Een eind aan het downloaden?

Peter Thijsse (MARIS)

Digishape symposium 21 maart 2017

MARIS

Overzicht

- Introductie
- Internationale ontwikkelingen in mariene data management
  - SeaDataNet
  - EMODnet:
    - Thematic lots
    - Data ingestion
  - SeaDataCloud
- Virtual research environment (VRE)
  - Werken in de cloud
  - Voorbeeld en demo CLIPC

1. International developments

- GEO-GEOSS: Global Earth Observation System of Systems
- UNESCO IOC-IODE: International Oceanographic Data Exchange programme

European Commission:

- COPERNICUS (formerly known as GMES) as European component of GEOSS
- EC Research programmes to develop capabilities and infrastructures
- EC INSPIRE Directive for a spatial data infrastructure

- EU Marine Strategy Framework Directive
- Marine knowledge 2020
- Blue Growth Initiative 3

Leading to EMODnet

1. International developments: Participation from NL

- By individual organisations in various projects
- By governmental representatives in European committees
- As National Oceanographic Data Committee (NODC)
- set up in 1997 by convenant between leading organisations
- NODCi infrastructure project 2004 – 2008
- aims to provide harmonised discovery and access as well as long term stewardship for their data resources
- representative in EU projects and infrastructures
- cooperation with IHM

