



*Meteorologisk
institutt
met.no*

WIS Workshop on Information Access Enablers

DCPC development from IPY
perspective

Heiko Klein, Genf, 18.05.2010



Information Exchange in IPY

IPY aims:

- Link researchers across different fields to address questions and issues lying beyond the scope of individual disciplines.
- Leave a legacy of observing sites, facilities and networks, as well as individual data and data systems to support ongoing polar research and monitoring.
- Balance the rights between investigators and indigenous people, and the need for widespread access through the free and unrestricted sharing and access of both data and metadata.



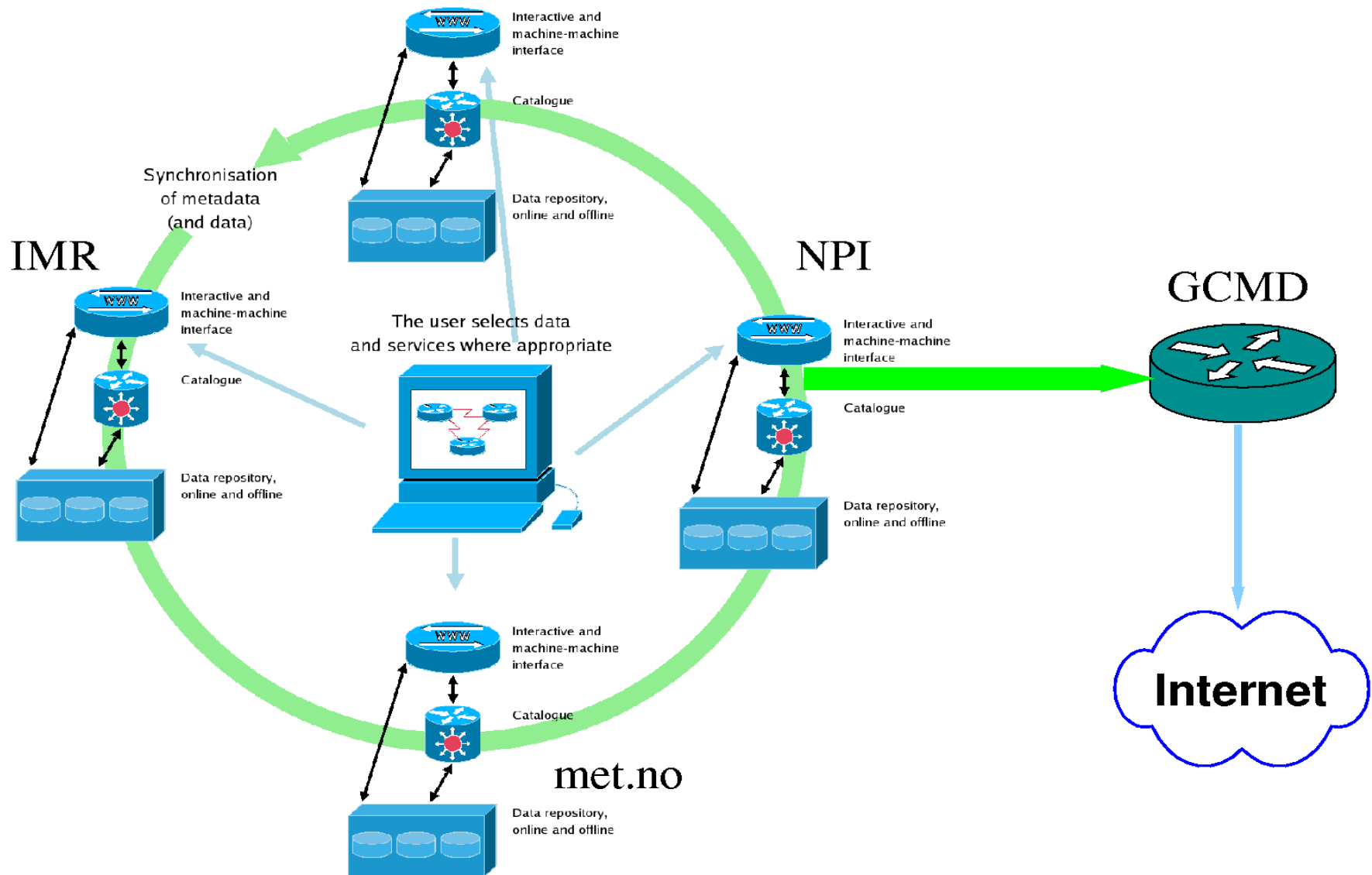
IPYDIS

The International Polar Year Data and Information Service (IPYDIS) is a global partnership of data centers, archives, and networks working to ensure proper stewardship of IPY and related data.

