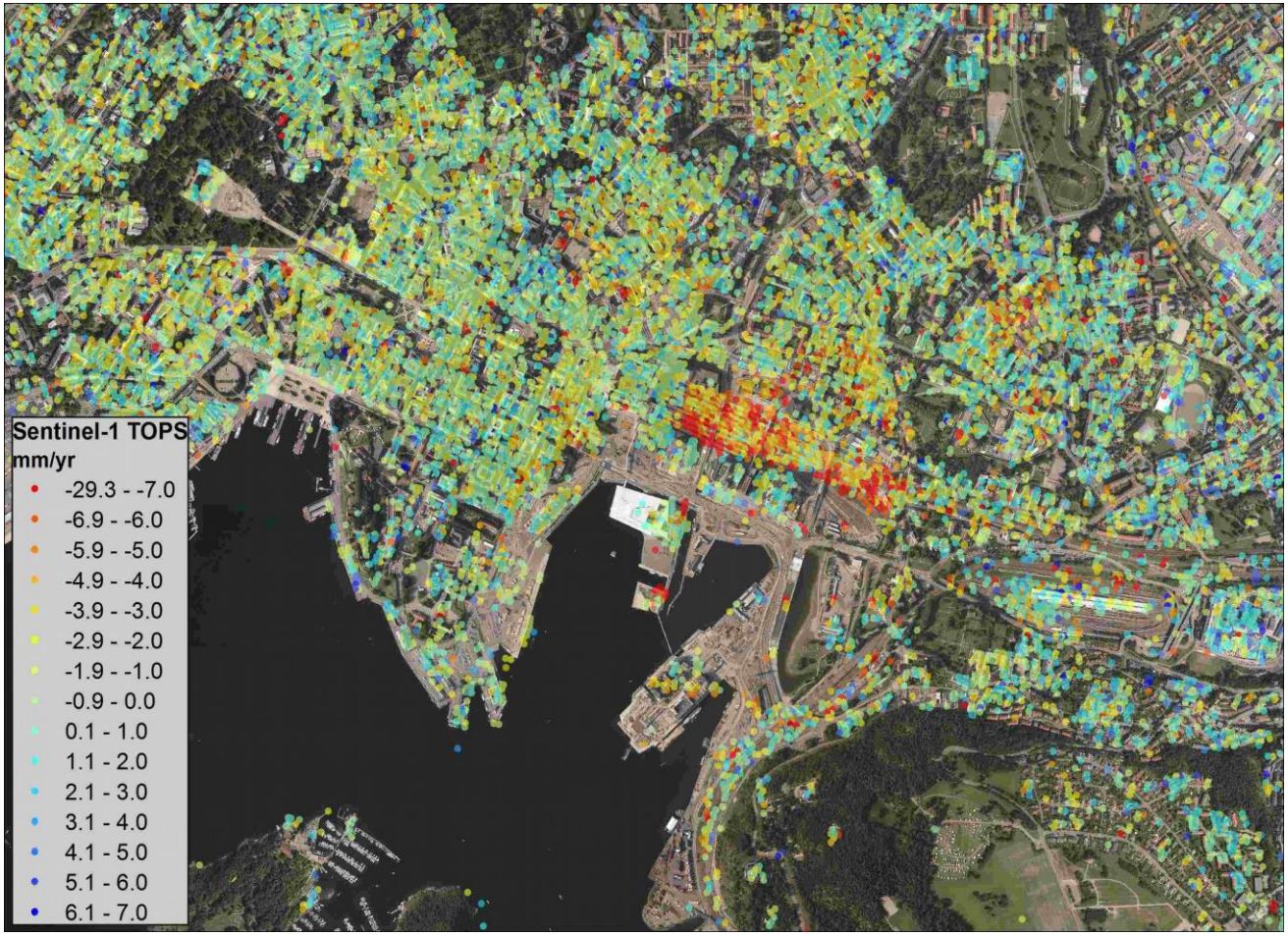
Subsidence around: Oslo Central Station



Contains modified Copernicus Sentinel-1A data (2015-2016)

Downtown Oslo

- Data and Analysis:
  - Sentinel-1 IW mode data 'PSI analysis'
- Observation period:
  - Mar 2015 – Mar 2016
- Description:
  - *Known subsidence problems in central station and around opera house*