International developments: SeaDataNet

History of SeaDataNet

EU – MAST
EU –MASTII
EU-FP5
EU-FP6
EU-FP7

EU-H2020

90s
EDMED
Euronodim
MEDATLAS
EDIOS

2002-2005
Sea-Search

2006-2011
SeaDataNet

2011-2015
SeaDataNet II

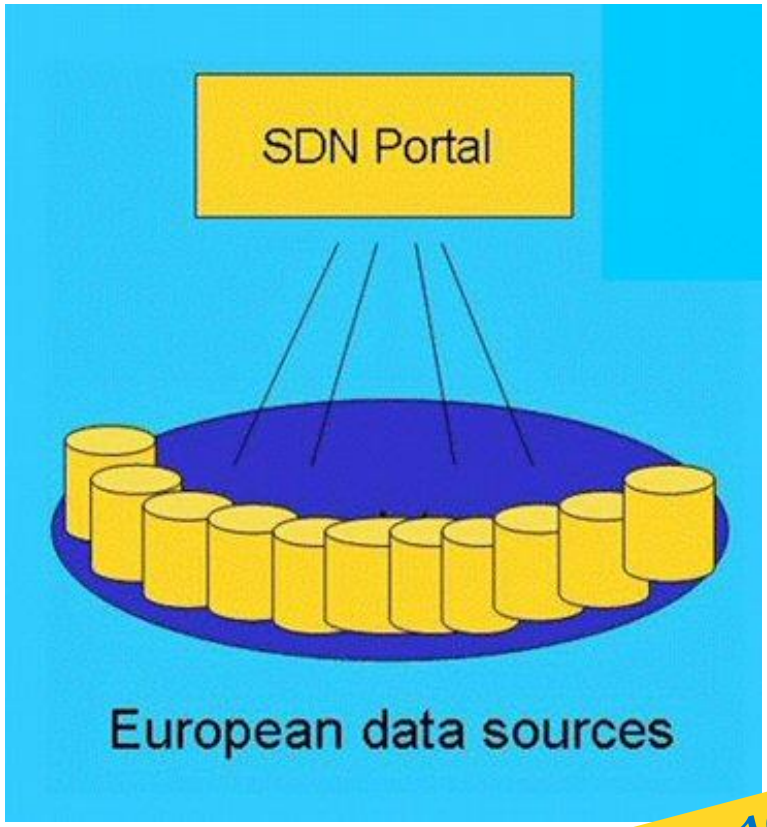
2016-2020
SeaDataCloud

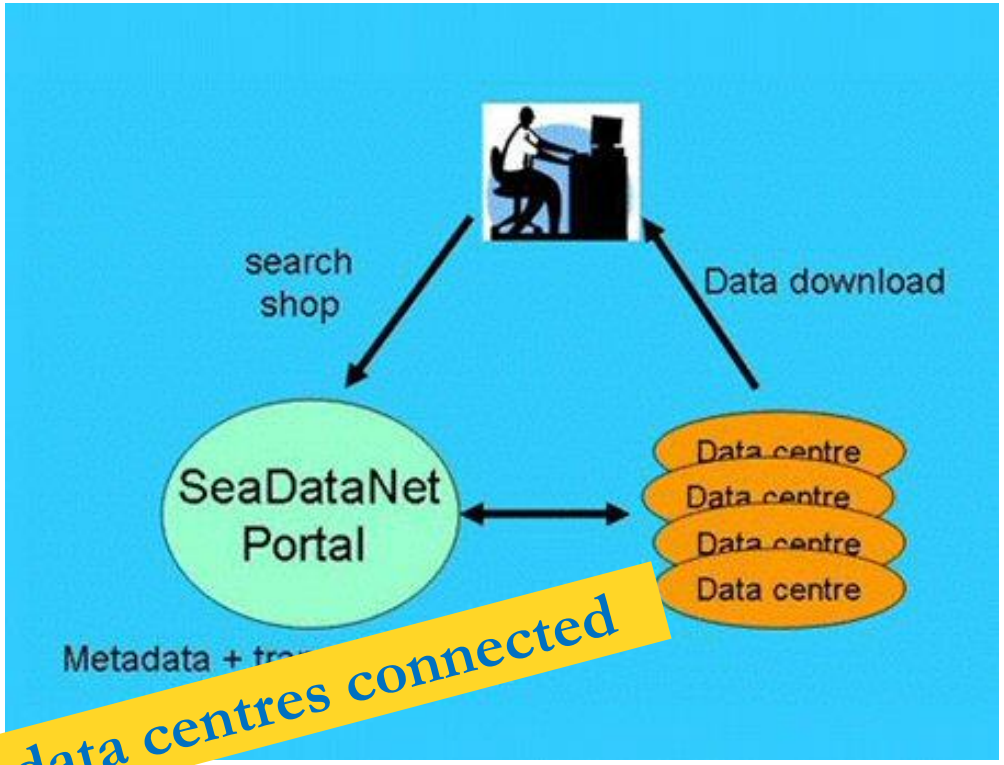
SeaDataNet has set up and operates a pan-European infrastructure for managing marine and ocean data by connecting National Oceanographic Data Centres (NODCs) and oceanographic data focal points from 35 countries bordering European seas

Standards, services and tools

- Set of common standards for metadata and data formats for the marine domain, adapting ISO and OGC standards and achieving INSPIRE compliance
- Controlled vocabularies for the marine domain (> 160.000 terms over > 60 lists)
- Set of tools to be used by each data centre – capacity building and standardisation
- Pan-European services for discovery, access, visualisation and data products
- International ODIP cooperation with USA and Australia for seeking common standards and interoperability solutions in support of global portals such as GEOSS, POGO and IODE ODP