IPYDIS ~ WIS/DCPC

- International exchange (>60 countries)
- Interdisciplinary science (>50,000 participants representing physical, life, and social scientists)

Norwegian Implementation





RESEARCH IN SVALBARD - DATABASE SEARCH

search

- RESULT TYPE**
 Data Set (9)
- STATUS**
 Complete (9)
- LOCATIONS**
- Nordishavet (3)
 - Hopen (2)
 - Baffin Bay (1)
 - Bjernøya (1)
 - Jan Mayen (1)
- INSTITUTIONS**
- NPI (9)
 - AARI (1)
 - DNMI (1)
- ASSOCIATES**
- Vinje, Torgny (6)
 - Korsnes, Reinert (3)
 - Løyning, Terje Brinck (3)
 - Gerland, Sebastian (2)
 - Ørbæk, Jon Børre (2)
- TOPICS**
 Oceans (9)
- TERMS**
 Sea Ice (9)

Result 1 - 9 of 9 for "" (1.59 seconds)

Sort by **Relevance descending**

[Data Set Iceberg drift](#)
 To study iceberg drift ARGOS data from buoys placed on icebergs. Torgny Vinje had a large project from 1988 to 1992 named IDAP, where 50 ARGOS buoys were placed on icebergs between Svalbard next to Franz Josef land. Data up until 1992 are processed by Torgny Vinje. Part participation with ...
Institution(s): NPI

[Data Set Sea ice drift \(ICEX buoys\)](#)
 To study drift of sea ice Program to study ice drift in the Arctic and the Antarctic. used: RAMS (Random Access Management System) 1975-1979, which was a part years (look up NIMBUS), and ARGOS 1979-now, which is data that NP buys from Toulouse, ...
Institution(s): NPI

[Data Set Iceberg occurrences in the Barents sea \(the IDAP project\)](#)
 To map the iceberg occurrences in the Barents sea The IDAP (Ice Data Aquisition commission from the oil companies to map the iceberg occurrences in the Barents Tromse Satellite Station. The aerial photos comes from russian flights in the years observations comes from ...
Institution(s): NPI, AARI

[Data Set NOAA pictures](#)
 Basis for making sea ice maps Black and white distorted pictures which were used Database made.
Institution(s): NPI

[Data Set Ice Maps, Historical Archive for the Nordic Seas](#)
 The ACSYS Historical Ice Chart Archive presents historical sea-ice observations and 70°E in the form of digitized maps, stored as shape files. The earliest chart d from December 2002. More recent charts are available electronically from the Nor (www.met.no), ...
Institution(s): NPI, DNMI

[Data Set Sea ice thickness measurements with ice bores](#)
 To register sea ice thicknesses People from the meteorological station at Hopen in information has been sent by Telex (via Rogaland radio in Norway) to Torgny Vinje this region from 1967. Manual measurements on the sea ice - 100m out from the



- DOKIPY search
- HOME ...
 - DATA OVERVIEW
 - SEARCH DOKIPY
 - FILE UPLOAD
 - DATASET QUESTIONNAIRE
 - METADATA QUESTIONNAIRE
 - OPENDAP

DOKIPY search

Search for IPY data. Use the links on the left hand side to access pages for setting search conditions. Then use the menu below to view results.

The catalogue contains datasets with references to actual data as well as metadata describing planned activities. Currently there are no direct connection from the planned activity descriptions to the corresponding datasets.

