



Royal Netherlands  
Meteorological Institute  
*Ministry of Infrastructure and the  
Environment*

## Existing Solutions

Operating data services:  
Climate Explorer  
ECA&D  
[climate4impact.eu](https://climate4impact.eu)  
[data.knmi.nl](https://data.knmi.nl)

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# Climate data services at KNMI

Operational climate data services hosted at KNMI:

- Climate Explorer (1999)
- ECA&D (2001)
- data.knmi.nl (2012)
- Climate4impact.eu (2013)
- Developed over the years
- In different projects
- Different technologies
- Lots of lessons learned...

The collage displays four different climate data services:

- Climate Explorer:** A website interface with a world map and navigation links like 'Home', 'News', 'About', and 'Site'.
- ECA&D:** A website with a hexagonal logo and navigation links for 'Home', 'FAQ', and 'Daily'.
- is-ENES:** A website titled 'Exploring climate' with a navigation bar and a main content area featuring images of agricultural and energy sectors.
- KNMI Data Centre:** A search interface for 'Observations & computational models' with filters for 'Which', 'Where', and 'When', and a table of datasets.

Title	Name	Version	Where	When	Availability
Long term average 1981-2010 - Average monthly temperature	Tp3	4	Netherlands	1981-01-01 - 2011-01-01	
Long term average 1981-2010 - Average yearly temperature	Tp4	4.01	Netherlands	1981-01-01 - 2011-01-01	
Long term average 1981-2010 - Average monthly precipitation	Tp5	4	Netherlands	1981-01-01 - 2011-01-01	



# Climate Explorer

Three main functions

## 1. Data portal

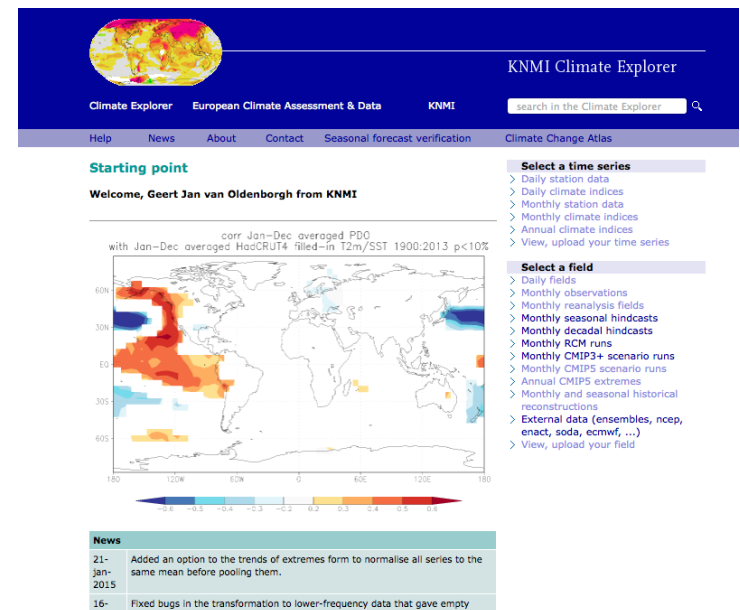
- Station data, Climate indices
- Analysed fields, Reanalyses, Model output




