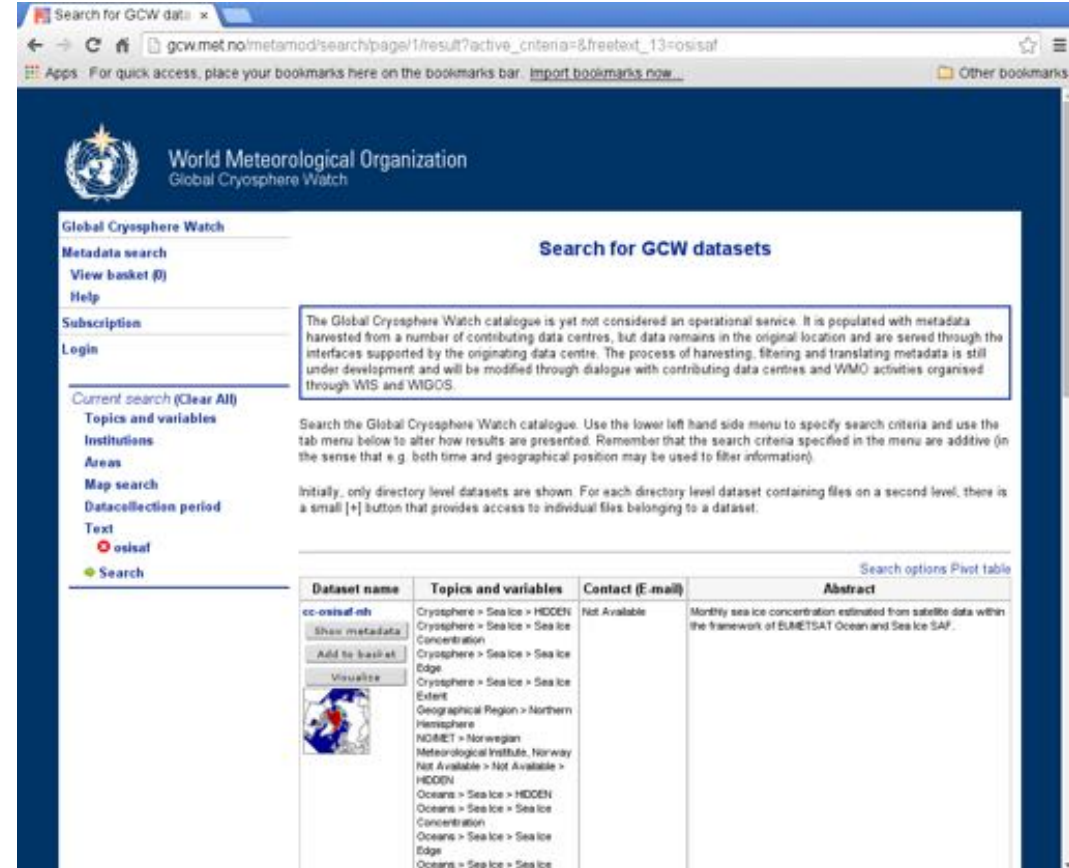


# The GCW Data Portal

Øystein Godøy, Lara Ferrighi, Joel Fiddes

# Purpose

- To provide an overview of the datasets that are relevant for GCW
- To provide access to datasets
  - Real time data streams
  - Archive access
- Distributed Data Management
  - Metadata driven
  - Not hosting data
- To connect GCW with
  - WMO Information System
  - WIGOS



The screenshot shows the 'Search for GCW datasets' page on the GCW website. The page includes a search bar, navigation links, and a search results table. A text box explains that the catalogue is not an operational service and is populated with metadata harvested from various data centres.

**Search for GCW datasets**

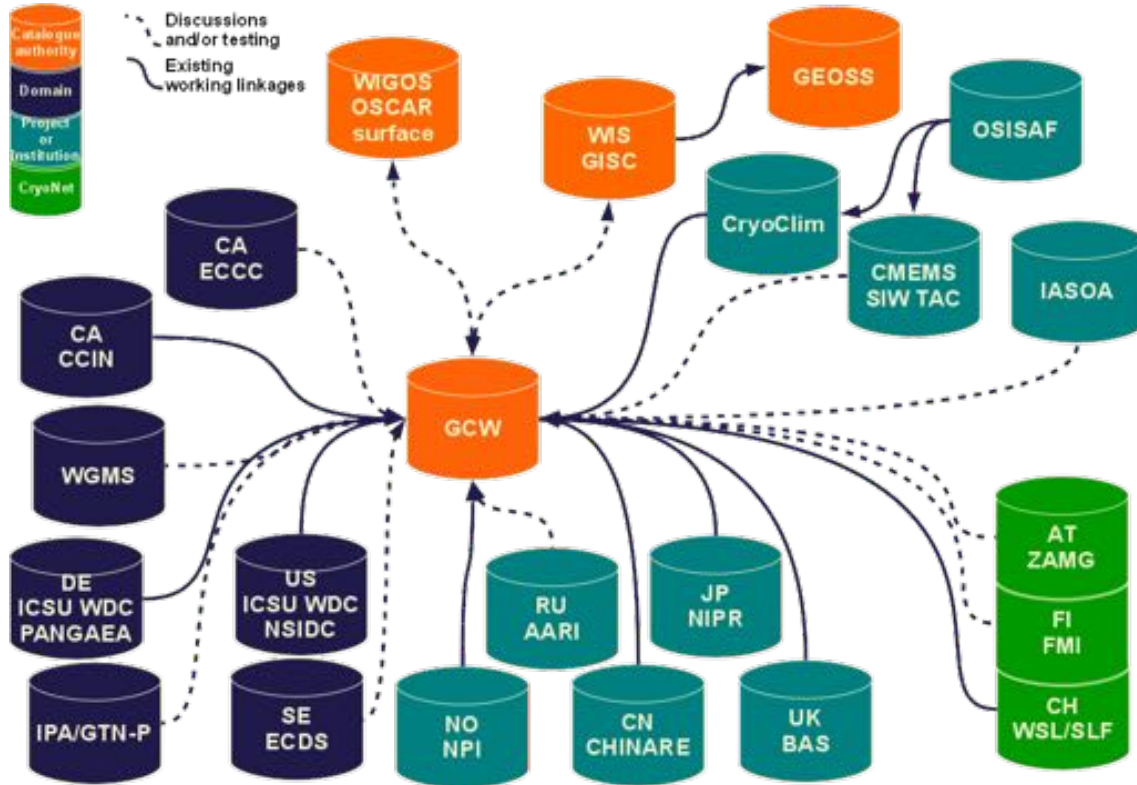
The Global Cryosphere Watch catalogue is yet not considered an operational service. It is populated with metadata harvested from a number of contributing data centres, but data remains in the original location and are served through the interfaces supported by the originating data centre. The process of harvesting, filtering and translating metadata is still under development and will be modified through dialogue with contributing data centres and WMO activities organised through WIS and WIGOS.

