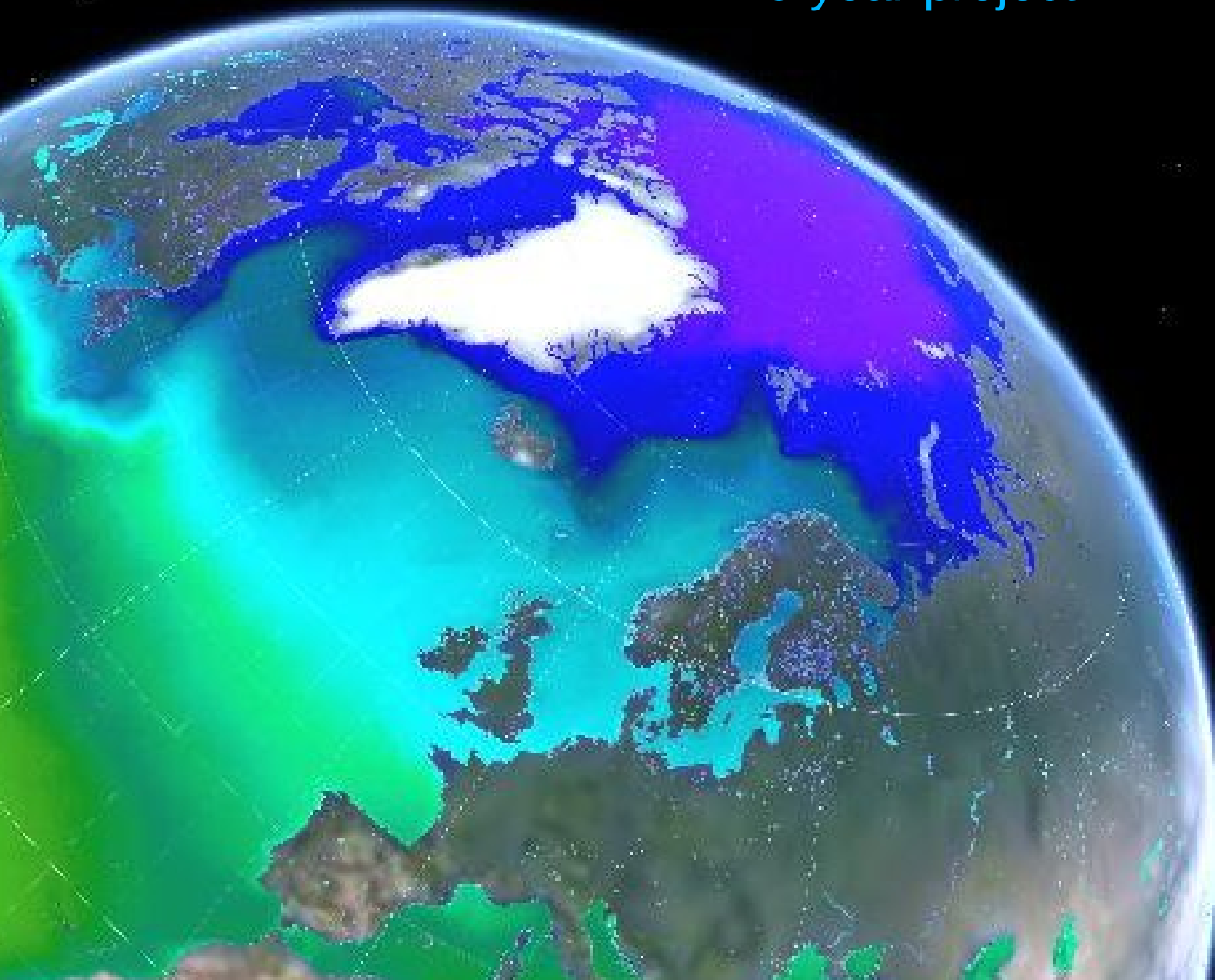


NORMAP

**Norwegian Satellite Earth Observation
Database for Marine and Polar Research**

'Infrastructure programme' of Norwegian Research Council
6-year project



Meteorologisk
institutt



KONGSBERG



Objectives



- * to create and maintain a data repository (including metadata) of the high latitude and Arctic based on Earth Observation data from polar orbiting satellites to facilitate and stimulate high quality and original multidisciplinary Earth System research, application and education in marine, polar and climate sciences.*
- * Open and free access to all users
- * The scientific community is the target group, not general public or policy makers
- * Area will focus on Northeast Atlantic to Arctic Ocean including coastal seas