CDI service for discovery and unified access of data





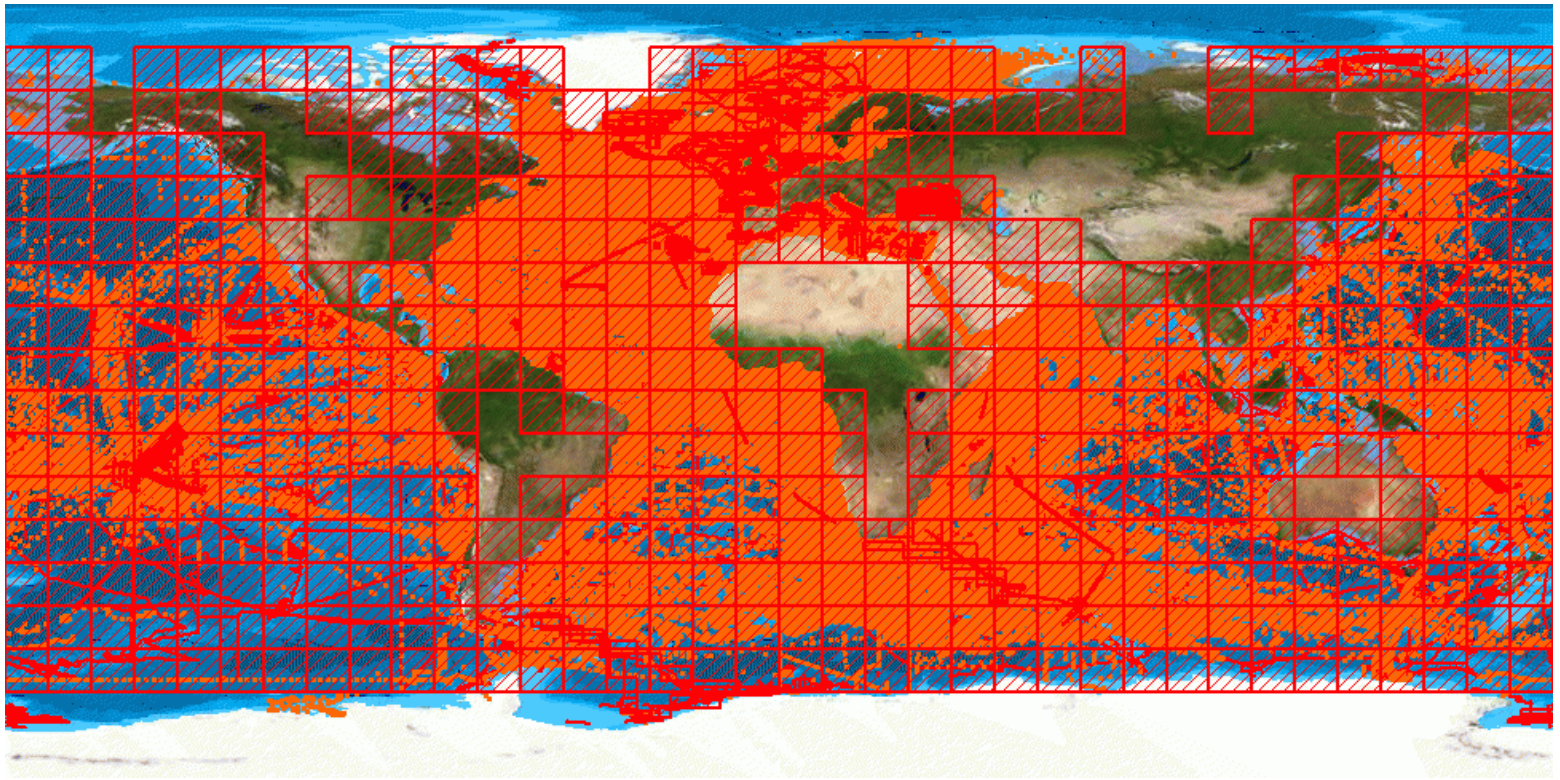
Already >100 data centres connected

Coverage of the CDI Data Discovery & Access service