## 2. Data manipulation

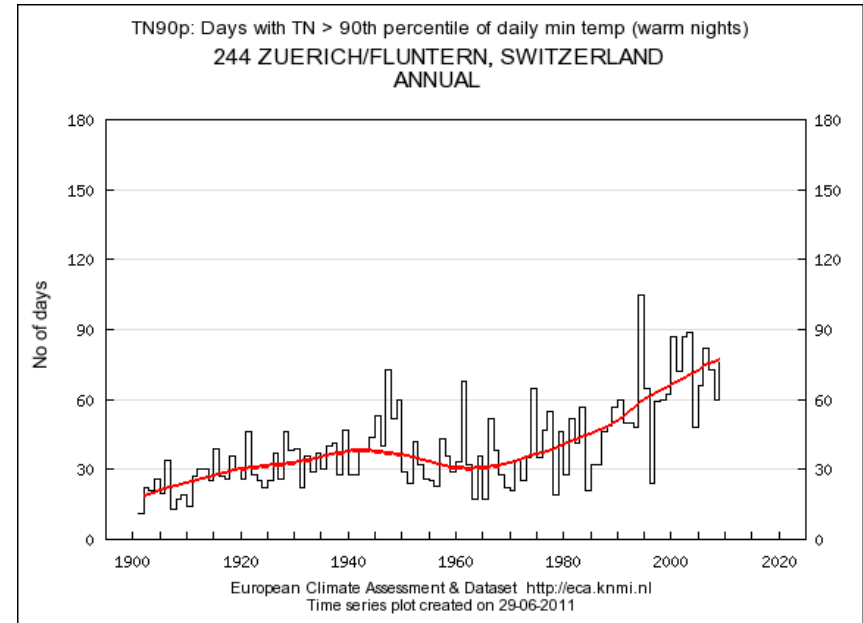
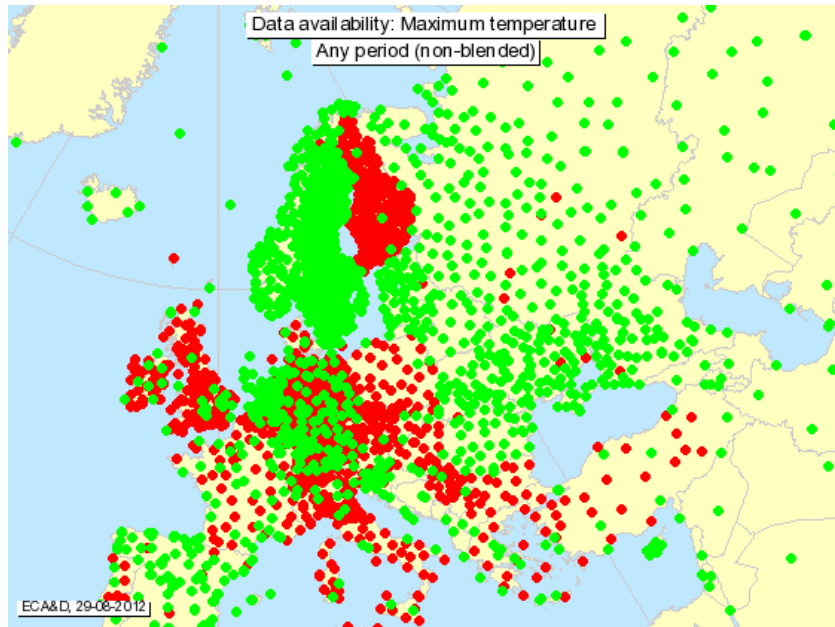
- Point values, area averages of fields
- Lower frequency statistics, extreme indices
- Filtering

## 3. Data analysis

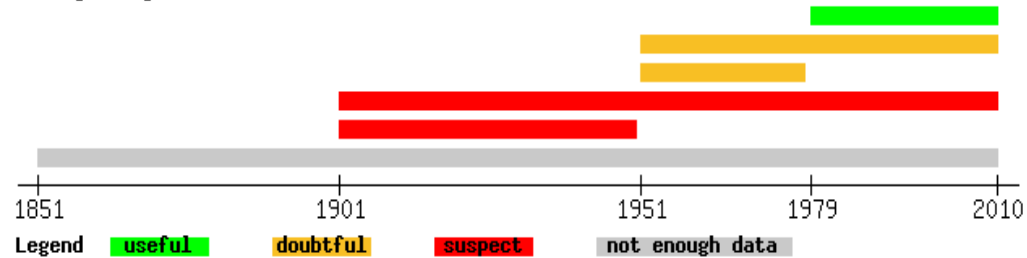
- Mean, s.d., &c.
- Extreme value fits, return times, return values
- Correlation, regression, composite analysis
- EOFs, SVDs.