Search the Global Cryosphere Watch catalogue. Use the lower left hand side menu to specify search criteria and use the tab menu below to alter how results are presented. Remember that the search criteria specified in the menu are additive (in the sense that e.g. both time and geographical position may be used to filter information).

Initially, only directory level datasets are shown. For each directory level dataset containing files on a second level, there is a small [+]  
button that provides access to individual files belonging to a dataset.

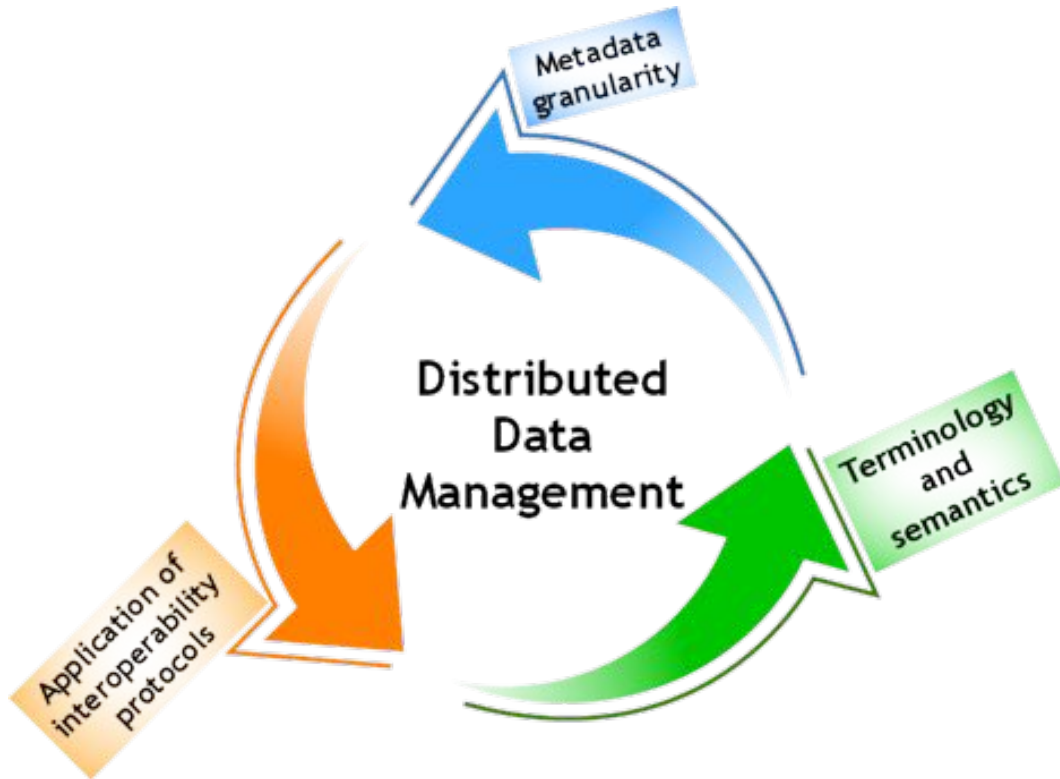
Dataset name	Topics and variables	Contact (E-mail)	Abstract
cc-osisaf nh [Show metadata] [Add to basket] [Visualize]	Cryosphere > Sea Ice > HCCEN Cryosphere > Sea Ice > Sea Ice Concentration Cryosphere > Sea Ice > Sea Ice Edge Cryosphere > Sea Ice > Sea Ice Extent Geographical Region > Northern Hemisphere NMIBET > Norwegian Meteorological Institute, Norway Not Available > Not Available > HCCEN Oceans > Sea Ice > HCCEN Oceans > Sea Ice > Sea Ice Concentration Oceans > Sea Ice > Sea Ice Edge Oceans > Sea Ice > Sea Ice	Not Available	Monthly sea ice concentration estimated from satellite data within the framework of EUMETSAT Ocean and Sea Ice SAF.

