



Norwegian
Meteorological
Institute



Norsk Romsenter
Norwegian Space Centre

The Norwegian National Ground Segment - **satellitdata.no**

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Department of Remote Sensing and Data Management

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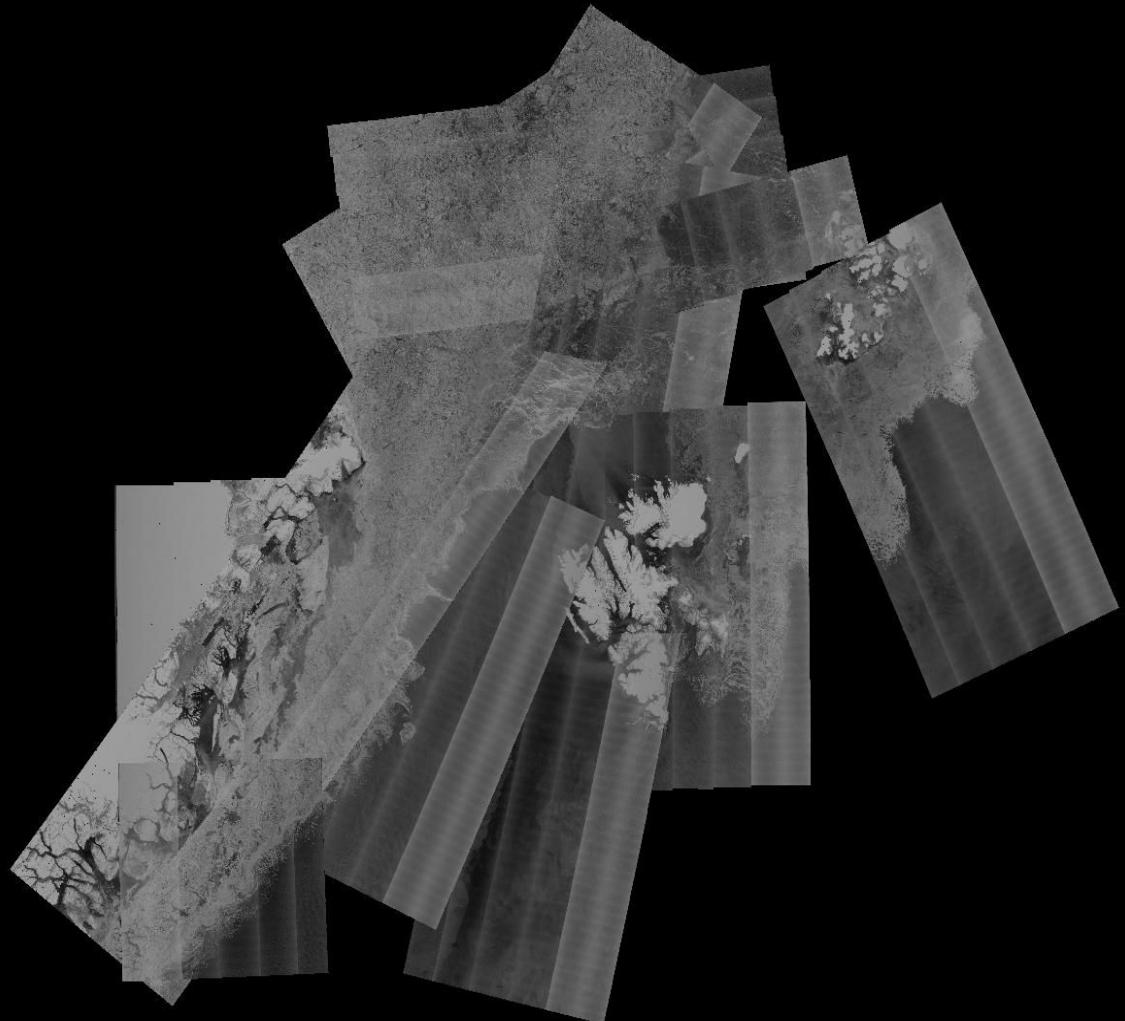
09.10.2018

Outline

The Mission

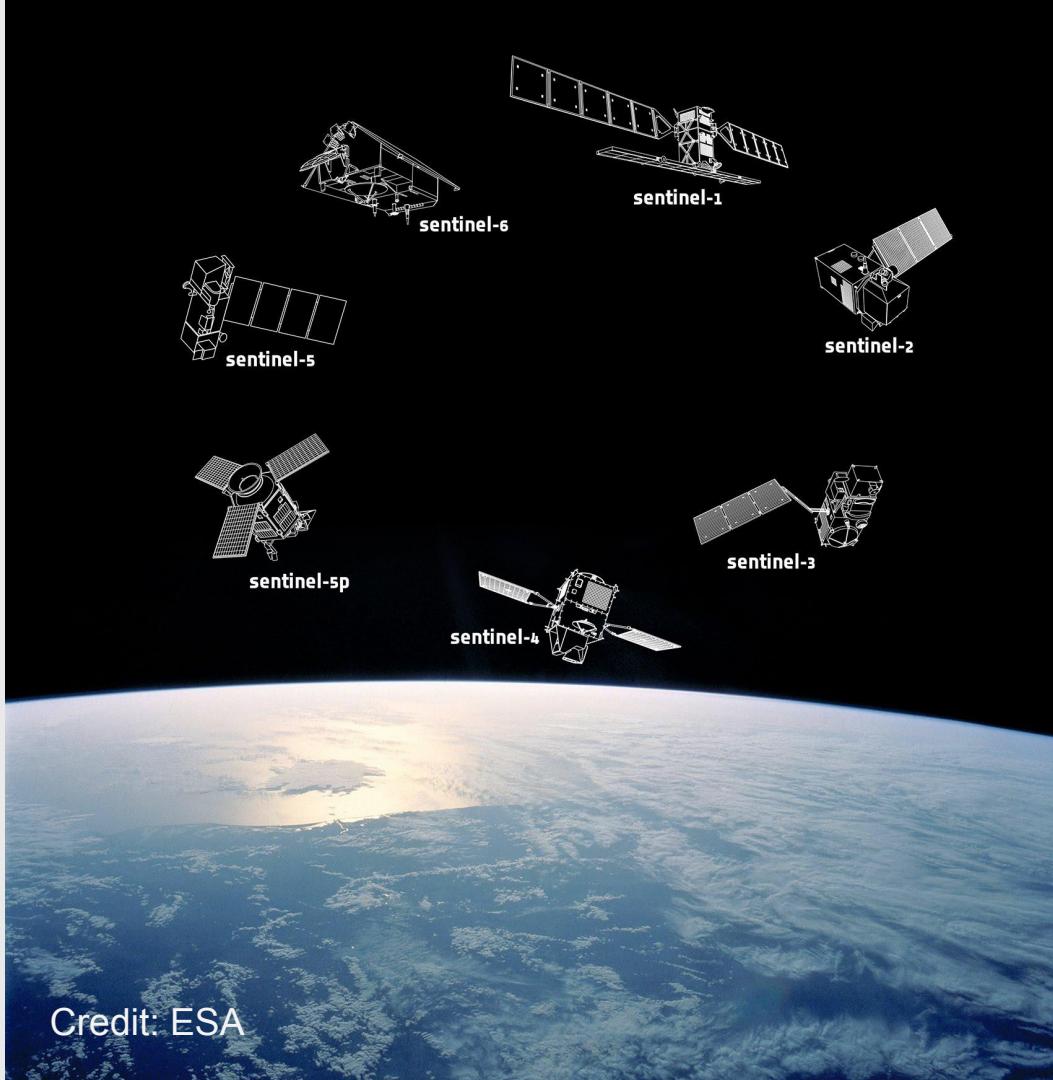
The Approach

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?