-  66 Participants
-  62 Countries
-  10259 Stations
-  40630 Daily station series
-  75 Derived indices/series



Homogeneity for cloud cover series ZUERICH/FLUNTERN, SWITZERLAND



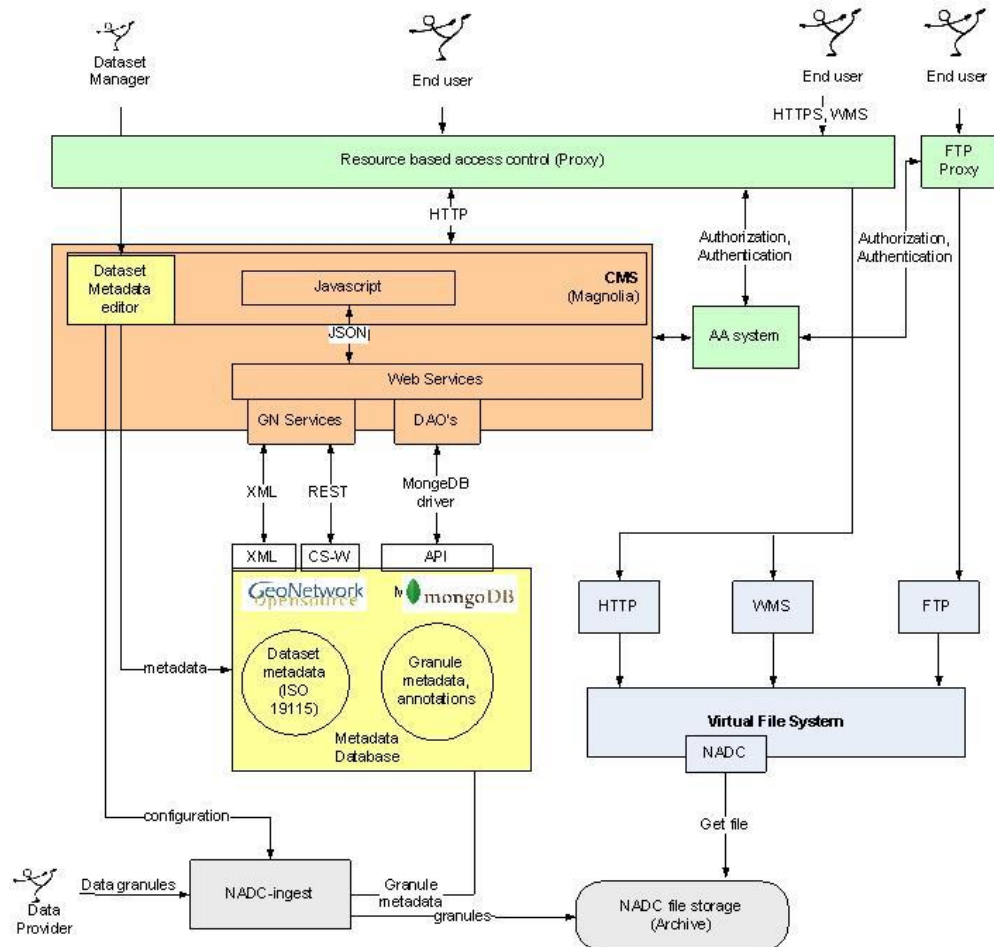
ECA&D is the backbone of the WMO RA-VI RCC on Climate Data



# Data.knmi.nl

## Features:

- Data upload
- Metadata editor
- Supports ANY file format
- Coupled to INSPIRE network
- Coupled to NL Open Data network
- Automated visualization
- Virtual file system to access tape archive
- 10K+ unique visitors each month (and growing)





## IS-ENES2 climate4impact.eu

<http://climate4impact.eu/>

Dedicated to the climate impact community: based on 21 use cases from e.g, Deltares, Alterra, UvA.

Dissemination of model results from both global and regional model experiments

Extensive documentation for impact modelers: guidelines, warnings, do's and don'ts

Facilitates interaction between climate modelers, companies and climate services

Search, visualize and compute: from Petabyte to megabyte size reduction, drill down to the information needed, downscaling and indices

Cooperation with SPECS, EUPORIAS, CLIPC projects

is-enes  
INFRASTRUCTURE FOR THE EUROPEAN NETWORK  
FOR EARTH SYSTEM MODELLING

Exploring climate model data

IS-ENES | Contact | Sign in

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### IS-ENES climate4impact portal

Welcome to the IS-ENES climate4impact portal, oriented towards climate change impact modelers, impact and adaptation consultants, as well as other experts using climate change data.

Here you will find access to data and quick looks of global climate models (GCM) scenarios, as well as regional climate model (RCM) and downscaled higher resolution climate data. The portal provides data transformation tooling for tailoring data to your needs and mapping & plotting capabilities.