# Heterogeneous community



- National Meteorological and Hydrological Services
- Universities
- Independent research institutions
  - Successful interoperability development with Slf-Davos
- Varying degree of interoperability for
  - metadata
  - data
  - Mutual benefit of standardisation
  - Not necessarily the same objective

# Challenges (2)



- Interoperability

- Metadata

- Protocols (✓)
    - Structures (✓)
    - Semantics/terminology (-)

- Data

- Protocols (✓)
    - Formats (-)
    - Semantics/terminology (-)
    - Common data model (-)

# Types of metadata

- Discovery metadata
  - **who** measured, simulated or analysed **what**, **where**, and **when** as well as **conditions for reuse** and **access mechanisms** for the data
  - to enable users to find appropriate data for the task
- Use metadata
  - **identification of the variables/parameters** generated, **units of variables/parameters**, how **missing values** are encoded, definition of **grid and map projections** for gridded data, **methodology applied in space or time** to achieve the values in a dataset etc
  - to enable users to properly understand the data found

# Being a WMO activity commits

- WMO Information System (WIS)
  - ISO19115 WMO Profile
  - Describing
    - something that
    - can be accessed
    - under certain conditions
    - and responsibilities
  - Used for finding data
- WMO Integrated Global Observing System (WIGOS) metadata
  - OGC Observations and Measurements
    - Metadata structure under development
  - Describing
    - the temporal evolution of
      - instrumentation,
      - procedures,
      - processing,
      - local conditions etc
    - that are needed to fully understand the data found
  - Used for interpretation of data

#	Category	Description
1	Observed variable	Specifies the basic characteristics of the observed variable and the resulting datasets.
2	Purpose of observation	Specifies the main application area(s) of the observation and the observing programme(s) and networks the observation is affiliated to.
3	Station/platform	Specifies the environmental monitoring facility, including fixed station, moving equipment or remote sensing platform, at which the observation is made.
4	Environment	Describes the geographical environment within which the observation is made. It also provides an unstructured element for additional meta-information that is considered relevant for adequate use of the data and that is not captured anywhere else in this standard.
5	Instruments and methods of observation	Specifies the method of observation and describes characteristics of the instrument(s) used to make the observation. If multiple instruments are used to generate the observation, then this category should be repeated.
6	Sampling	Specifies how sampling and/or analysis are used to derive the reported observation or how a specimen is collected.
7	Data processing and reporting	Specifies how raw data are transferred into the observed variable and reported to the users.
8	Data quality	Specifies the data quality and traceability of the observation.
9	Ownership and data policy	Specifies who is responsible for the observation and owns it.
10	Contact	Specifies where information about the observation or dataset can be obtained.

# WIGOS vocabularies

2	Code table 1-02 - measurement units	1
3	Code table 1-01 - Observed variable - measurand	6
4	Code table 2-01 – application areas	9
5	Code table 2-02 – Programme/Network affiliation	9
6	Code table 3-04 - Station/platform (Observing facility) type (simplified) [WMO, 2013a]	9
7	Code table 3-08 – Data communication method	10
8	Code table 3-09 - Station operating status	10
9	Code table 4-02 - Surface cover classification scheme	11
10	Code table 5-01 – Source of observation	11
11	Code table 5-02 - Measurement/observing method	12
12	Code table 5-04 – Instrument Operating Status	21
13	Code table 5-08-01 - control standard type	21
14	Code table 5-08-02 - control location	21
15	Code table 5-08-03 - Instrument control result	22
16	Code table 5-14 - Status of observation	22
17	Code table 5-15 - Exposure of instrument	22
18	Code table 6-03 - Sampling strategy	22
19	Code table 7-07 – Data format	23
20	Code table 8-04 – Quality Flag System	26