METADATA Search

Full text search

Geographical search



Data collection period

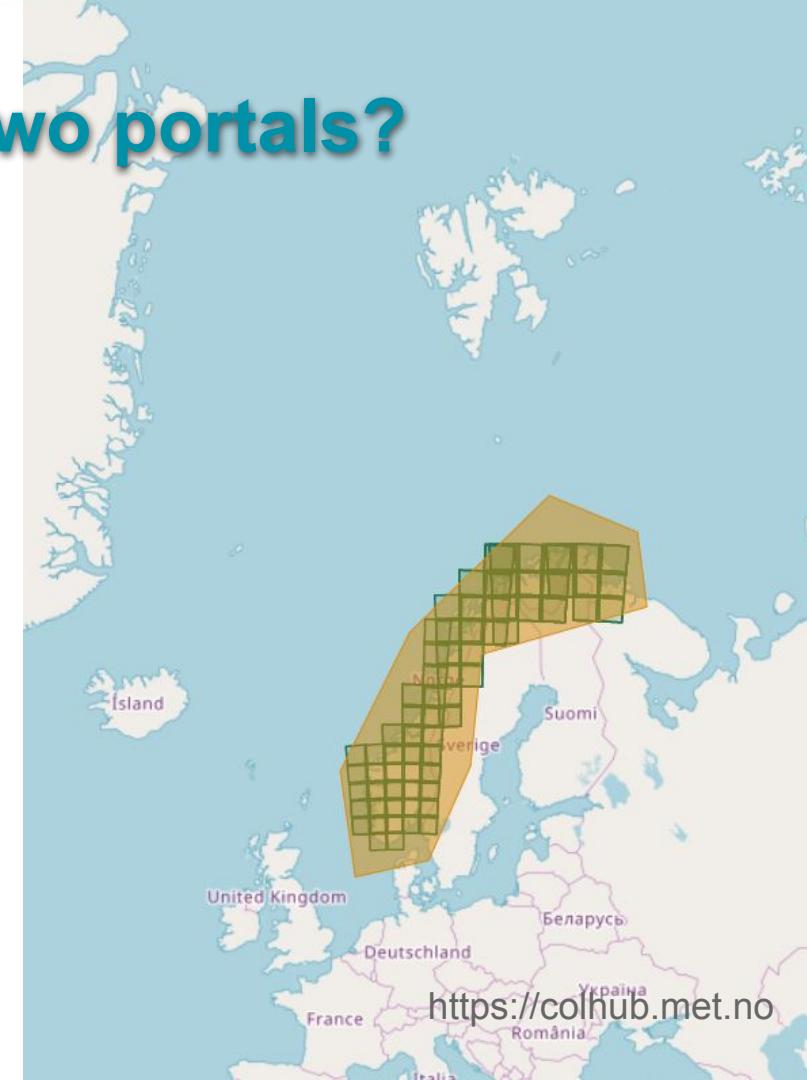
Start date
2018-05-01

End date
yyyy-mm-dd

Bounding box

Platform

Cloud cover [%] of scene



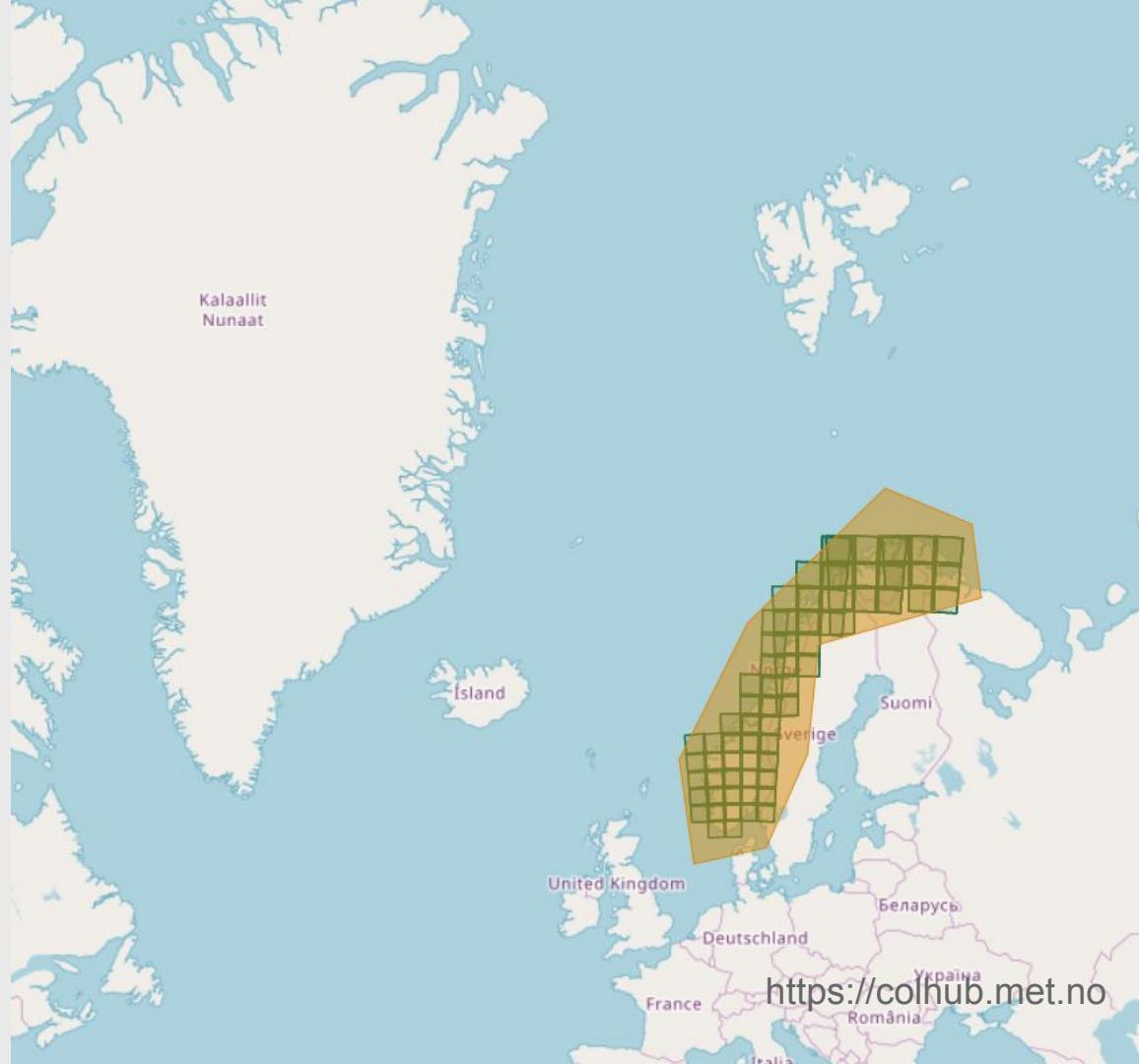
The Approach

colhub.met.no

- DHuS software suite
- GUI, OpenSearch, ODATA
- Served operational needs
- ESA CGS