Guidance on how to use climate scenarios, documentation on the climate system, frequently asked questions and examples in several impact and adaptation themes are presented and described, along with the steps required to go from GCM data to impact model input data.

The climate4impact portal is now operational (15 April 2014): [read more](#).

Agriculture/Forestry Energy Health Infrastructure/Urban  
Marine/Coastal Nature/Biodiversity Tourism Water Management

Click on one of these images to go to a specific climate change impact and adaptation theme.

The IS-ENES project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration.

Builds on and contributes to ESGF global infrastructure:



# There is a need for the different portals, but how to efficiently manage?

Decouple storage, services and front end portal

Data store:

- Common storage and access (OpenDAP, ESGF node)
- Standardize metadata (ISO 19115) and file format (NetCDF CF)

Services reuse:

- Common visualization tools (ADAGUC)
- Integrated transformations (eg extremes, indices)
- Transformations enabled using OGC WPS standard



## Work on integration of data store has started

Data store:

- KNMI data centre as the back bone (data store, services)
- Dedicated team of industry and KNMI developers
- Data store one of the developments

Use of SCRUM for development



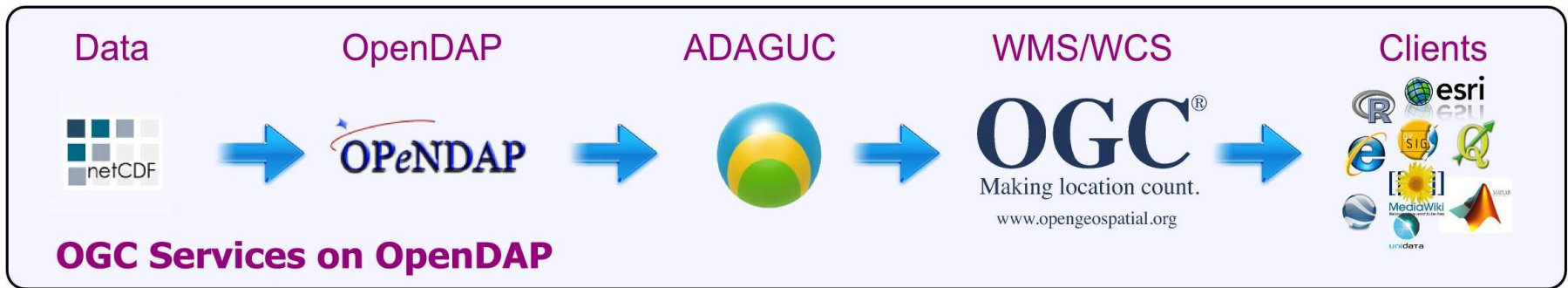




# Visualization services: ADAGUC



- Standards: OGC WMS and WCS server
  - WMS client viewer
  - Many projections, interpolations methods
  - Time series plotting
  - Used in many internal and EU projects
  - Open Source
- 
- Visualize any NetCDF CF data (just provide an URL to it)





## ADAGUC Server

- C++
- NetCDF CF datafiles: grids / RGBA images / point data / swath vector data
- Multidimensional (time, elevation, ensemble members, etc): 4D, 5D, 6D
- Aggregate files by any dimension, supporting many files (100000+)
- Implements MetOcean best practices reference\_time and elevation
- Preconfigurable styling (based on standard\_name attribute)
- Autoconfigurable for example for visualization of WPS output
- Fast reprojection / regridding of large files

### Extensions:

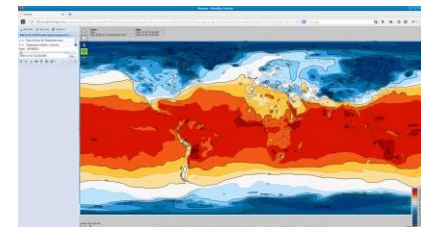
- GetReferenceTimes request
- GetFeatureInfo/GetPointValue
  - Can also return timeseries data in JSON/JSONP
  - Multiple dimension values (e.g. elevation=\* returns data for all elevations)
- The GetMap extensions found in ncWMS
- Showlegend, showscalebar, title and subtitle options



## How to create WMS services on OpenDAP at C4I

No additional configuration required!