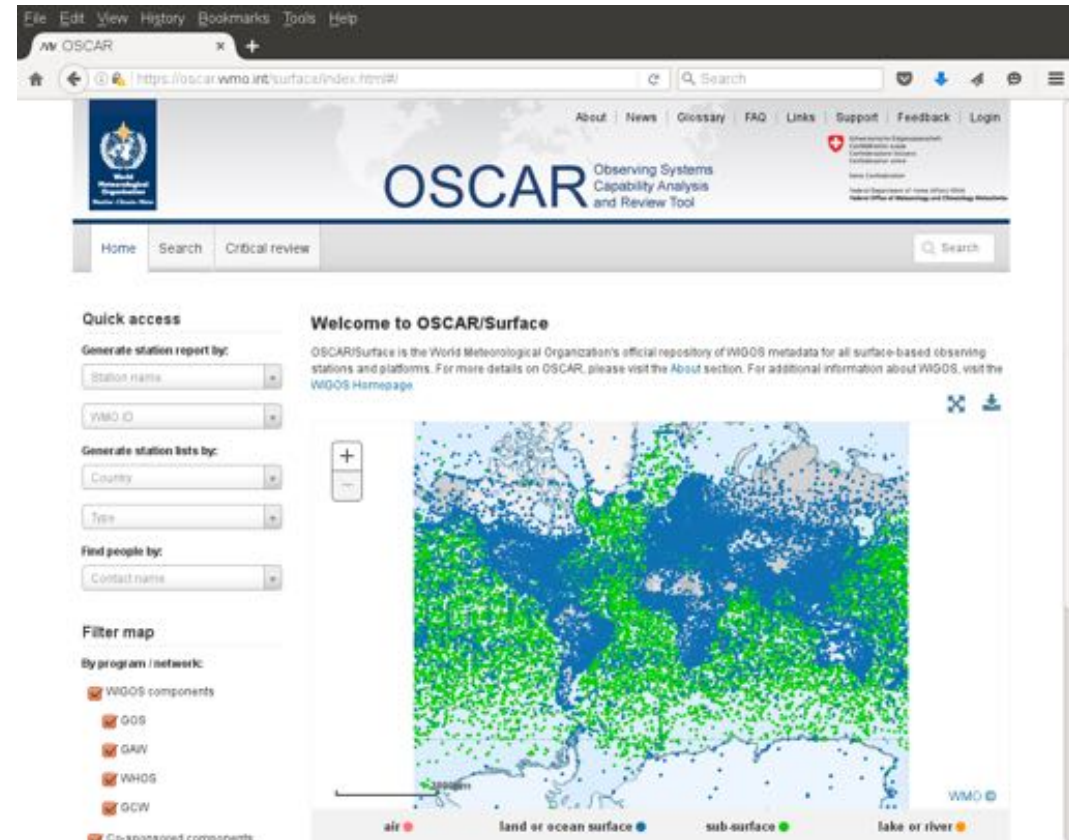


# GCW Data Management Status (1)

- Dedicated effort with WSL/SLF in Davos
  - Software for metadata interoperability developed in Davos
  - Solution integrated with RDBMS
  - To be released in support of other CryoNet stations
  - Basis for development of interoperability guidelines
- WIS Metadata
  - Supported by the GCW Data Portal
  - Consumes FGDC, GCMD DIF or ISO19115 through OAI-PMH or OGC CSW
- WIGOS Metadata
  - Currently not supported by the GCW Portal
    - Testing lightweight integration through the new portal solution
    - But editor, version controlled repository functionality and OAI-PMH for exchange is available and configurable for WMDS
  - Exploring ways to integrate GCW

# GCW Data Management Status (2)

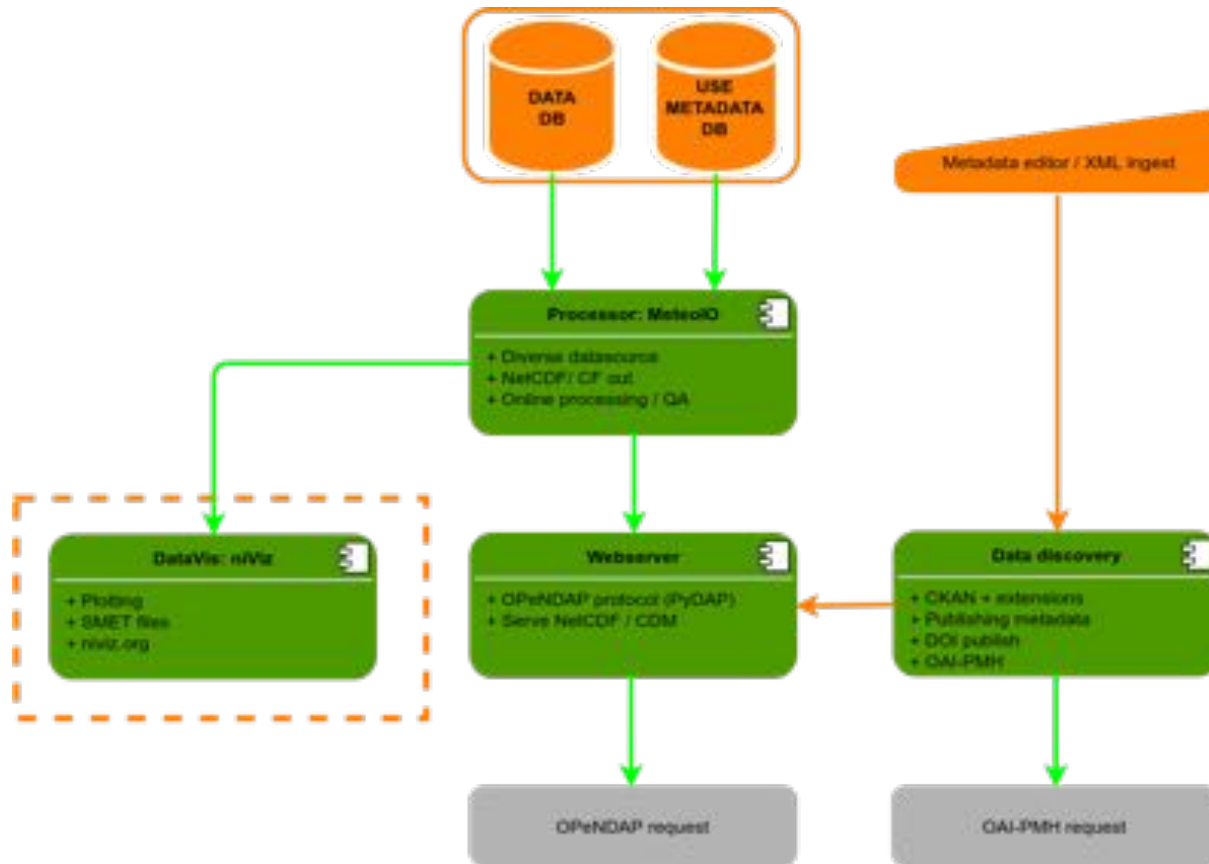
- Requirements for WIS/WIGOS interaction
  - Participated discussing WMDS (TT-WMD)
  - Testing transformation of CryoNet information to WDMS XML
  - Discussions on exchanging information
  - Need to review vocabularies
  - How to create a cost efficient system/approach