NL nodes:
RWS
NIOZ
NIOO-CEME
KNMI
TNO
DdH
SOVON
IMARES

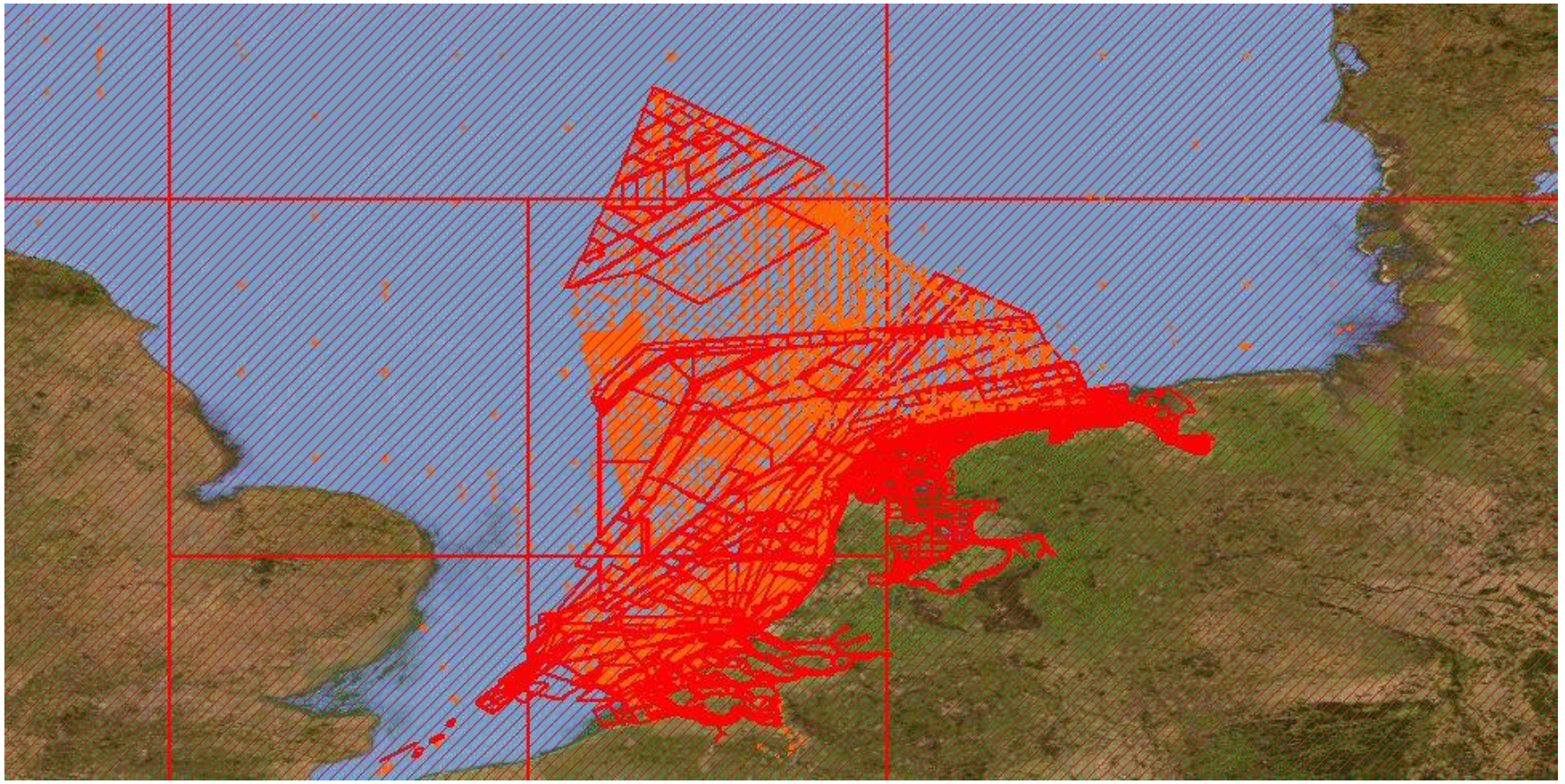
March 2017: **102** data centres connected