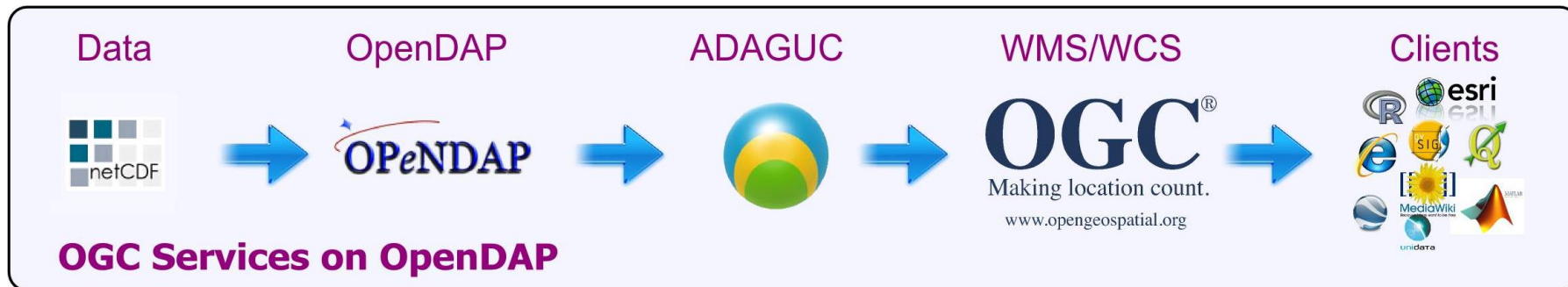
Provide your opendap URL as source parameter to the WMS service:



<http://climate4impact.eu/impactportal/ImpactService?source=<urlencoded opendap endpoint>&>

For the rest, the service remains a standard WMS which works in many WMS clients!

Graphical styling is based on standard names and units of the netCDF variable

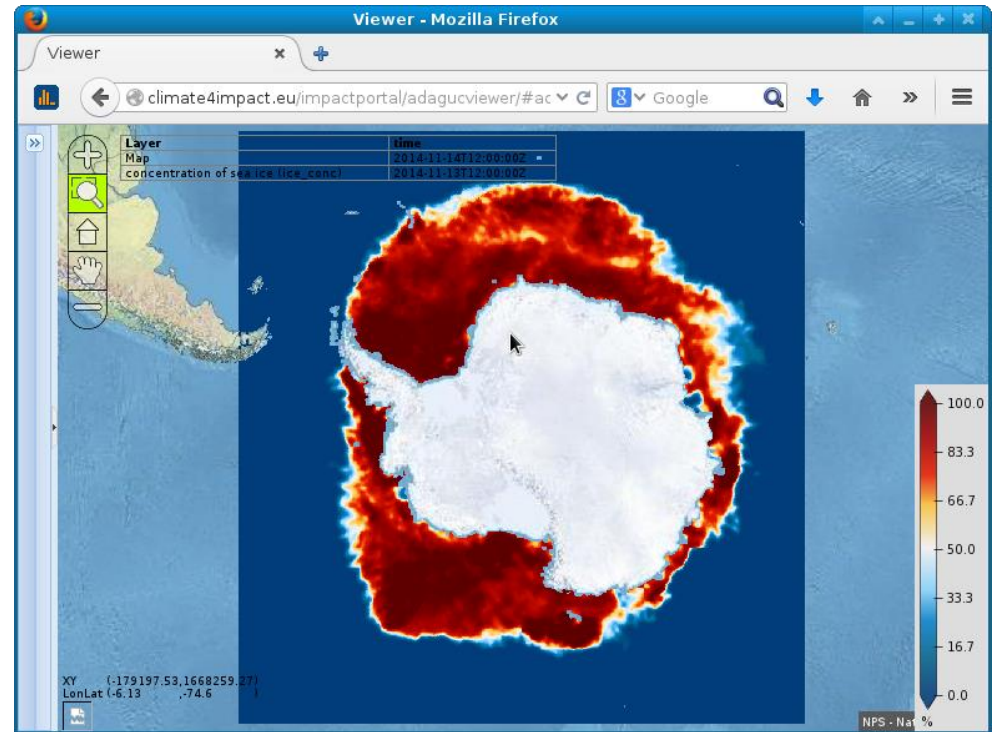
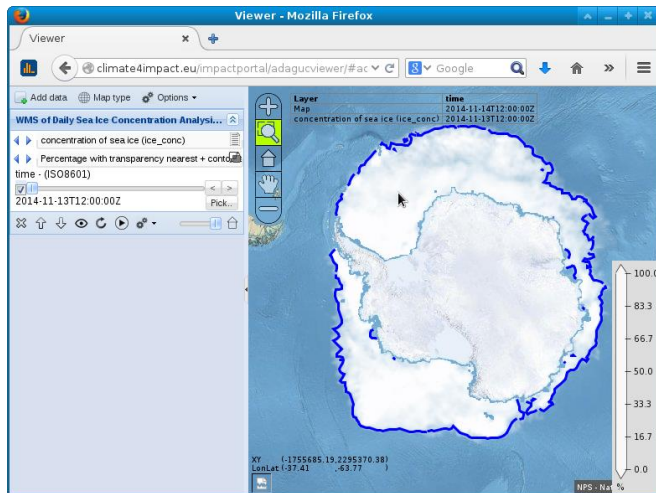
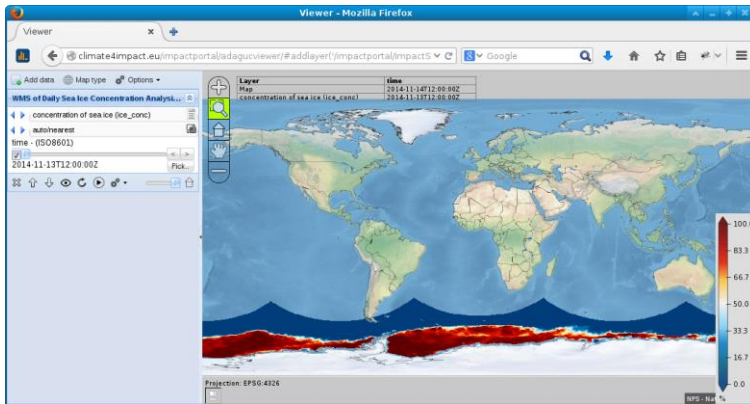