Applications



Applications of Satellite Earth Observation Data

- Process studies
- Climate Studies
- Validation of numerical models
- Assimilation into numerical models
- Management
- Operational decisions
- Risk assessment
- Education



Challenges



Challenge to Use Earth Observation Data

- Lack of information about available products
- Large data volume
- Multiple processing level
- Complicated interpretation of satellite signal
- Geo-location
- Comparison of different satellite products
- Alignment of satellite data with other data types



Howto?

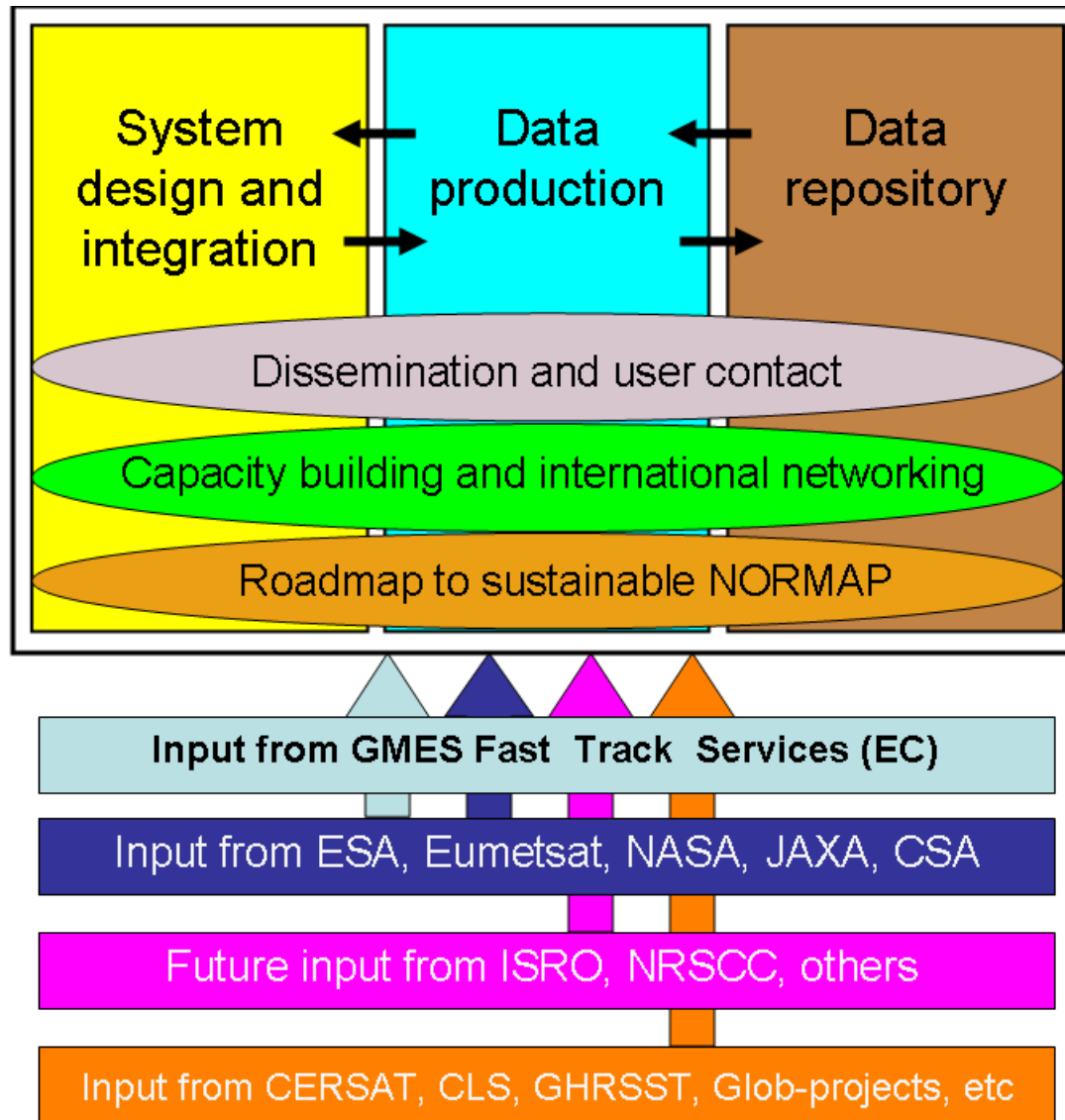


Main challenges for ordinary users

- To find relevant products
- To understand the relevant products
- To be able to utilize relevant products in research



NORMAP Concept



Data Processing Levels



LEVEL 0

Raw data as received from the satellite. Unprocessed data in full resolution, delivered in records (no projection) with all information required for further analysis connected.

LEVEL 1

Gridded data in satellite projection. Data may be radiometrically and geometrically corrected. Data can be represented as physical values, e.g. brightness temperature or TOA radiance.

LEVEL 2

Data is interpreted as geophysical variables such as concentration of ice or wave height or sea surface temperature. Data is still in satellite projection.

LEVEL 3

Data contains geophysical variables transformed into a map projection and usually averaged over time too.

LEVEL 4

Model output or results from analyses of lower-level data e.g., variables derived from multiple satellite measurements.