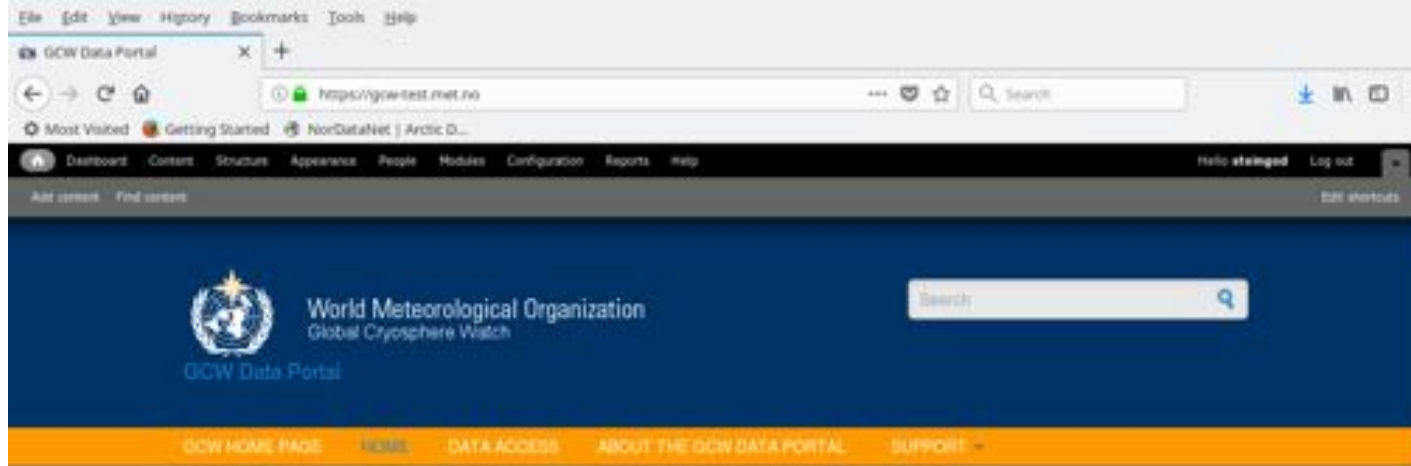


# GCW Data Management Status (3)

- Automatic filtering of harvested records
  - Where no dedicated “cryosphere” or “GCW” sets
  - Filters on keywords related to cryosphere
    - Depends on semantic framework
    - Challenges on controlled vocabularies
- Manually supervised ingestion of harvested metadata
  - A simple framework for semantic translations is available
- Metadata are exposed through OAI-PMH
  - GCMD DIF and ISO19115
  - WMO validation in place, being tested
- Documents
  - Interoperability guidelines
    - Modified following discussions with a number of research stations
    - Need to limit the number of interface standards
    - Reuse external services where possible
    - Data exchange
      - NetCDF/CF and OpeNDAP where possible
  - Operations manual

# GCW WSL/SLF software stack





### Under development

LAST UPDATED: JANUARY 4, 2016

The old GCW Data Portal is available at <http://gcw.met.no>. This portal is still under development and active content management has yet not started. The Global Cryosphere Watch catalogue is yet not considered an operational service. It is populated with metadata harvested from a number of contributing data centres, but data remains in the original location and are served through the interfaces supported by the originating data centre.

[Read more](#)

[Add new comment](#)