## EUMETSAT Ocean and Sea ICE SAF from Norwegian Meteorological Institute:

[http://met.no/Hav\\_og\\_is/English/Access\\_to\\_data/](http://met.no/Hav_og_is/English/Access_to_data/)

<http://thredds.met.no/thredds/catalog/osisaf/met.no/ice/conc/catalog.html>

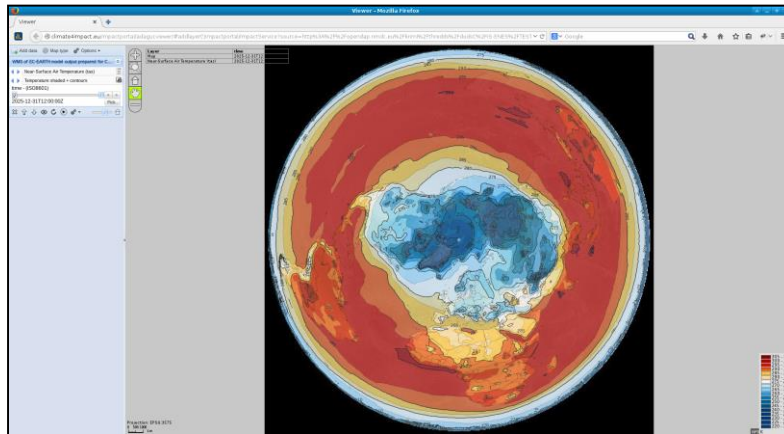
[http://thredds.met.no/thredds/dodsC/osisaf/met.no/ice/conc/2014/11/ice\\_conc\\_sh\\_polstere-100\\_multi\\_201411131200.nc](http://thredds.met.no/thredds/dodsC/osisaf/met.no/ice/conc/2014/11/ice_conc_sh_polstere-100_multi_201411131200.nc)