satellittdata.no

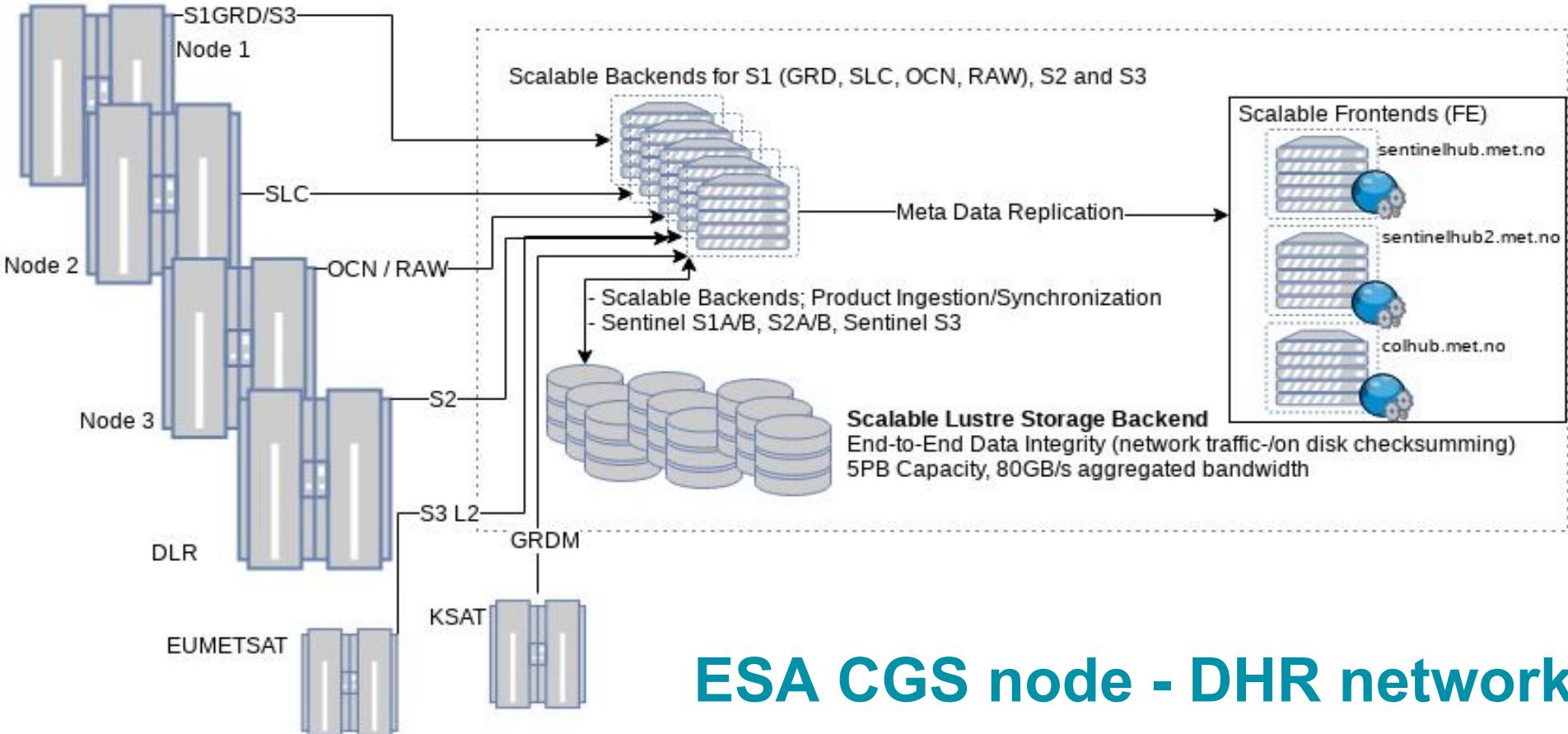
- Open data space prepared for integration of non EO data like meteorology, oceanography etc.
- Metadata driven approach
- Integrating services

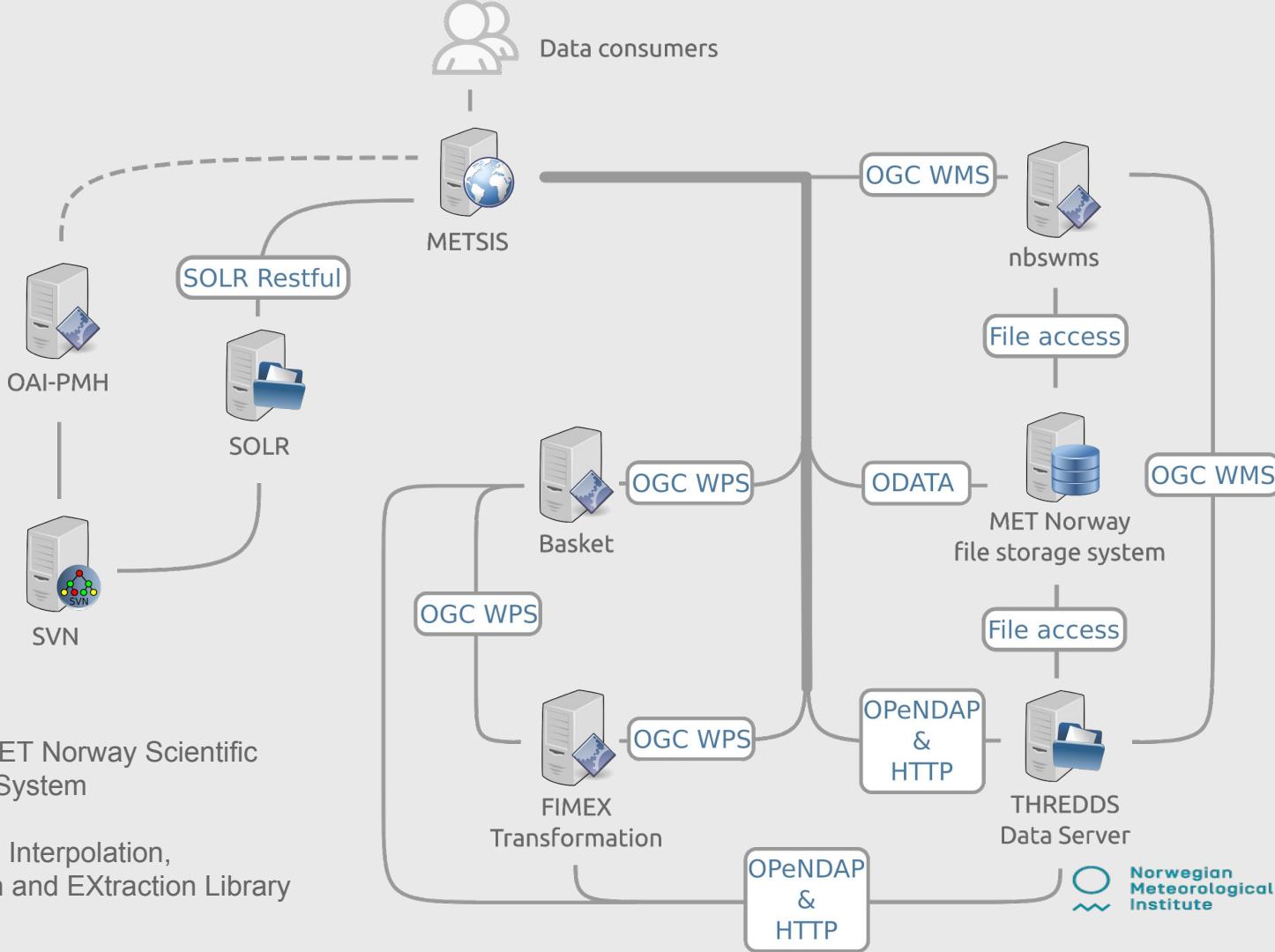


Norwegian Meteorological Institute/Post-Processing Infrastructure (PPI)