Data in de CDI Data Discovery & Access service



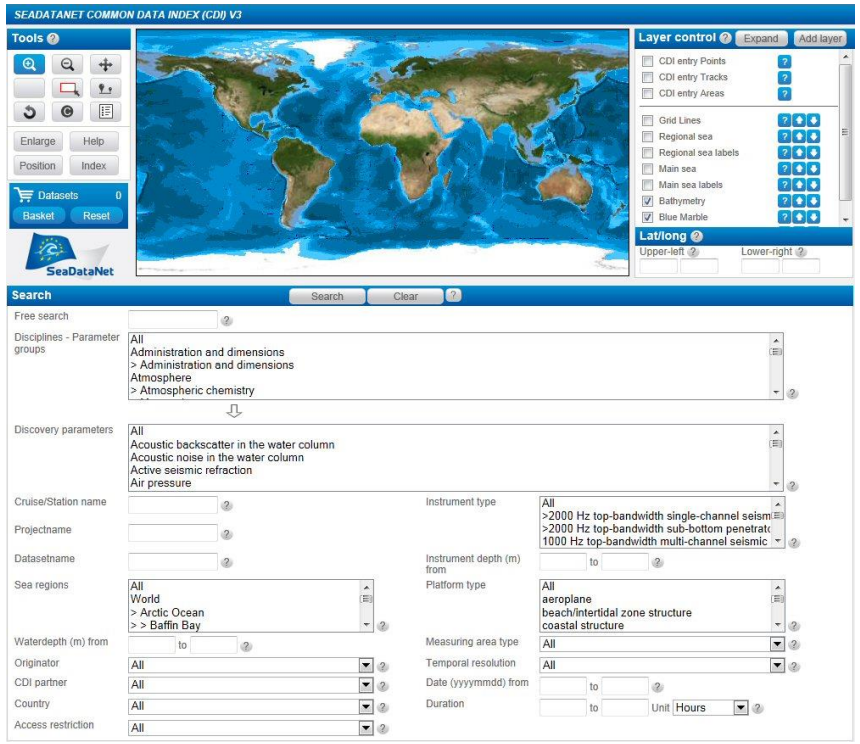
Coverage January 2017: **> 1,9 million** CDI entries from **102** data centres in **34** countries and **593** originators for physics, chemistry, geology, geophysics, bathymetry and biology; years **1805 – 2016**; **85,7%** unrestricted or under SeaDataNet licence

NL data in CDI Data Discovery & Access service



CDI coverage by NL nodes for the North Sea and coastal waters

User interfaces for discovery and shopping (examples)