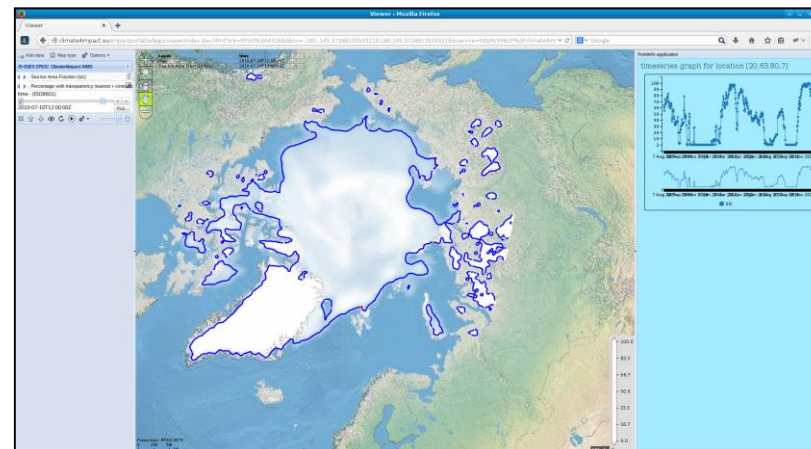
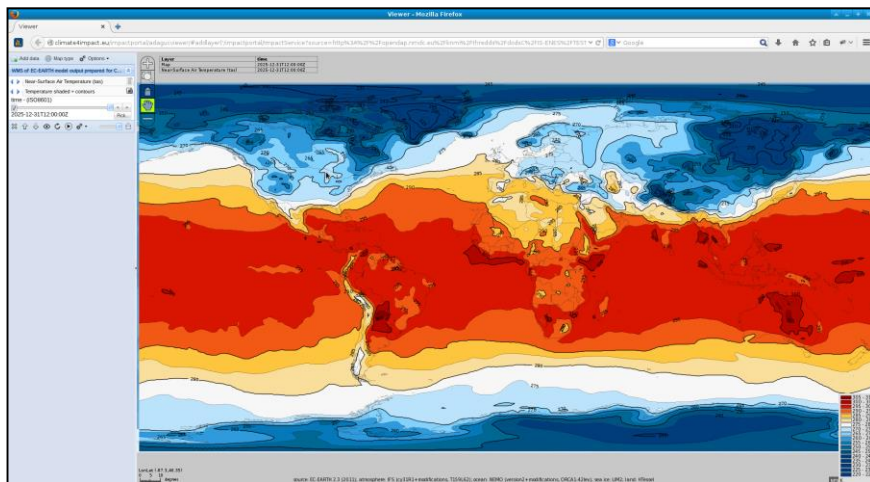
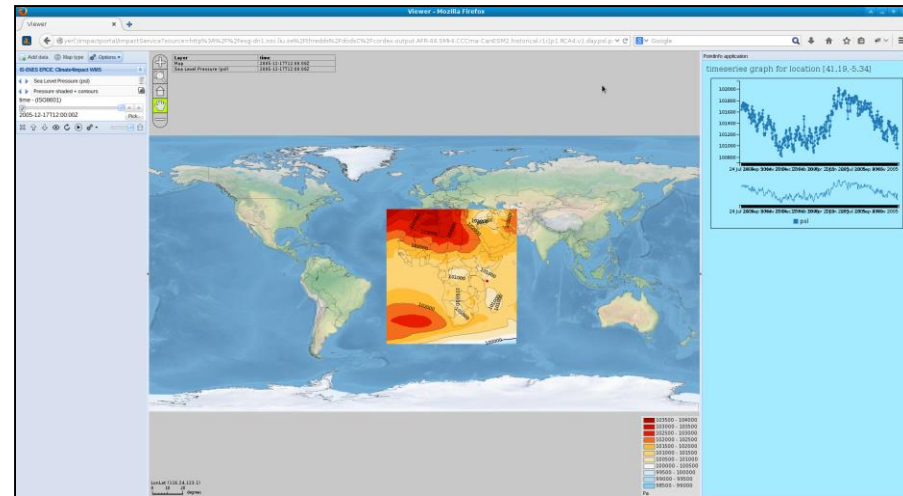
Concentration of sea ice for 2014-11-13



# CMIP5



# CORDEX





## Operational climate data services

KNMI hosts different portals for different user groups

→ We will keep the different portals

Now working on integration of the data store

Open Source:

Transformation and analysis toolbox (Climate explorer)

WMS/WCS server (ADAGUC)

Available for integration in Copernicus

ADAGUC workshop: June 17-19 2015 @ KNMI

