The Norwegian National Ground Segment - satellitdata.no

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Outline

The Mission
The Approach
The Future
The Mission

- simplify access to Sentinel data
- ensure support for national services
- preserve data for Norwegian AOI

Credit: ESA
Why do you have two portals?
The Approach

colhub.met.no
- DHuS software suite
- GUI, OpenSearch, ODATA
- Served operational needs
- ESA CGS

satellitdata.no
- Open data space prepared for integration of non EO data like meteorology, oceanography etc.
- Metadata driven approach
- Integrating services
Transformation

OGC WPS
• Subsetting
• Reprojection
• Reformatting

Example Sentinel-2:
• Extract variables B4, view and zenith angle over predefined AOI
• Reproject from UTM 32N (Tile VKN) to Arctic Polar Stereographic (EPSG:3995)

Result
8.7Mb vs 771Mb file ready to use in favoured projection
Visualisation

Sentinel-1
- All raw polarizations
- 40x40 m pixel resolution

Sentinel-2
- All bands resampled to 10x10 m pixel resolution
- Three RGBs
Data format - from SAFE to NetCDF-4/CF

CF -> Self describing

print(str("OPeNDAP: Supported in " + "multiple programming " + "languages.")
Utilizing OPeNDAP in EO

Ex1: Decide glacier extent from S2 data in Python

- Created polygon by means of image slicing.
- Used 0.2% of all the pixels in the product.
- Analyse Ready Data/Data Cube
- Temporal aggregated product covering the same area.

Available as Jupyter Notebook through gist: http://nbviewer.jupyter.org
Gist code: d5d29f5b2d691d8ed3c4b3cd65e2009e
Ex3: When OPeNDAP is not the solution

• Generating “large domain” products
• When you are offline
• Have to apply an algorithm to all products
e.g. atmospheric correction.
Future development:

- Orthorectified Sentinel-1 products
- Sentinel-3 products in NetCDF/CF
- OpenSearch API on index metadata
- Virtual Research Environment
Primary distribution node for Sentinel 1: DHR network

- Number of users colhub.met.no: 430
- Number of users sentinelhub.met.no: DHR network: DLR, AIRBUS, ZAMG, STFC, CLS,...
- Used capacity on disk: 1.6PB -> 2.4PB 2018/2019
- Policy: 30 days global Sentinel, >30 days Norwegian area of interest
- Products: S1 GRD+GRDM KSAT, SLC, RAW, OCN; S2 A/B(DLR)/DEM; S3 ESA+ S3 L2 EUMETSAT

Sentinel 1 numbers:

- Weekly throughput S1 relayed to mirror sites: colhub.met.no/CEDA Mirror Archive ~51TiB
- Weekly S1 distribution into the DHR network: ~84TiB (DLR, AIRBUS, ZAMG, STFC)
- Weekly S1 retrieval, global satellite data: ~42TiB

Outlook: Extension of the contract with ESA: 600TiB/month; S1,S2,S3,S5p
InSAR Norway is now open!
InSAR Norway is now open!

- **Insar.ngu.no**
- 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/Risk management 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
The quality of the InSAR subsidence measurements from Sentinel-1 is outstanding! (NGU & NORUT)
Mountain on the move in Sel
(InSAR Norway – Norwegian Ground Motion)
Subsidence in Bjørvika, Oslo
(InSAR Norway – Norwegian Ground Motion Service)
Subsidence in Bjørvika, Oslo
(InSAR Norway – Norwegian Ground Motion Service)
Subsidence in Bjørvika, Oslo
(InSAR Norway – Norwegian Ground Motion Service)
Subsidence at the Austevoll marina
(InSAR Norway – Norwegian Ground Motion Service)
Subsidence at the Grilstad marina
(InSAR Norway – Norwegian Ground Motion Service)
Subsidence in Horten - Need for new sea level climate adaption (InSAR Norway – Norwegian Ground Motion Service)
Dam monitoring
(InSAR Norway – Norwegian Ground Motion Service)
Subsidence in the Tellenes titanium mining area
(InSAR Norway – Norwegian Ground Motion Service)
Facts InSAR Norway – November 2018 release

• 2 billion measurement locations with time series in Norway (320 000 km2)
• 6250 measurement locations per km2
• 240 samples per location over 4 years
• 4-8 times per 6 days (non-winter period)
• 5 M€uro investment 2016-2021
• 15 Euro per km2
• 400 measurement locations with time series over 4 years for 1 Euro
• Good return on investment due to economy of scale 😊