SHOW RESULTS		TWO-WAY TABLES	OPTIONS	HELP	
Name	Institutions	Areas	Activity types	Abstract	
ecmwf	met.no Norwegian Meteorological Institute	Iceland Sea Denmark Strait Sea Fram Strait Barents Sea Greenland Sea Laptev Sea	Model run	Products from the ECMWF Atmospheric Deterministic medium-range weather forecasts up to ten days. Check out http://www.ecmwf.int/ for details. The model output has been subsetted, reprojected and reformatted using FIMEX (http://wiki.met.no/fimex/).	
		Arctic Ocean Chukchi Sea Beaufort Sea			



Metamod2

- Metadata generation, upload, storage, exchange and search platform
- Loosely coupled to data-layer
- Free software (GPL), php/perl
- Used for IPY at met.no and SMHI
- Currently extended for DCPC usage
- <https://wiki.met.no/metamod/start>



Metamod2: Metadata sources

- Manually added - questionnaire (key-value pairs: **MM2**)
- Automatically extracted from data, i.e. netcdf-files + CF-1.0 + damocles data recovery convention (key-value pairs: **MM2**)
- Harvester (OAI-PMH): **Dublin Core (DC), DIF**
- Partly impl.: Harvester (CSW/ISO23950): **ISO19115, WMO Core profile**

DOKIPY meta data form - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://dokipy.met.no/1/qst/fmmeta.php

Latest Release Notes Fedora Project Prosjekter [DokIT] Zimbra: Preferences: ... Fedora Weekly News Community Support Fedora Core 5

TidBank@ Log... involverte:start... Login Data Manage... DOKIPY meta... DOKIPY SSF - Database

Data Set Description

Dataset title

Description

URL describing/linking the data

Topic category

Activity type

Northernmost latitude (decimal degrees North)

Southernmost latitude (decimal degrees North)

Westernmost longitude (decimal degrees East)

Easternmost longitude (decimal degrees East)

Geographic area (multiple choices)

- Ocean > Arctic Ocean > Barents Sea
- Ocean > Arctic Ocean > Beaufort Sea
- Ocean > Arctic Ocean > Chukchi Sea
- Ocean > Arctic Ocean
- Ocean > Atlantic Ocean > North Atlantic Ocean > Azores
- Ocean > Atlantic Ocean > North Atlantic Ocean > Baltic Sea

Data collection period - start (in the form YYYY-MM-DD HH:MM UTC)

http://damocles.met.no:8080/thredds

File Edit View History Bookmarks Tools Help http://cryoclim.met.no/metamod/pmh

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```

<OAI-PMH xsi:schemaLocation="http://www.openarchives.org/OAI/2.0/ http://www.openarchives.org/OAI/2.0/"
  <responseDate>2010-05-15T08:47:18Z</responseDate>
  <request verb="ListRecords" metadataPrefix="dif">http://cryoclim.met.no/metamod/pmh/oai2.php?request=ListRecords
    <record>
      <header>
        <identifier>oai:met.no:metamod/CC/snow</identifier>
        <datestamp>2010-04-23</datestamp>
      </header>
      <metadata>
        <DIF xsi:schemaLocation="http://gcmd.gsfc.nasa.gov/Aboutus/xml/dif/ http://gcmd.gsfc.nasa.gov/Aboutus/xml/dif_v9.7.1.xsd">
          <Entry_ID>CC_snow</Entry_ID>
          <Entry_Title>
            CryoClim snow product for northern hemisphere (gridded and averaged)
          </Entry_Title>
          <Data_Set_Citation>
            <Dataset_Creator>NA</Dataset_Creator>
          </Data_Set_Citation>
          <Dataset_Title>
            CryoClim snow product for northern hemisphere (gridded and averaged)
          </Dataset_Title>
          <Dataset_Release_Date>Not Available</Dataset_Release_Date>
          <Dataset_Release_Place>Not Available</Dataset_Release_Place>
          <Dataset_Publisher>
            Norwegian Meteorological Institute, Norwegian Computing Centre
          </Dataset_Publisher>
          <Version>Not Available</Version>
          <Online_Resource>
            http://thredds.met.no/thredds/catalog/cryoclim/met.no/snow/
          </Online_Resource>
          </Data_Set_Citation>
          <Personnel>
            <Role>Technical Contact</Role>
            <First_Name>Egil</First_Name>
            <Last_Name>Støren</Last_Name>
            <Email>Not Available</Email>
          </Personnel>
        </DIF>
      </metadata>
    </record>
  </ListRecords>
</OAI-PMH>

```

Done