ESA Collaborative Ground Segment Node- Primary Sentinel 1 distribution node

ESA - Sentinel Distribution Nodes





Transformation

OGC WPS

- Subsetting
- Reprojection
- Reformatting

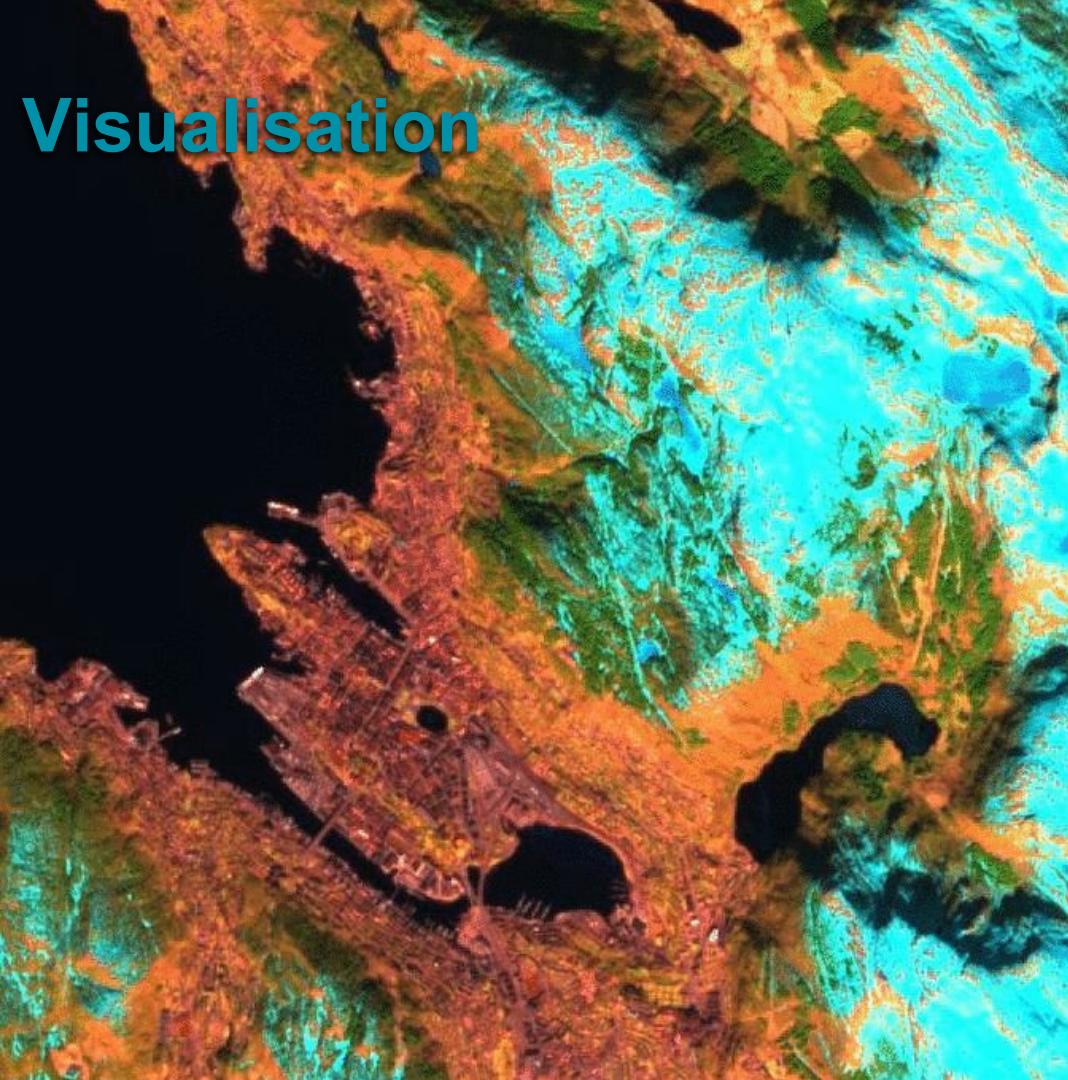
Example Sentinel-2:

- 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



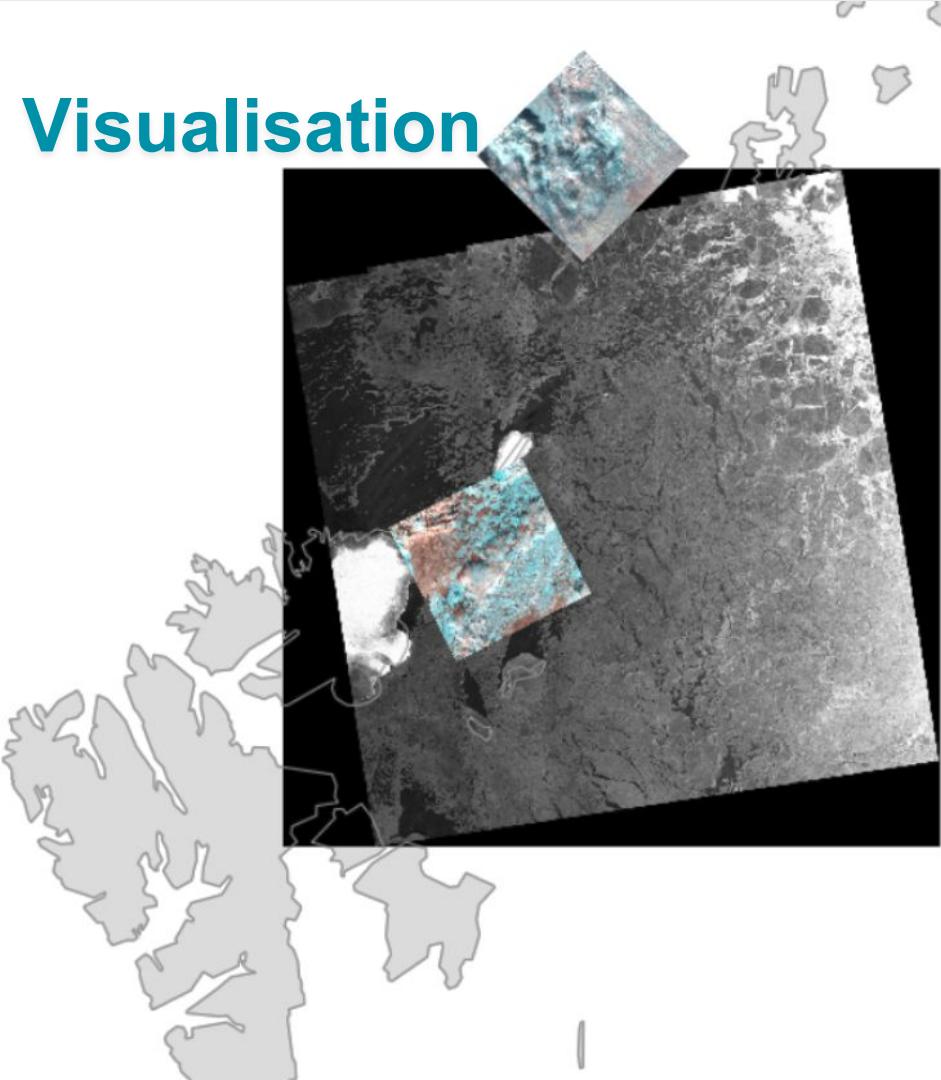
Visualisation

Sentinel-1

- All raw polarizations
- 40x40 m pixel resolution

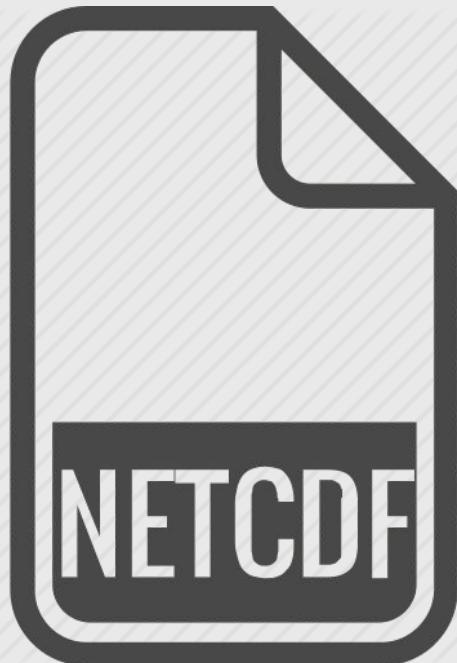
Sentinel-2

- All bands resampled to 10x10 m pixel resolution
- Three RGBs





Data format - from SAFE to NetCDF-4/CF



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

CF -> Self describing

Ex1: Utilizing OPeNDAP

Task:

Detect Folgefonna glacier in a Sentinel-2 product and decide the glacier extent.