Extended Search

Option to combine multiple search criteria and free text search

Quick Search

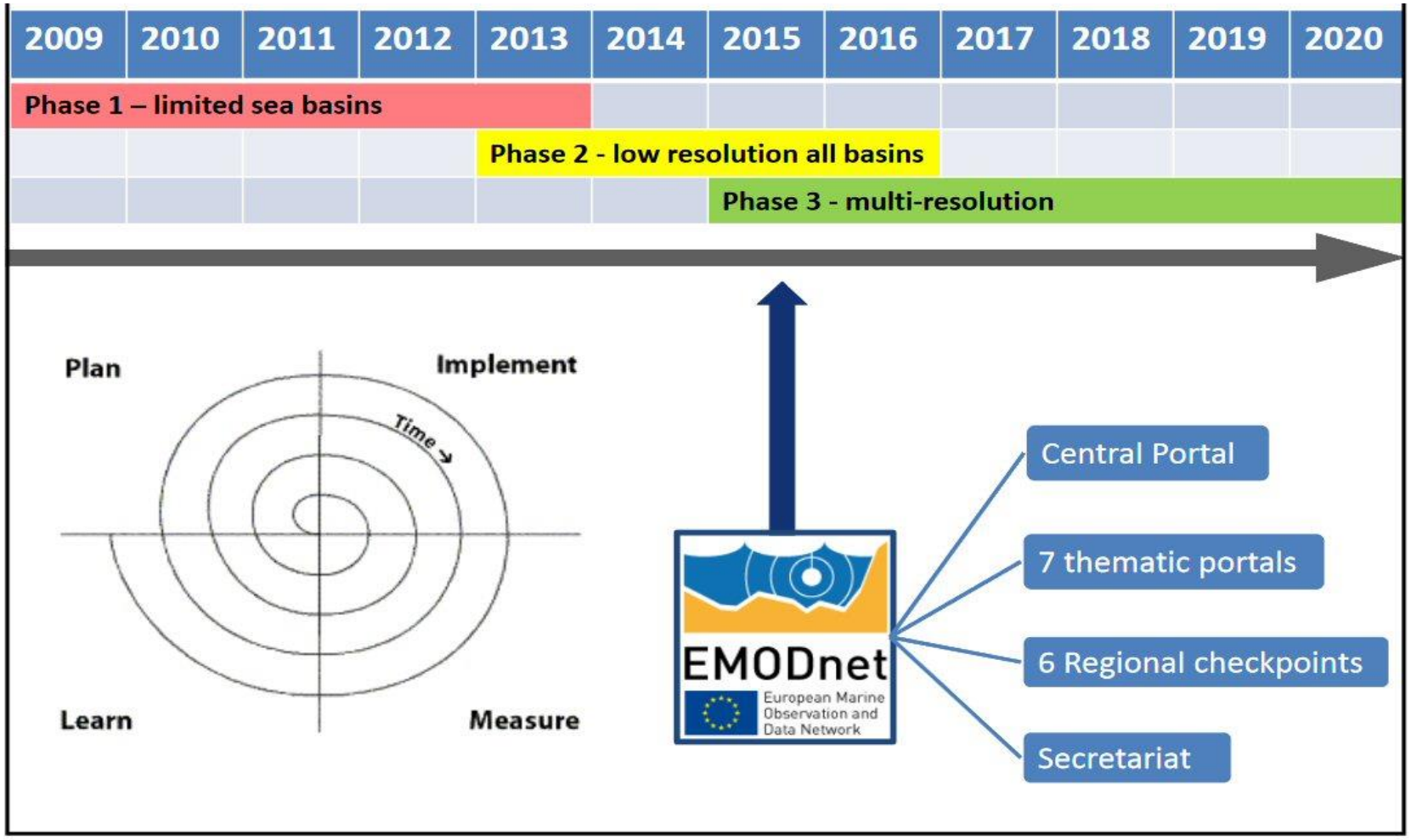
Drill down facet search – intuitive and more easy for 1st time users

International developments: EMODnet

EMODnet initiative

- Adoption of the Integrated Maritime Policy and Marine Strategy Framework Directive (MSFD)
- Initiative by EU DG MARE for an overarching European Marine Observation and Data Network (EMODnet), based upon a ‘systems of systems’ approach
- SeaDataNet qualified itself as core data management system for the EMODnet development and is ‘powering’ a number of the EMODNet thematic portals (chemistry, bathymetry, physics and biology)

SeaDataNet core partner in developing and building: European Marine Observation and Data Network



Resulting in uptake of SeaDataNet standards and expansion of the infrastructure of data centres giving data overview and access