```

heikok@tko2635: ~/Documents
lon:units = "degrees east" ;
lon:grid_mapping = "Polar_Stereographic_Grid" ;
float ice_conc(time, yc, xc) ;
ice_conc:long_name = "concentration of sea ice" ;
ice_conc:standard_name = "sea_ice_concentration" ;
ice_conc:units = "%";
ice_conc:FillValue = -1.e+10f ;
ice_conc:valid_min = 0.f ;
ice_conc:valid_max = 100.f ;
ice_conc:grid_mapping = "Polar_Stereographic_Grid" ;
ice_conc:coordinates = "lat lon" ;

// global attributes:
:title = "OSI SAF Daily Sea Ice Concentration Analysis" ;
:product_id = "OSI-401" ;
:product_name = "osi_saf_ice_conc" ;
:product_status = "under development" ;
:abstract = "The daily analysis of sea ice concentration are obtained from\n",
"operation satellite images of the polar regions. It is based\n",
"on atmospherically corrected signal and an optimal sea ice\n",
"concentration algorithm. This product is available for free\n",
"from the EUMETSAT Ocean and Sea Ice Satellite Application\n",
"Facility (OSI SAF)." ;
:topiccategory = "Oceans ClimatologyMeteorologyAtmosphere" ;
:keywords = "Sea Ice Concentration,Sea Ice,Oceanography,Meteorology,Climate,Remote Sensing" ;
:gcmd_keywords = "Cryosphere > Sea Ice > Sea Ice Concentration\n",
"Ocean > Sea Ice > Sea Ice Concentration\n",
"Geographic Region > Northern Hemisphere\n",
"Vertical Location > Sea Surface\n",
"EUMETSAT/OSISAF > Satellite Application Facility on Ocean and Sea Ice, European Organisation for the Exploitation of Meteorological Satellites" ;