Tools:

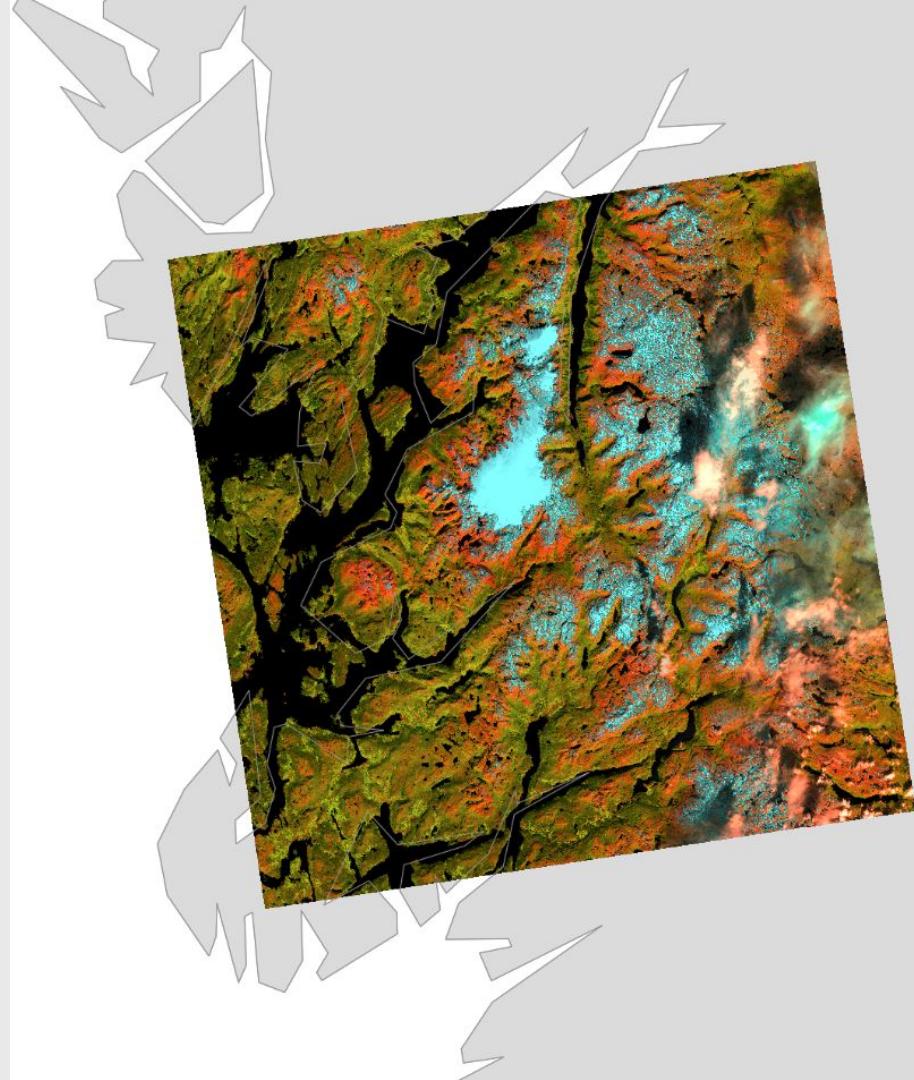
Sentinel-2A OPeNDAP stream from TDS
Python with GIS libraries (gdal, cartopy,
geopandas, shapely, etc.)

Available as Jupyter Notebook through gist:

<http://nbviewer.jupyter.org>

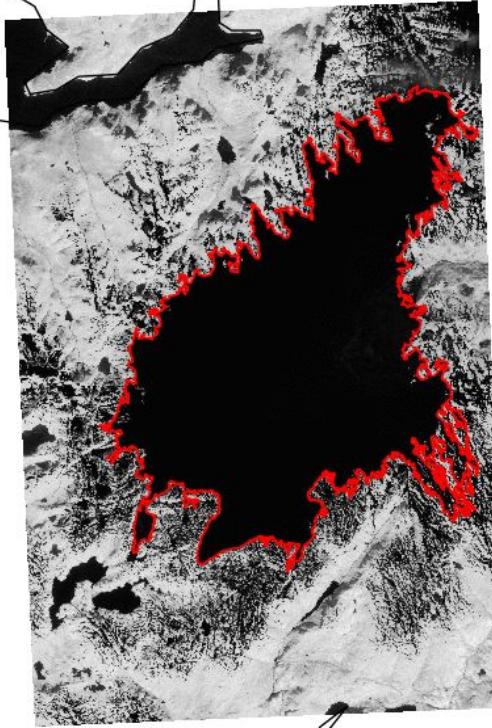
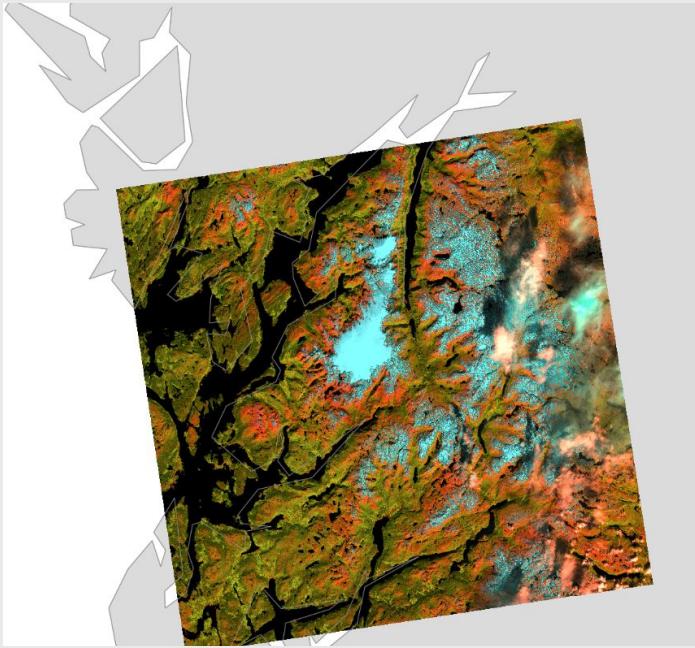
Gist code:

[d5d29f5b2d691d8ed3c4b3cd65e2009e](https://gist.github.com/rdmccarthy/d5d29f5b2d691d8ed3c4b3cd65e2009e)