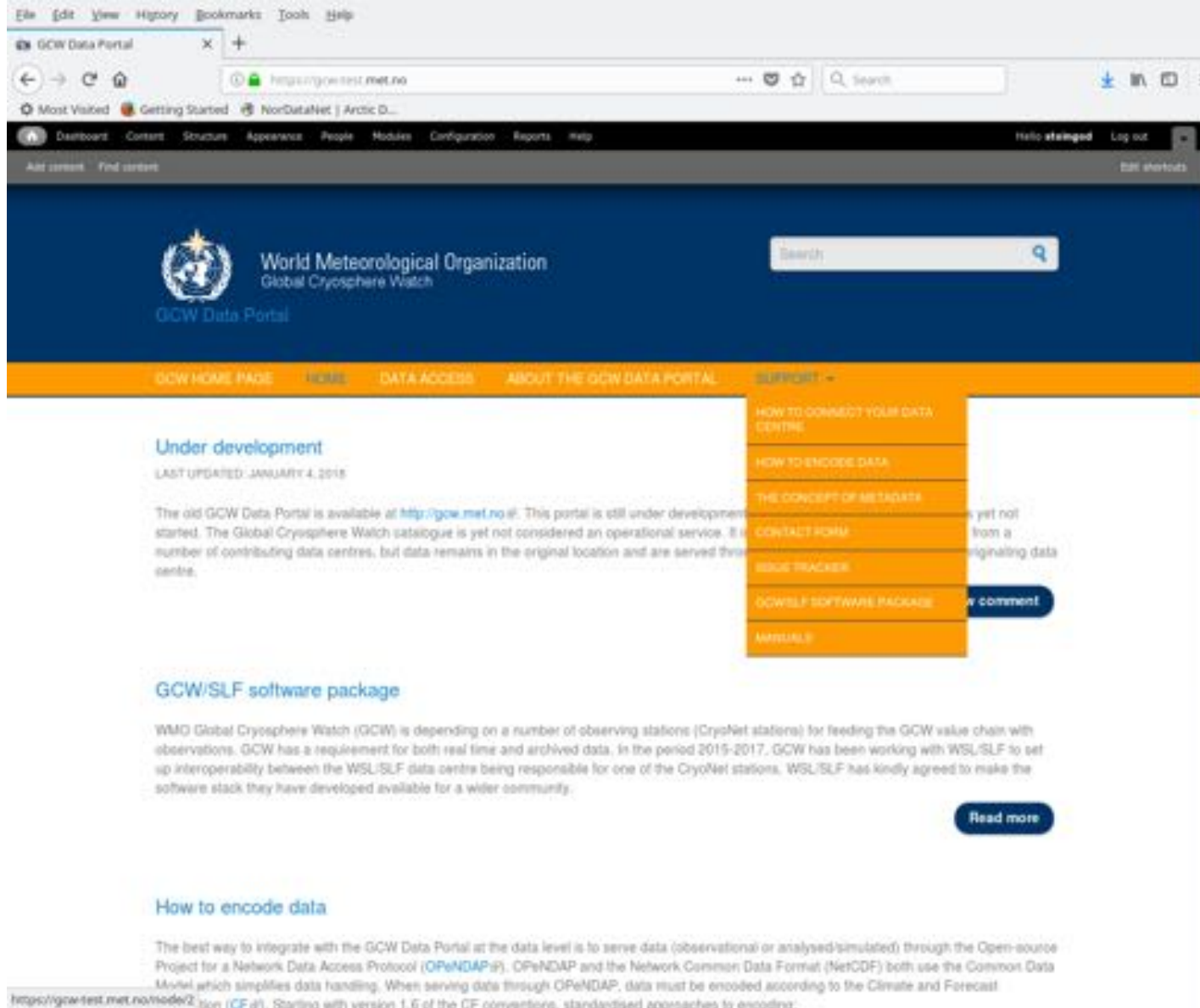
### GCW/SLF software package

WMO Global Cryosphere Watch (GCW) is depending on a number of observing stations (CryoNet stations) for feeding the GCW value chain with observations. GCW has a requirement for both real time and archived data, in the period 2015-2017. GCW has been working with WSL/SLF to set up interoperability between the WSL/SLF data centre being responsible for one of the CryoNet stations. WSL/SLF has kindly agreed to make the software stack they have developed available for a wider community.

[Read more](#)