:northernmost_latitude = 90.f ;
:southernmost_latitude = 31.01929f ;
:easternmost_longitude = 180.f ;
:westernmost_longitude = -180.f ;
:activity_type = "Space borne instrument" ;
:area = "Northern Hemisphere" ;
:start_date = "2009-10-20 00:00:00" ;
:stop_date = "2009-10-20 23:59:59" ;
:project_name = "EUMETSAT OSI SAF" ;
:institution = "EUMETSAT OSI SAF" ;
:PI_name = "Rasmus Tonboe" ;
:contact = "osisaf-manager@met.no" ;
:distribution_statement = "Free" ;
:references = "OSI SAF Sea Ice Product Manual, Eastwood S. (editor), v3.6, September 2009\n",
"http://saf.met.no\n",

```




Metadata-conversion challenges

- Minimum requirements / missing information
- Different multiplicities of entries
- Several ways of encoding metadata (ISO19115)
- Different dictionaries for keywords, translation cumbersome, partly impossible
- WMO Core profile keywords not interdisciplinary
- WMO Core profile validator (xsd)?

=> Conversion not 100% lossless



Metamod2: Metadata exposure

- Search interface
- Offered through OAI-PMH
- Planned: ISO23950 / CSW
- Internal storage: = source storage
- Export-formats: MM2, DIF, DC, ISO19115
(WMO core 1.0?)

Specialized search forms



North:
West: East:
South:

INFO

Click here for area selector

Southern Ocean

Antarctica

INFO

500 Meilen

Kartendaten ©2010 AND, Europa Technologies, GEBCO, Google, King Island, MapData Sciences Pty Ltd, MapIT, Tele Atlas - Nutzungsbedingungen

http://cryoclim.met.no/metamod/sc...

DATACOLLECTION PERIOD

SEARCH

Select another area: Antarctic

SWITCH MAP

Metadata search (OpenDap)



The screenshot shows a Google search interface with the following elements:

- Search Bar:** Contains the text "northern gridded ice displacement" and a "Suche" button.
- Results Summary:** "Ungefähr 129'000 Ergebnisse (0.21 Sekunden) Erweiterte Suche".
- Left Sidebar:** A vertical menu with icons and labels: "Alles", "Bilder", "Videos", "Maps", "News", "Bücher", "Blogs", "Social", "Diskussionen", "Das Web", "Seiten auf Deutsch", "Seiten aus der Schweiz", and "Mehr Optionen".
- Search Results:**
 - Result 1:** "Polar Pathfinder Daily 25 km EASE-Grid Sea Ice Motion Vectors" - [Diese Seite übersetzen]
The **northern grid** is 361 x 361, centered on the geographic North Pole. ... **Ice** motion computed from satellite imagery represents the **displacement** between ...
nsidc.org/data/docs/.../nsidc0116_ice_motion.gd.html - Im Cache - Ähnlich
 - Result 2:** "[PDF] Satellite Microwave Radar- and Ihtoy-tracked Ice Motion in the ..." - [Diese Seite übersetzen]
Dateiformat: PDF/Adobe Acrobat - Schnellansicht
von M Drinkwater - 1994 - Zitiert durch: 8 - Ähnliche Artikel
The 5 km **gridded** vectors show close correspondence with the drift direction and **displacement** of ISW- 1, but the mesoscale characteristics of the **ice** motion ...
trs-new.jpl.nasa.gov/dspace/bitstream/2014/34508/1/94-0857.pdf
 - Result 3:** "OPeNDAP Dataset Query Form" - [Diese Seite übersetzen]
The time span of the **ice displacement** is approximately 48 hours. ... Sea **Ice** > Sea **Ice** Motion Ocean > Sea **Ice** > Sea **Ice** Motion Geographic Region > **Northern** ...
osisaf.met.no/.../ice.../ice-drift_ice_drift_nh_polstere-625_multi-oi_200610131200-200610151200.nc.html - Im Cache
 - Result 4:** "Geodynamics - Postglacial rebound at the Northern Cascadia" - [Diese Seite übersetzen]
6 Feb 2008 ... **Ice** sheet thicknesses (m) are given for each **grid** element. ... (a and b) Crustal **displacement** and (c and d) crustal tilt resulting from a ...
gsc.nrcan.gc.ca > ... > Geological Survey of Canada - Im Cache - Ähnlich




Data handling

- Allow all datatypes, export as is
([Metamod2 at SMHI for IPY](#))
- Unique data-type in repository, flexible export ([Metamod2 at met.no](#))
 - Provide guidance on data-packing
 - How flexible? Preprocessing, streaming?
 - Data-owner controlled flexibility



Data handling at met.no

- Full-automated data-services through Unidata's THREDDS Data Server 
 - HTTP-download
 - Aggregation (e.g. join all time-steps)
 - OpenDAP (data-subsetting, stream)
 - Much used, excellent clients (netcdf-library, ncks)
 - WCS (data-subsetting, stream, OGC)
 - WMS (OGC)
 - Openlayers based web-client



Met.no Thredds

THREDDS Data Server

Catalog <http://thredds.met.no/thredds/catalog/cryoclim/met.no/osisaf-nh/catalog.html>

Dataset: [osisaf-nh/osisaf-nh_aggregated_ice_concentration_nh_polstere-100_200504010000.nc](#)

- ID: [cryoclim/met.no/osisaf-nh/osisaf-nh_aggregated_ice_concentration_nh_polstere-100_200504010000.nc](#)

Access:

- OPENDAP:** [/thredds/dodsC/cryoclim/met.no/osisaf-nh/osisaf-nh_aggregated_ice_concentration_nh_polstere-100_200504010000.nc](#)
- HTTPServer:** [/thredds/fileServer/cryoclim/met.no/osisaf-nh/osisaf-nh_aggregated_ice_concentration_nh_polstere-100_200504010000.nc](#)
- WMS:** [/thredds/wms/cryoclim/met.no/osisaf-nh/osisaf-nh_aggregated_ice_concentration_nh_polstere-100_200504010000.nc](#)

Dates:

- 2010-04-26 16:52:42Z (modified)

Viewers:

- [NetCDF-Java ToolsUI \(webstart\)](#)

OPeNDAP Dataset Access Form

Tested on Netscape 4.61 and Internet Explorer 5.00.

Action:

Data URL:

Global Attributes:

```
title: "Monthly aggregated sea ice concentration product"
product_name: "EUMETSAT OSISAF sea ice"
product_status: "under development"
abstract: "Monthly sea ice concentration estimated from satellite data within the framework of EUMETSAT Ocean and Sea Ice SAF."
topiccategory: "Oceans ClimatologyMeteorologyAtmosphere"
```

Variables:

Polar_Stereographic_Grid: 32 bit Integer

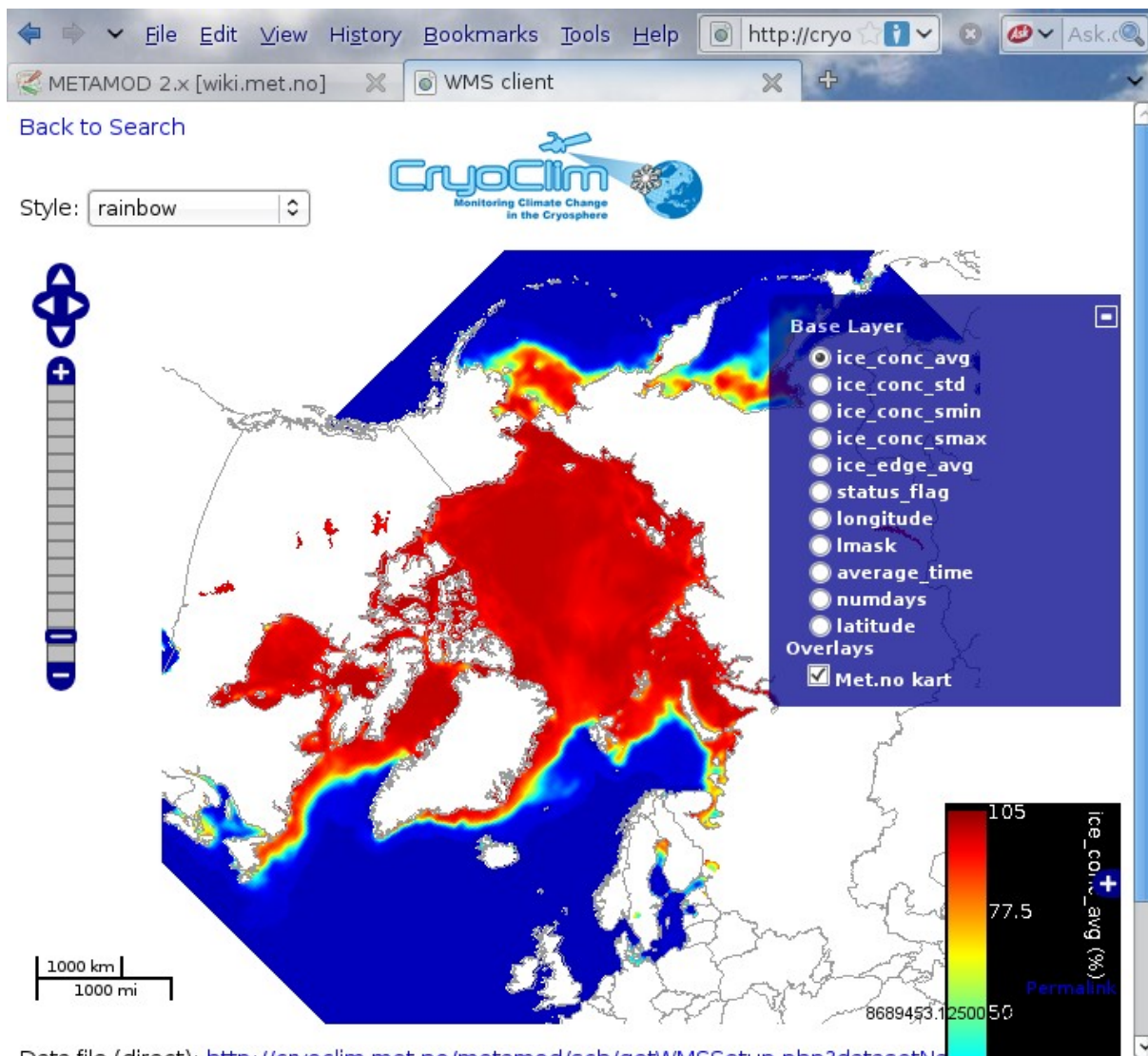
Polar_Stereographic_Grid =