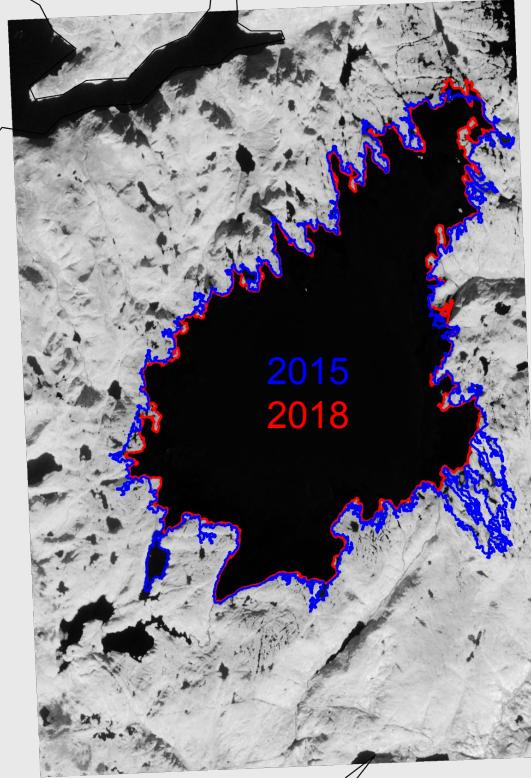
Ex1: Utilizing OPeNDAP

- Created polygon by means of image slicing.
- Used 0.2% of all the pixels in the product.



Ex1: Utilizing OPeNDAP

- Created polygon by means of image slicing.
- Used 0.2% of all the pixels in the product.
- Could be applied to temporal aggregated product covering the same area.



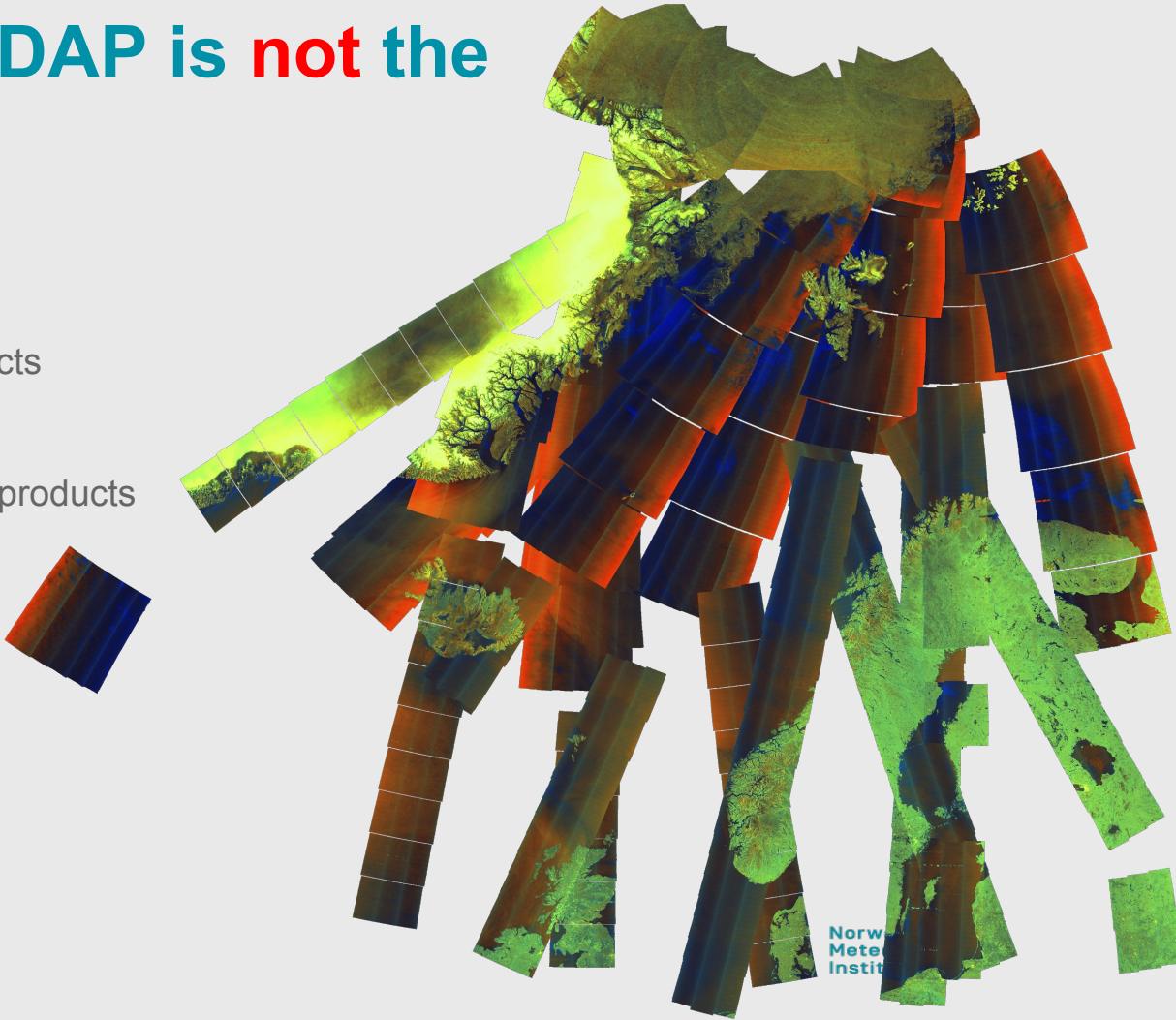
2015-08-12



Ex2:

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.



Some numbers

colhub.met.no ~ 1.6 PB

Sentinel-1: 600 000 (RAW, SLC, GRD, OCN)

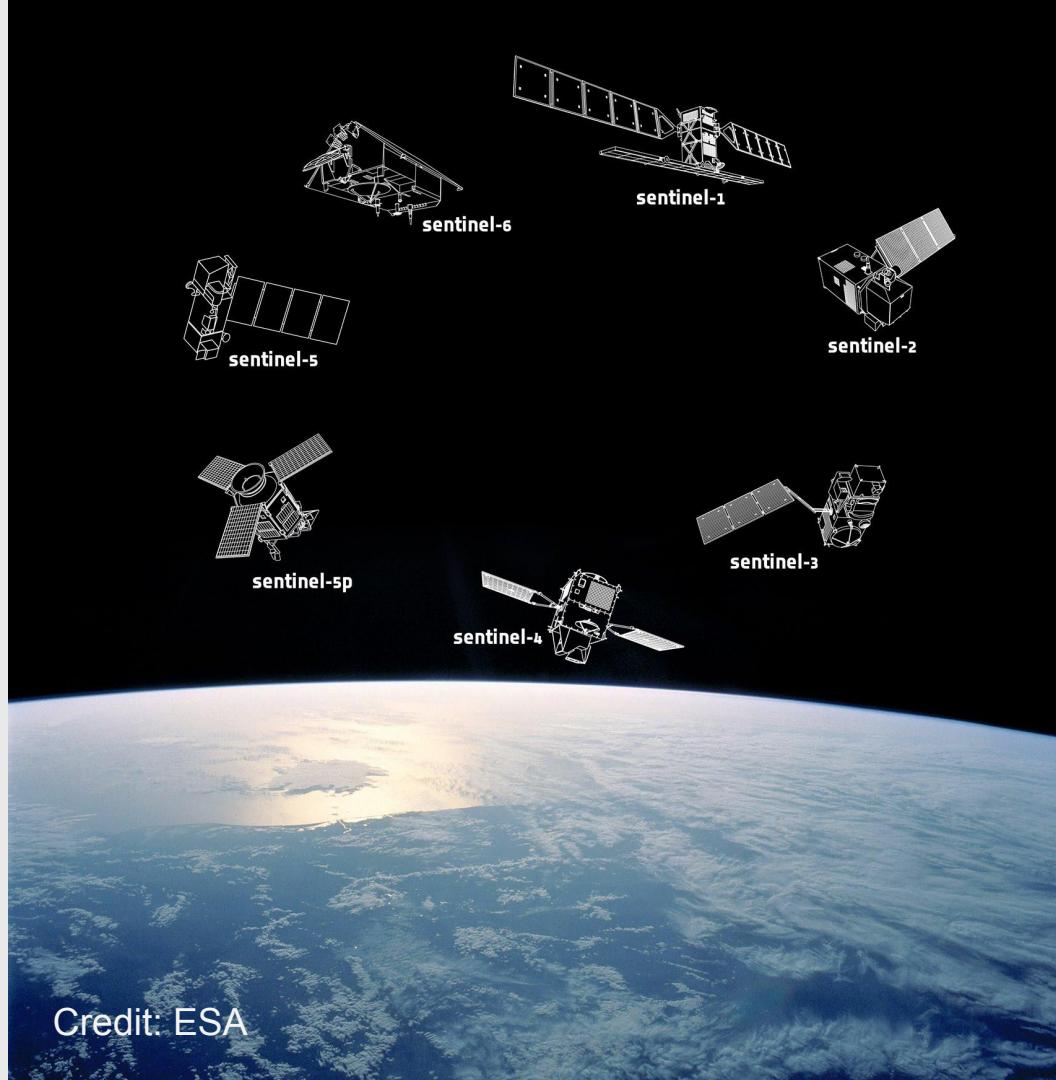
Sentinel-2: 440 000 (L1C, L2A) (18 000)