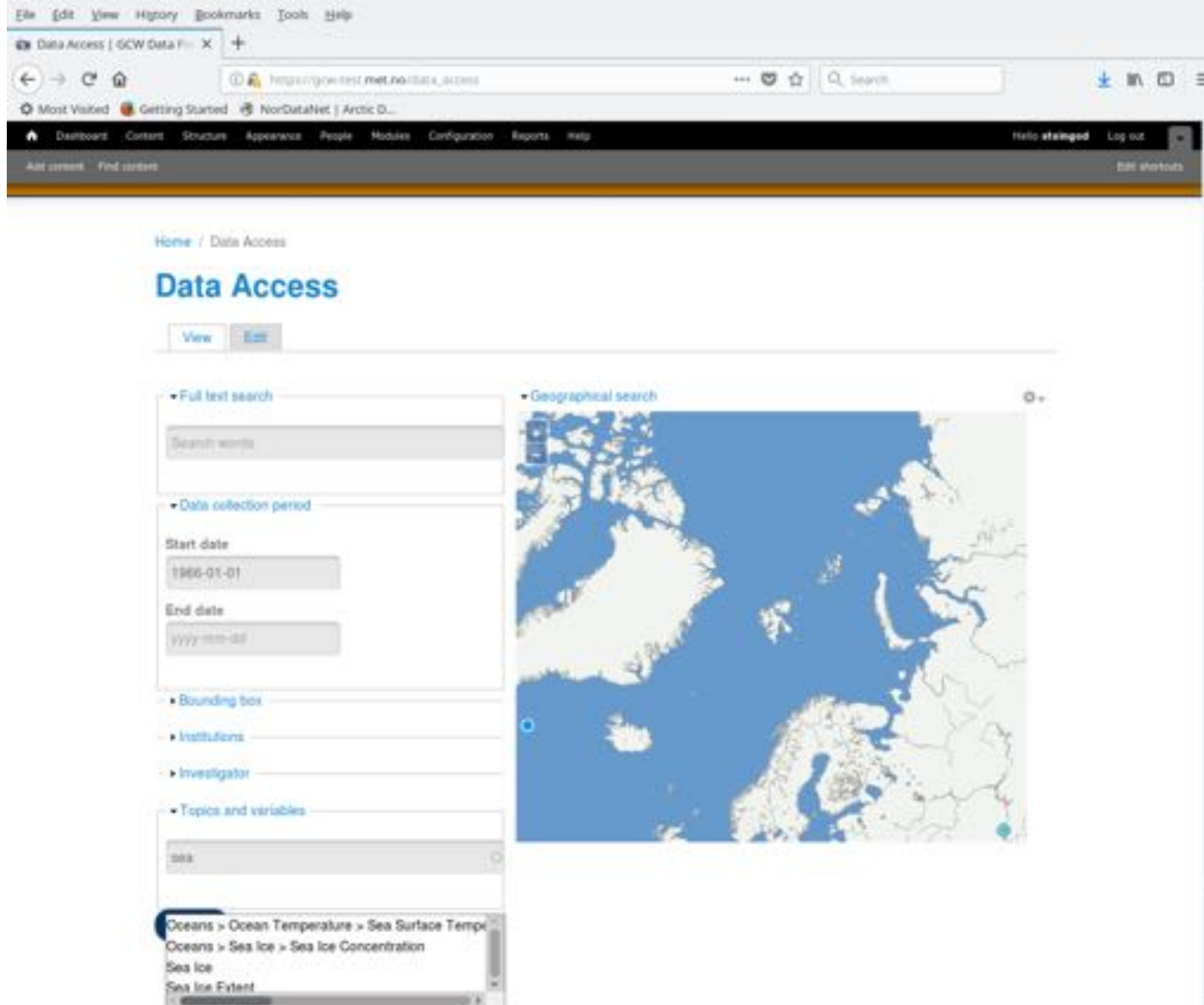
### How to encode data

The best way to integrate with the GCW Data Portal at the data level is to serve data (observational or analysed/simulated) through the Open-source Project for a Network Data Access Protocol (OPeNDAP). OPeNDAP and the Network Common Data Format (NetCDF) both use the Common Data Model which simplifies data handling. When serving data through OPeNDAP, data must be encoded according to the Climate and Forecast convention (CF). Starting with version 1.6 of the CF conventions, standardised approaches to encoding:



The screenshot shows a web browser displaying the GCW Data Portal. The browser's address bar shows the URL <https://gcw-test.met.no>. The website header includes navigation links such as 'Dashboard', 'Contents', 'Structure', 'Appearance', 'People', 'Modules', 'Configuration', 'Reports', and 'Help'. A search bar is located in the top right corner. The main content area features the WMO logo and the text 'World Meteorological Organization Global Cryosphere Watch GCW Data Portal'. A navigation menu is visible, with 'SUBPAGES' expanded to show a list of links: 'HOW TO CONNECT YOUR DATA CENTRE', 'HOW TO ENCODE DATA', 'THE CONCEPT OF METADATA', 'CONTACT FORM', 'ISSUE TRACKER', 'GCW/SLF SOFTWARE PACKAGE', and 'MANUALS'. The 'GCW/SLF SOFTWARE PACKAGE' link is highlighted with a blue 'comment' button. Below the navigation menu, there are three main sections: 'Under development', 'GCW/SLF software package', and 'How to encode data'. The 'Under development' section includes a sub-header 'Under development' and a paragraph stating that the old GCW Data Portal is still under development and that the Global Cryosphere Watch catalogue is not yet operational. The 'GCW/SLF software package' section describes the dependency on CryoNet stations and the interoperability with WSL/SLF. The 'How to encode data' section discusses the use of Open-source Project for a Network Data Access Protocol (OPeNDAP) and the Network Common Data Format (NetCDF).





The screenshot shows a web browser window displaying the GCW Data Access interface. The browser's address bar shows the URL `https://gcw-test.met.no/data_access`. The page title is "Data Access | GCW Data F...". The browser's navigation bar includes "Home", "Data Access", and "Data Access". The page content features a "Data Access" heading with "View" and "Edit" buttons. Below this, there are several search filters: "Full text search" with a "Search words" input field; "Data collection period" with "Start date" (1966-01-01) and "End date" (yyyy-mm-dd) input fields; "Bounding box", "Institutions", and "Investigator" filters; and "Topics and variables" with a dropdown menu showing "sea". A "Geographical search" map of the Arctic region is visible on the right side of the page. The browser's navigation bar includes "Dashboard", "Contents", "Structure", "Appearance", "People", "Modules", "Configuration", "Reports", and "Help". The user is logged in as "Hello stamgod" and can "Log out".