```
grid_mapping_name: "polar_stereographic"
straight_vertical_longitude_from_pole: -45.0
latitude_of_projection_origin: 90.0
standard_parallel: 70.0
false_easting: 0.0
false_northing: 0.0
```

time: Array of 64 bit Reals [time = 0..0]

time:

```
long_name: "reference time of product"
standard_name: "time"
units: "Seconds since 1978-01-01 00:00:00"
axis: "T"
bounds: "time bounds"
```

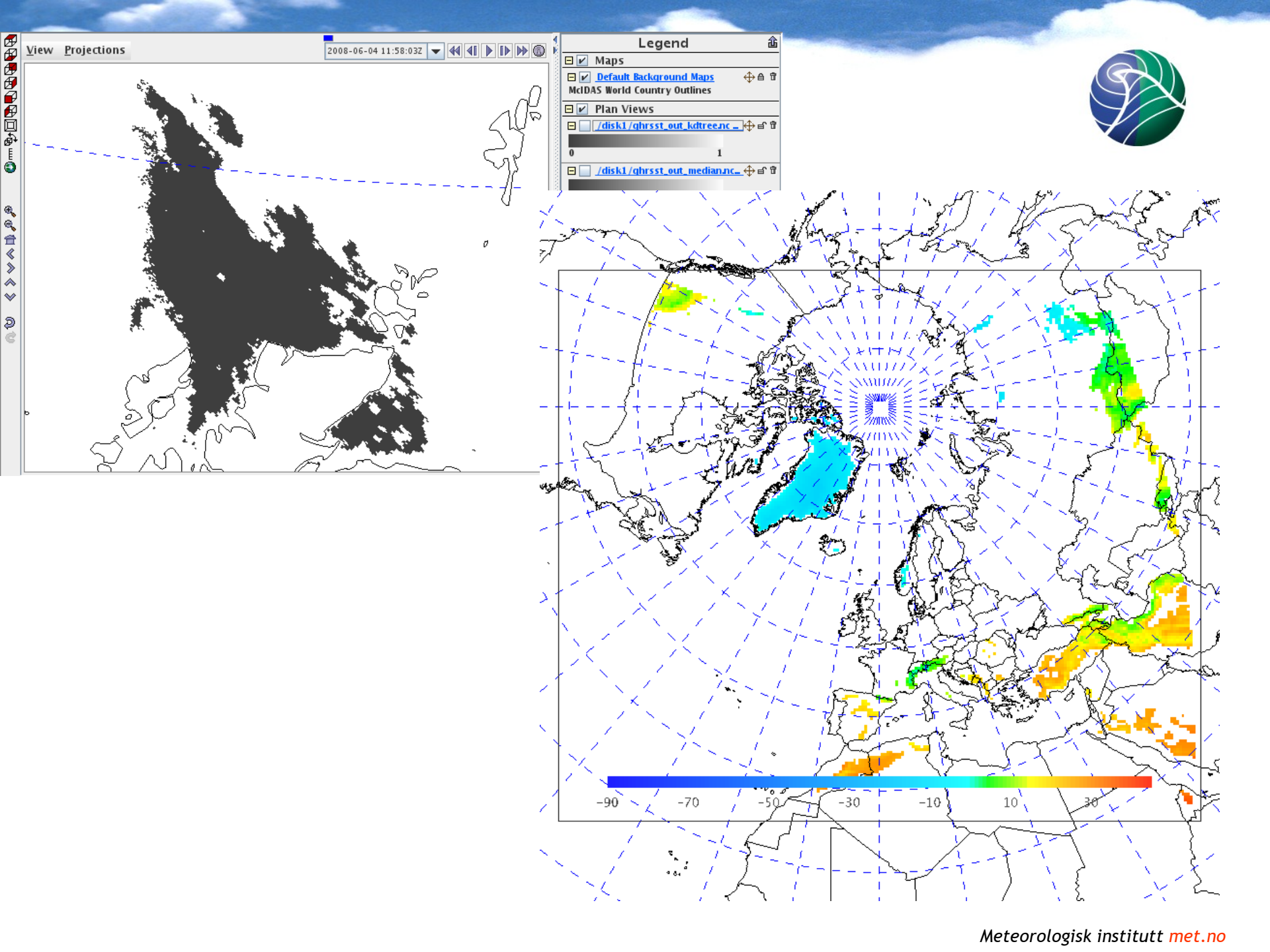




Data-handling through FIMEX

Fimex: File Interpolation, Manipulation and EXtraction library for gridded data

- <https://wiki.met.no/fimex/start>, C/C++, LGPL
- Pluggable file-formats: netcdf/hdf, grib1/2 (ecmwf grib_api), felt (met.no)
- Projection support via proj4
- Spatial interpolation: forward, backward, kd-tree, nearest-neighbor, bi-linear, bi-cubic, vectors
- Temporal interpolation
- Extraction with/without quality-settings





Metamod2 and Fimex

- Data-owner describes interpolation parameters (projections, resolution, method)
- On the fly processed data-downloads
- REST based, cache-able

The screenshot displays two browser windows. The left window shows the 'Uploads to the Data Repository' page, which includes a navigation menu on the left and a main content area with instructions for uploading data. The right window shows a 'Metadata Catalogue Search' table with columns for Name, Topics and variables, Keywords, history, and Datacollect period.

Uploads to the Data Repository

You are currently logged in to the CryoClim data file upload service.

The data repository at met.no is divided into directories owned by individual users (data providers). As a data provider you may create new directories (using the "Administration" page), and upload files to these directories (using the "Uploads" page). New files are checked against a set of file format requirements. If the file does not comply with requirements, you will receive an E-mail explaining the errors found.

Administration

You can create new directory datasets in the data repository and you are allowed to upload files to your directories.