Sentinel-3: 110 000 (...)

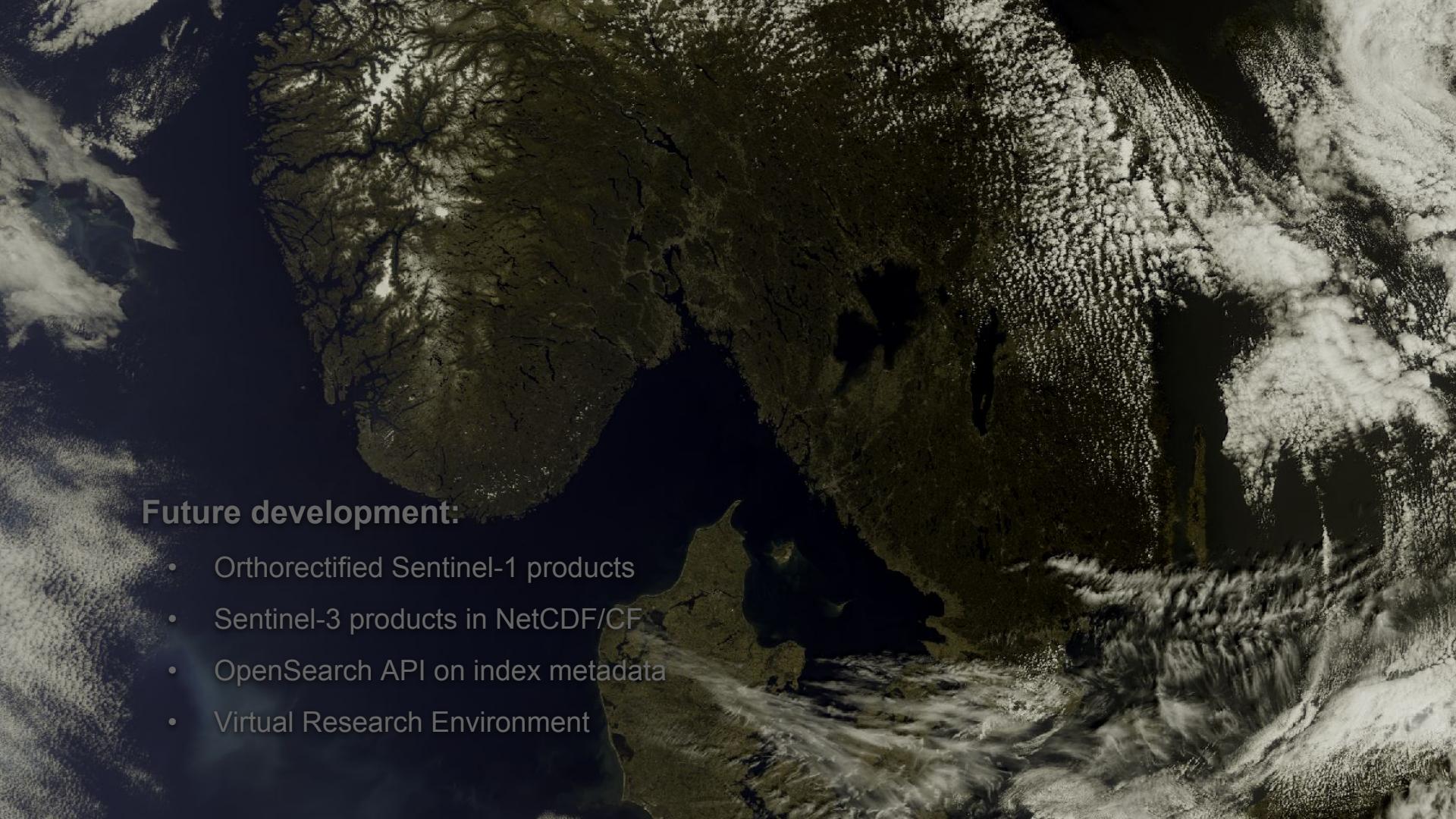
satellitdata.no ~ 130 TB

Sentinel-1: 2000 (GRD)

Sentinel-2: 170 000 (L1C)