EMODnet Chemistry

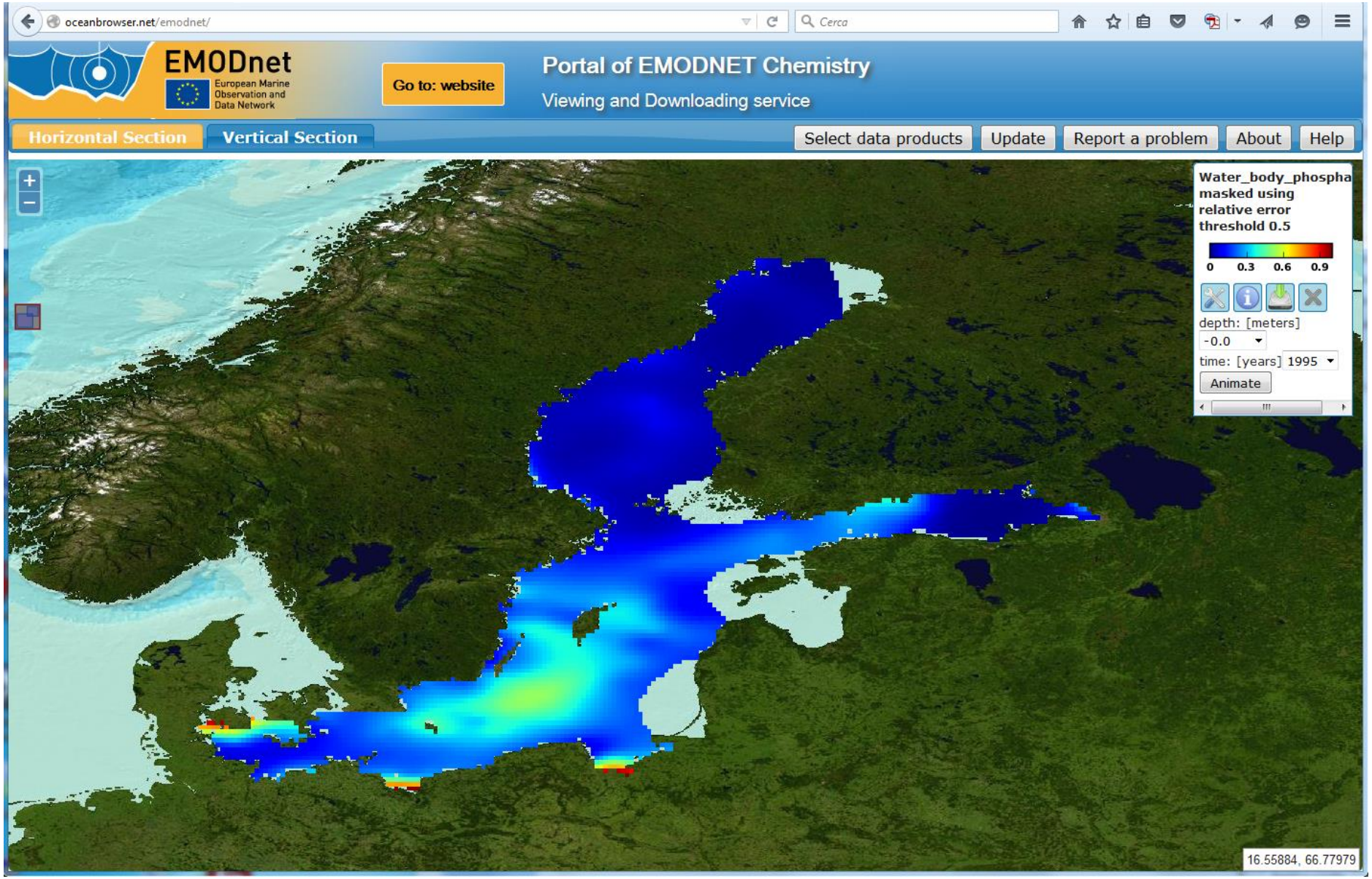
- Compiling validated data collections for selected chemical substances
- Generating interpolated maps (10 years – sliding window from 1960 to present) per substance for the European regional seas
- Close cooperation with EU DG Env, EEA and Regional Sea Conventions (such as OSPAR) to achieve fitness for purpose of the MSFD implementation
- Now moved into phase 3

Aggregation, products & services

- Relevant data sets are automatically harvested and then validated and harmonised by regional and chemical experts into aggregated buffers of data sets, which are input for the products and advanced services:
  - **Interpolated maps** for selected parameters (10 years – sliding window from 1960 to present) (using DIVA software)
  - **Station maps** with dynamic indication of data density
  - **Time series** dynamic plots for all collected data sets
  - **OceanBrowser** viewer as common service for viewing the DIVA maps and giving access to the time series graphics
  - **Product catalogue** to document all products with metadata
  - **CDI catalogue** to document all used data with metadata