To create a new directory dataset, fill in the dataset name and optionally the dataset key at the right hand side, or enter the dataset name in the "Dataset name" field. Then click the CREATE/UPDATE button. Only alphanumeric characters and "-" (hyphen) are allowed in dataset names.

To retrieve a dataset, select the dataset name in the "Dataset name" field. Then click the RETRIEVE button. You will then get this page again with the dataset name and dataset key filled in. Make your changes and click the RETRIEVE button.

Dataset name: (max 20 characters)

RETRIEVE CREATE/UPDATE CANCEL

EDIT PROJECTIONS EDIT WMS PARAMET

Metadata Catalogue Search

Name	Topics and variables	Keywords	history	Datacollect period
hirlam12_sf_1h_2008-07-03_06	relative_humidity air_temperature cloud_area_fraction precipitation_amount air_pressure_at_sea_level y_wind cloud_area_fraction_in_atmosphere_layer x_wind surface_temperature_where_land	Model Forecast Temperature Wind Humidity Clouds	2008-07-03 creation by fimex from file '/opdata/hirlam12/h12sf06.dat'	2008-07-03 2008-07-05
hirlam12_sf_1h_2009-06-23_06	relative_humidity air_temperature cloud_area_fraction precipitation_amount air_pressure_at_sea_level y_wind cloud_area_fraction_in_atmosphere_layer x_wind surface_temperature_where_land	Model Forecast Temperature Wind Humidity Clouds	2009-06-23 creation by fimex from file '/opdata/hirlam12/h12sf06.dat'	2009-06-23 2009-06-26
hirlam12_sf_3h_2008-08-05_12	air_temperature lwe_thickness_of_surface_snow_amount lwe_thickness_of_convective_precipitation_amount	Model Forecast Temperature Wind	2008-08-05 creation by fimex from file '/opdata	2008-08-05 2008-08-08



Access to Long-Term Archives

- Metadata of archived data visible in data-discovery
- Special archived data request - email?
- Offline handling of request?



Metamod2 & Fimex Team

- met.no:
 - Egil Støren
 - Geir Aalberg
 - Heiko Klein
 - Trond Michelsen
 - Øystein Godøy
 - Øystein Torget
- NR (Norwegian Computing Center):
 - Thor Kristoffersen
 - Øivind Due Trier