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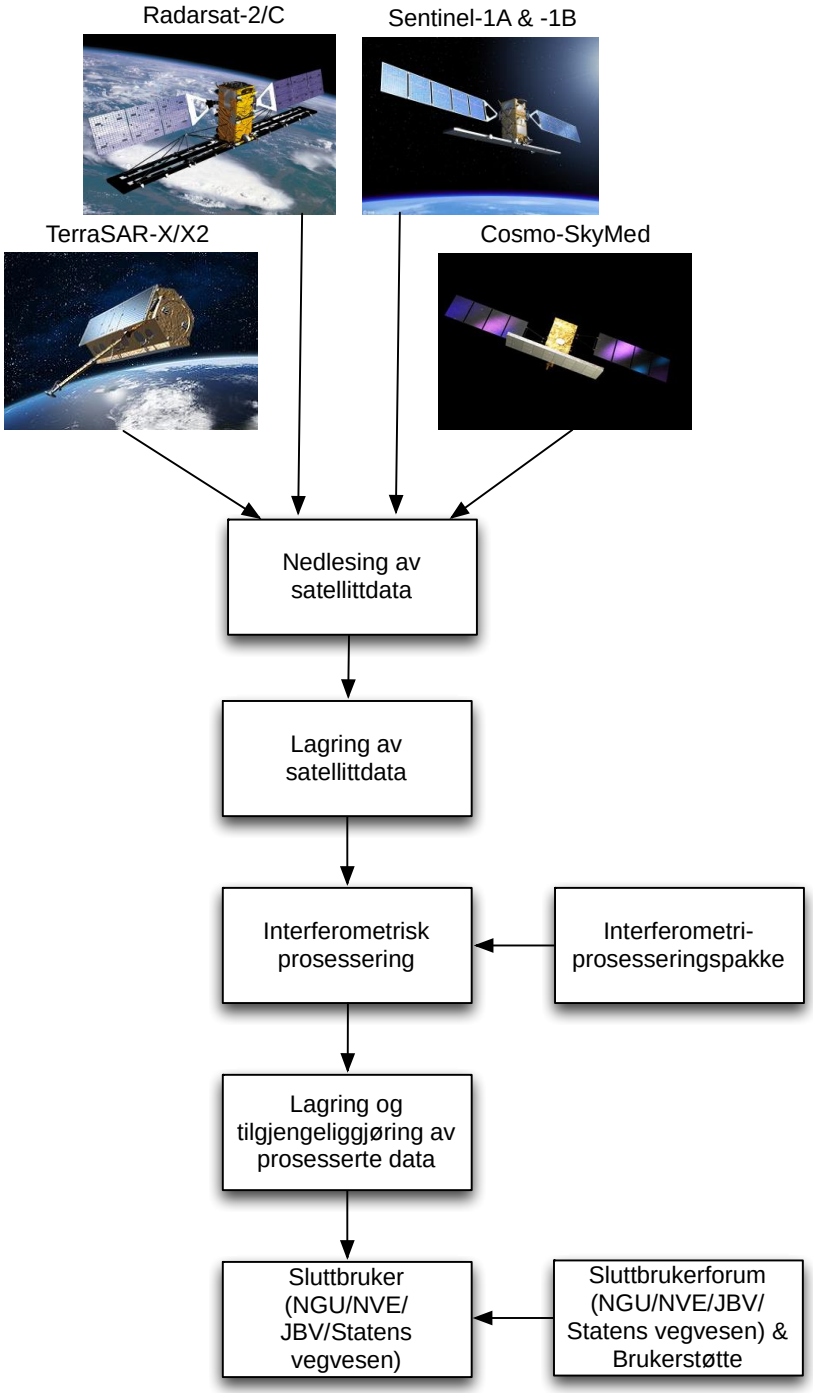
Norwegian national centre for InSAR (2016->)

- Collaboration between Norwegian Space Centre, The Geological Survey of Norway (NGU) & The Norwegian Water Resources and Energy Directorate (NVE) & subcontractors NORUT & PPO.labs
- Goal: Operational InSAR subsidence data production over Norway
- Improved accessability of InSAR results for public and commercial users
- Mapping of geohazards, rock slides & infrastructure subsidence
- Tool for creating downstream use in e.g. geotechnical, climate, big data analysis, insurance, property market, structural engineering & transport applications



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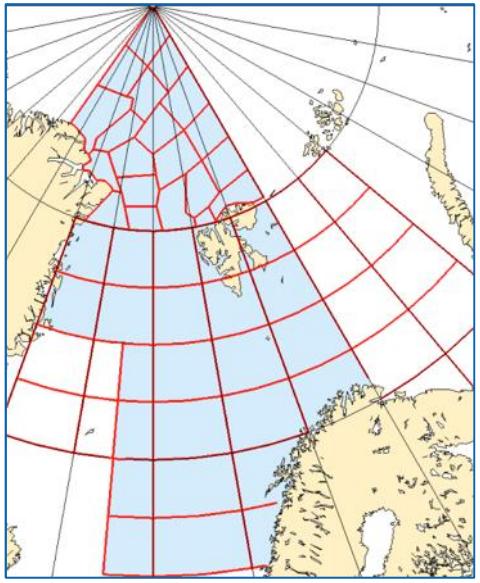
Beliggenhet, interesser og ansvar

Kartverket

MET



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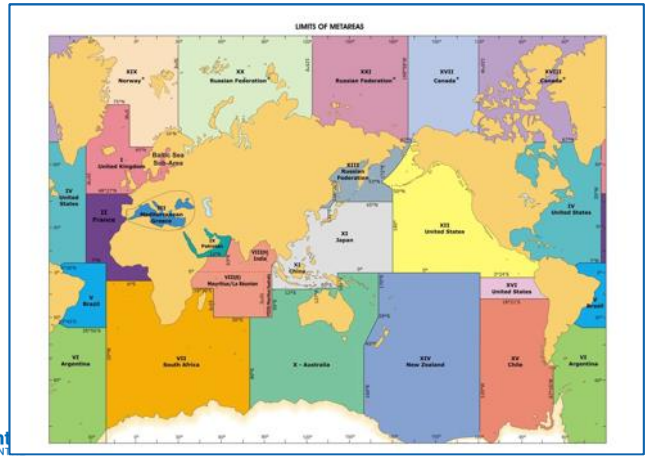

Kystverket

Regjeringen.no