Data Sources

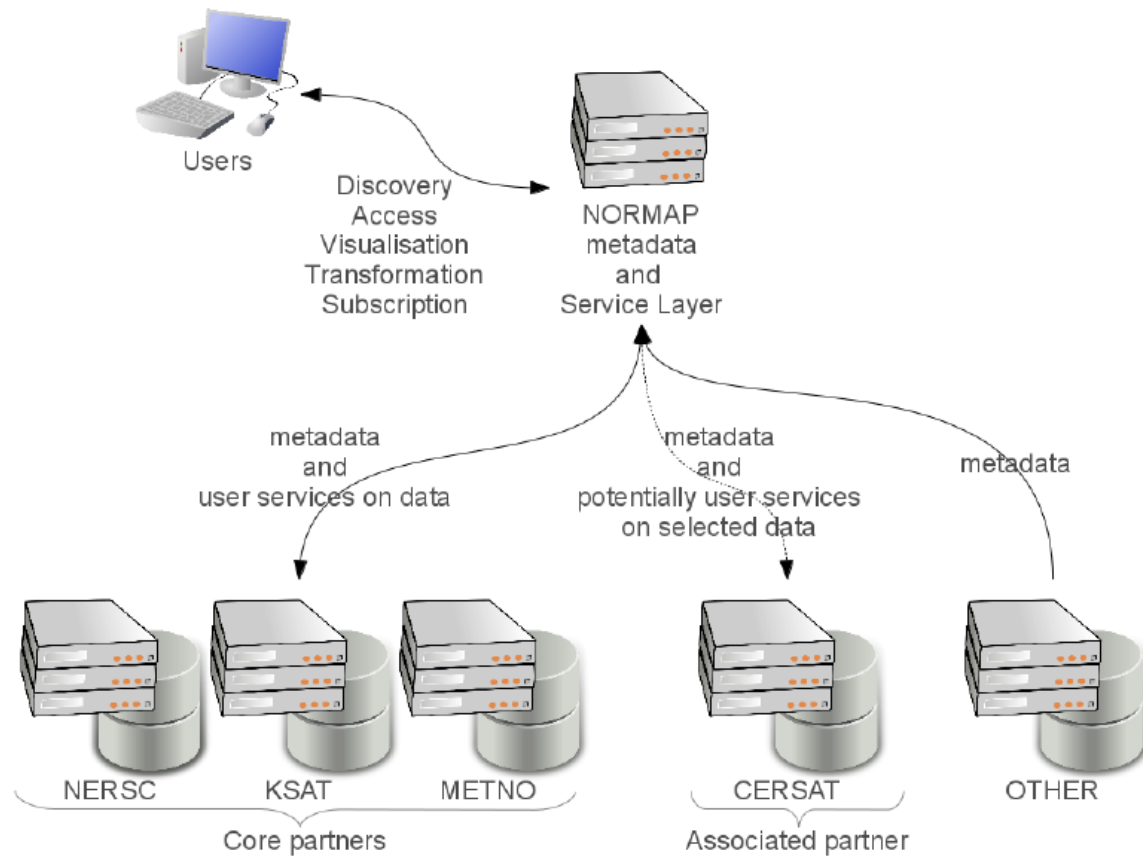


Where Earth observation data can be found

- Level **0** and Level **1** data generally is located in archives of satellite owners
- Level **2** and Level **3** is found in archives of satellite owners and in independent data warehouse
- Level **4** data is found in archives of scientific institutes
- Linking of directories is rarely done
- Often there are limitations in accessing data
- Data usually requires some basic preparation before they are useful in analyzing



Distributed repository



- NORMAP system design document completed September 2011
- Interaction with selected users started Fall 2013
- First data release 1st quarter 2014



NORMAP products



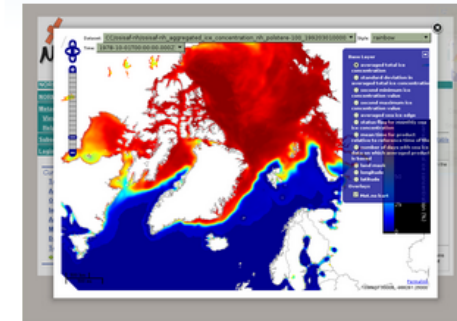
Variables	Data sources and sensor types	Derived information products	Available servers and databases
Sea level*	Altimetry	High latitude and Arctic Ocean regional sea level trends	Salto/DUACS, MyOcean Sea Level TAC, ESA Sea Level CCI
Current	Altimetry for geostrophic current	Heat and volume transports	NERSC SAR Archive
Ocean color*	Imaging spectrometers	Primary production of particulate organic/inorganic carbon, and its influence on CO2 fluxes, water quality	NERSC HAB and SARIS MyOcean Color TAC GlobColor, KSAT (MODIS)