Credit: ESA

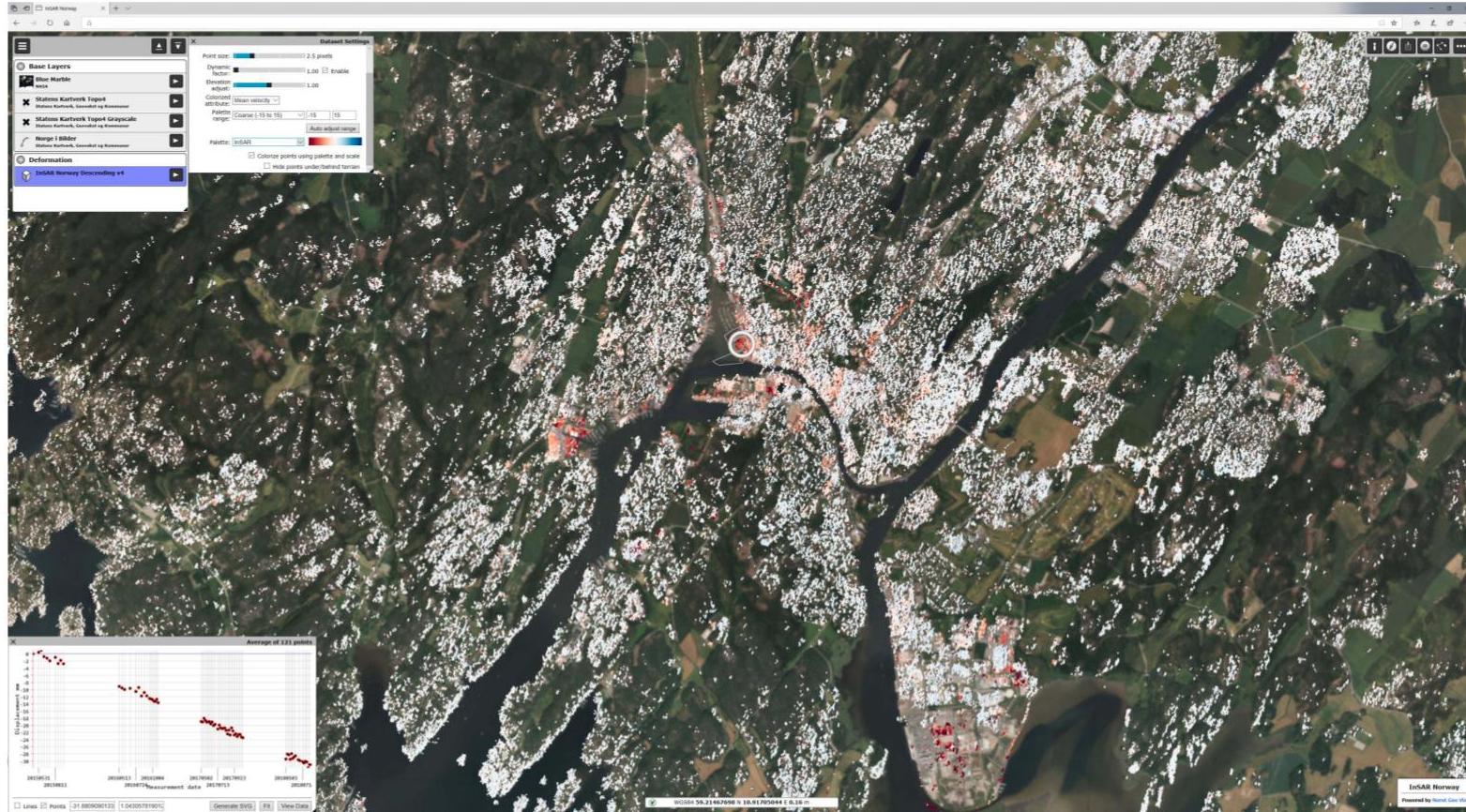
The background of the slide is a detailed satellite photograph of the Earth's surface. It shows various landmasses in dark green and brown tones, with intricate patterns of rivers and lakes. Overlaid on the land are numerous white, puffy clouds. The oceans are depicted in deep black, with lighter shades indicating different water depths or types. In the lower right corner, there are distinct features of a large storm system, with swirling white and grey clouds.

Future development:

- Orthorectified Sentinel-1 products
- Sentinel-3 products in NetCDF/CF
- OpenSearch API on index metadata
- Virtual Research Environment

Lansering av InSAR Norge 29. & 30. november

3 milliarder målepunkter med tidsserier over Norge (NGU, NVE, NRS, NORUT, PPO Labs)





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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
- Policy: 30 days global Sentinel, >30 days Norwegian area of interest
- Products: S1 GRD+GRDM KSAT, SLC, RAW, OCN; S2 A/B/DEM; S3 ESA+ S3 L2 EUMETSAT

Sentinel 1 numbers:

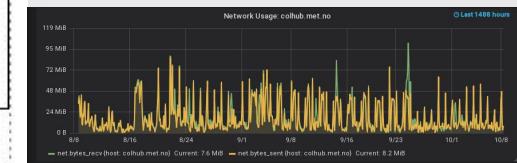
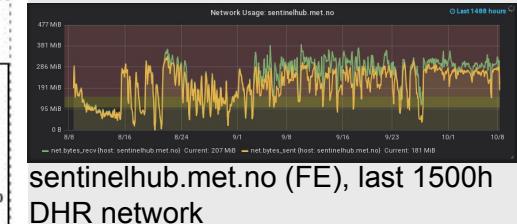
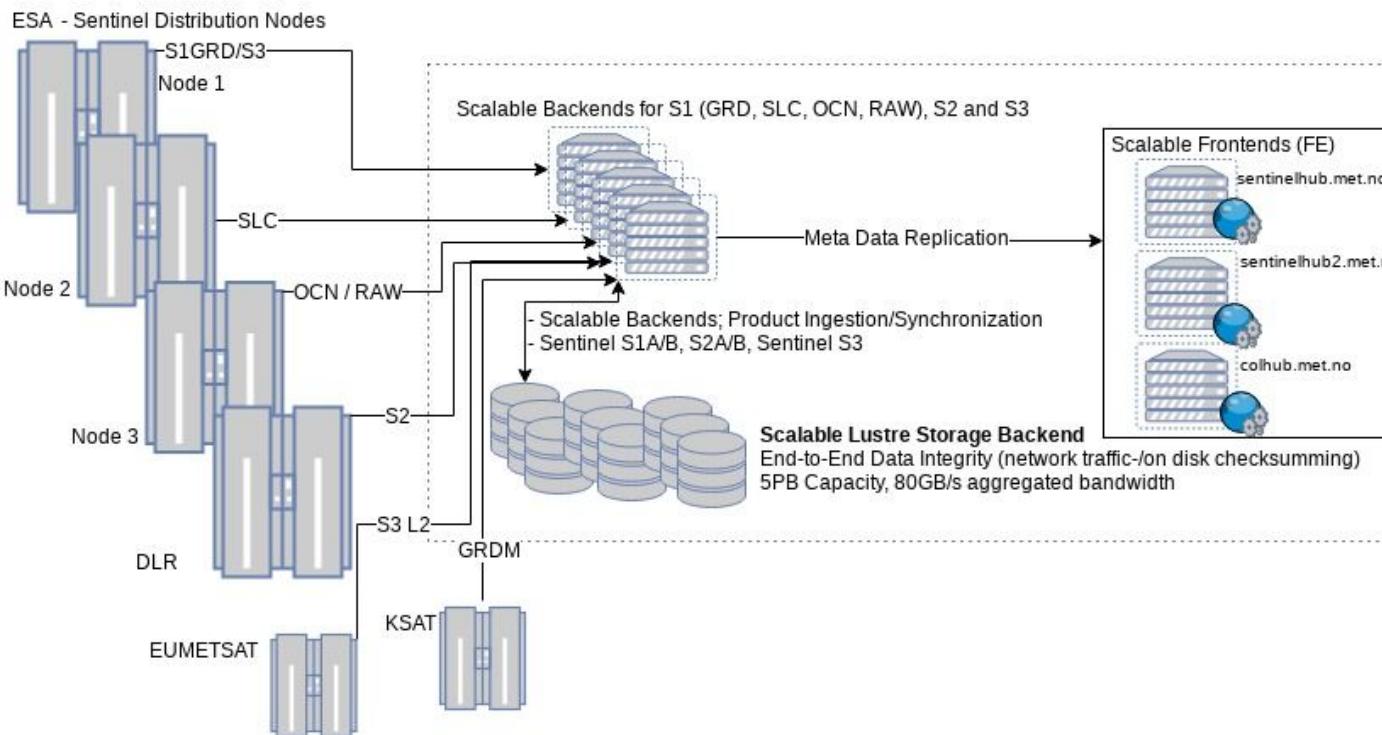
- Weekly throughput S1 relayed to mirror sites: colhub.met.no/CEDA Mirror Archive ~51TB
- Weekly S1 distribution into the DHR network: ~84TB (DLR, AIRBUS, ZAMG, STFC)
- Weekly S1 retrieval, global satellite data: ~35TB

Outlook: Extension of the contract with ESA: 600TB/month; S1,S2,S3,S5p

Primary distribution node for Sentinel 1: DHR network

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National Mirror Site
(<https://www.satellitdata.no/>)