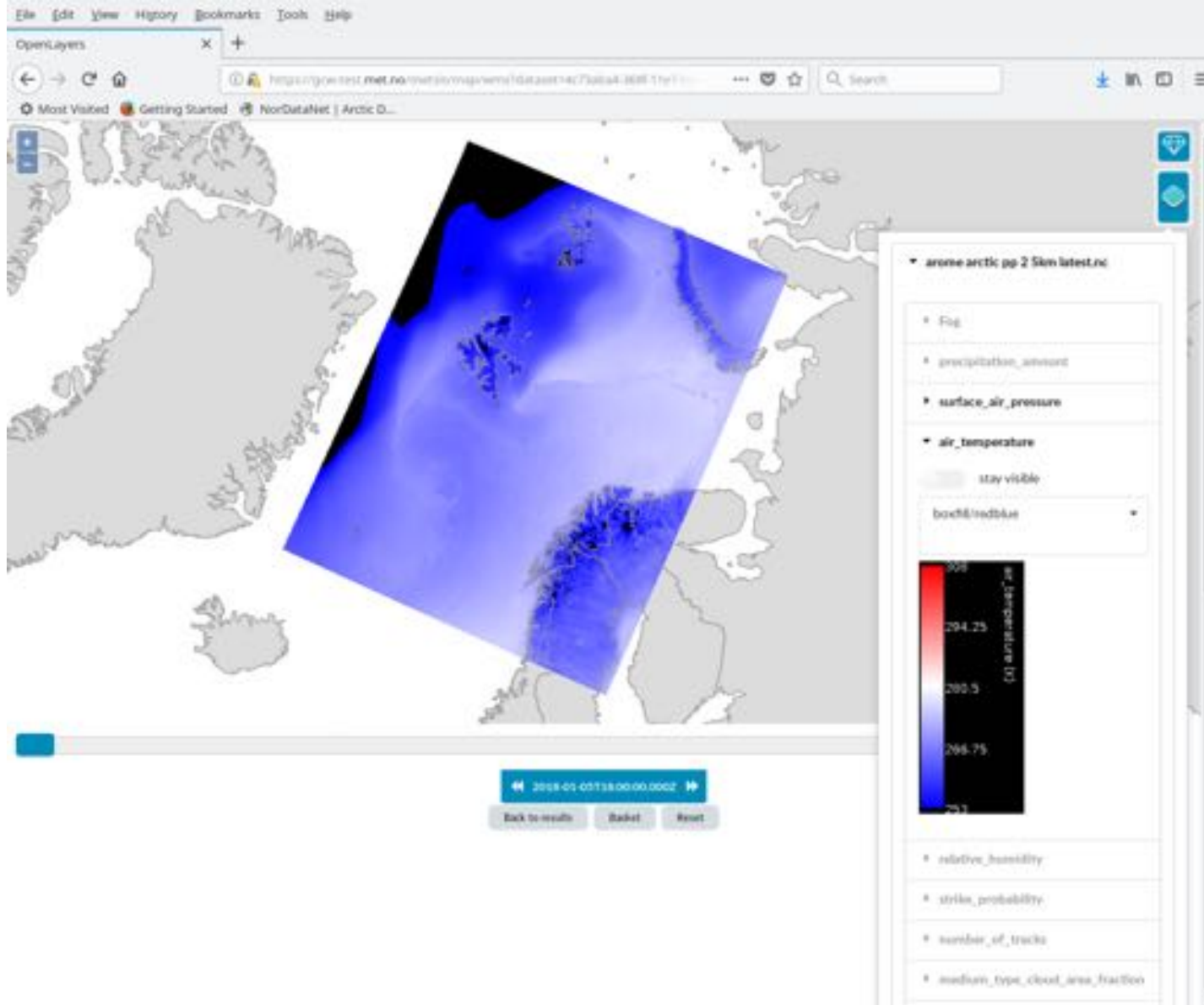
Available metadata | GCW | X

https://gcw-test.met.no/metadata/display/metadata/?datasetID=477&tab=...

Home / Available metadata

## Available metadata

Metadata key	Metadata value
TITLE	met-anime-arctic-20km-latest
ABSTRACT	Post-processed forecasts based on the latest run of the ARCTIC Arctic model. Parameters like temperature, cloud cover, precipitation and wind have gone through additional post-processing. Horizontal data resolution is 2.5km. The forecast is updated 4 times per day. For historical runs, see <a href="http://threads.met.no/threads/ukelag/arcticmet/20km-latest.html">http://threads.met.no/threads/ukelag/arcticmet/20km-latest.html</a>
PERSONNEL NAME	Eirik Steyer
PERSONNEL ROLE	Investigator
PERSONNEL ORGANISATION	Norwegian Meteorological Institute
TEMPORAL EXTENT START DATE	2019-02-01T12:00:00Z
DATA ACCESS RESOURCE	HTTP: <a href="http://threads.met.no/threads/ukelag/arcticmet/20km-latest/threads/met-anime-arctic_2_5km_latest/">http://threads.met.no/threads/ukelag/arcticmet/20km-latest/threads/met-anime-arctic_2_5km_latest/</a> OPeNDAP: <a href="http://threads.met.no/threads/ukelag/arcticmet/20km-latest/threads/met-anime-arctic_2_5km_latest/">http://threads.met.no/threads/ukelag/arcticmet/20km-latest/threads/met-anime-arctic_2_5km_latest/</a> ODC WMS: <a href="http://threads.met.no/threads/ukelag/arcticmet/20km-latest/threads/met-anime-arctic_2_5km_latest/">http://threads.met.no/threads/ukelag/arcticmet/20km-latest/threads/met-anime-arctic_2_5km_latest/</a>
BBOX	ENVELOPE: 18.330 5.87 6.62 61
VERSION	158440710241714176
ACTIVITY TYPE	Model run
DATA ACCESS TYPE	HTTP OPeNDAP ODC WMS
DATA ACCESS WMS LAYERS WMS LAYER	ar_temperature precipitation_amount
DATASET PRODUCTION STATUS	In Work
ISO TOPIC CATEGORY	climatologyMeteorologyAtmosphere
KEYWORDS KEYWORD	Arctic Atmosphere - Atmospheric Pressure - Sea Level Pressure Atmosphere - Atmospheric Temperature - Air Temperature Atmosphere - Atmospheric Temperature - Dew Point Temperature Atmosphere - Atmospheric Temperature - Surface Air Temperature Atmosphere - Atmospheric Winds - Surface Winds Atmosphere - Clouds - Cloud Amount Frequency Atmosphere - Precipitation - Precipitation Amount
LAST METADATA UPDATE	2019-09-27T09:24:00Z
METADATA IDENTIFIER	dc:75a6f-360f-17a7-6a0b-68070661a2
METADATA STATUS	active
OPERATIONAL STATUS	Operational





# Functionality under way

- Adding services on top of data
  - Visualisation of timeseries using OpeNDAP
  - Transformation from NetCDF/CF to CSV etc using OpeNDAP
  - Map projections and subsetting of gridded data
  - Similar for profiles...
  - Compliance checkers for data (NetCDF/CF)
    - Human/Machine (OGC WPS)
- Integration with Virtual Research Environment
  - Use your own or predefined software

# Final comments

- The same approach is used within Norwegian Scientific Data Network (NorDataNet)
- EU APPLICATE
- EU INTERACT
- Year of Polar Prediction (YOPP)
- Svalbard Integrated Arctic Earth Observing System (SIOS)