Sea ice drift	Passive and active microwaves	Transport across straights. Contribution to freshwater	NERSC, KSAT met.no OSI-SAF, CERSAT, ESA CCI
Sea ice extent, concentration, and type	Passive and active microwaves,	Regional high latitude sea ice climatology, impact on albedo	NERSC, KSAT met.no OSI-SAF, GlobIce MyOcean Sea Ice/Wind TAC, ESA CCI
Sea ice thickness*	Radar and laser altimetry	Sea ice freeboard and thickness	ESA CCI
Surface wind speeds and direction	Passive microwaves, scatterometer, SAR and optical (cloud winds)	Wind climatology, storm tracks, Polar lows, surface stress, curl	CERSAT, OSI-SAF NERSC SAR Archive (coastal winds), KSAT
Ocean waves	Altimeter, SAR	Wave climatology	CERSAT, GlobWave
Sea surface temperature*	Passive microwaves, IR,	High latitude and Arctic SST fields in consistence with sea ice extent and heat fluxes	CERSAT, GHRSSST, Medspriration met.no OSI-SAF MyOcean SST TAC
Water vapor	Microwave radiometer	Column integral	EUMETSAT CM_SAF NOAA-NESDIS
Clouds	IR and VIS	Cloud cover, Cloud top temperature and dynamics	EUMETSAT CM_SAF NOAA-NESDIS, KSAT
Radiative fluxes	Infrared radiometers	Bulk formula for latent and sensible heat flux,	met.no OSI SAF EUMETSAT CM_SAF
Precipitation over the ocean	Microwave radiometer	Rain rate	NOAA-NESDIS



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Thank you!