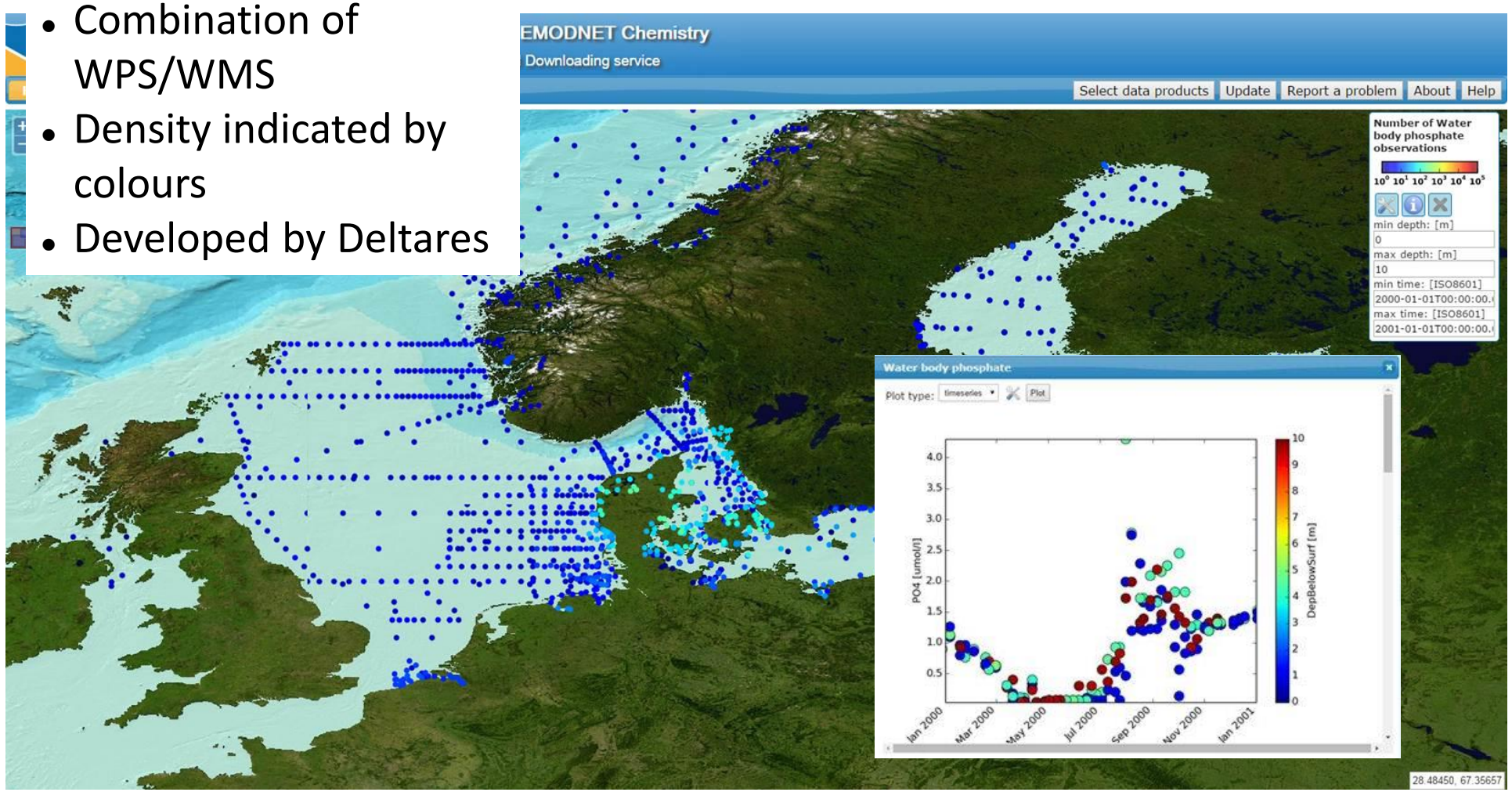
- NL project partners: MARIS, Deltares, NIOZ, and RWS

OceanBrowser example:
Concentration maps of phosphate in spring per 10 years as animations



Spatial distribution and density by GeoServer layers in OceanBrowser, including plot option

- Combination of WPS/WMS
- Density indicated by colours
- Developed by Deltares

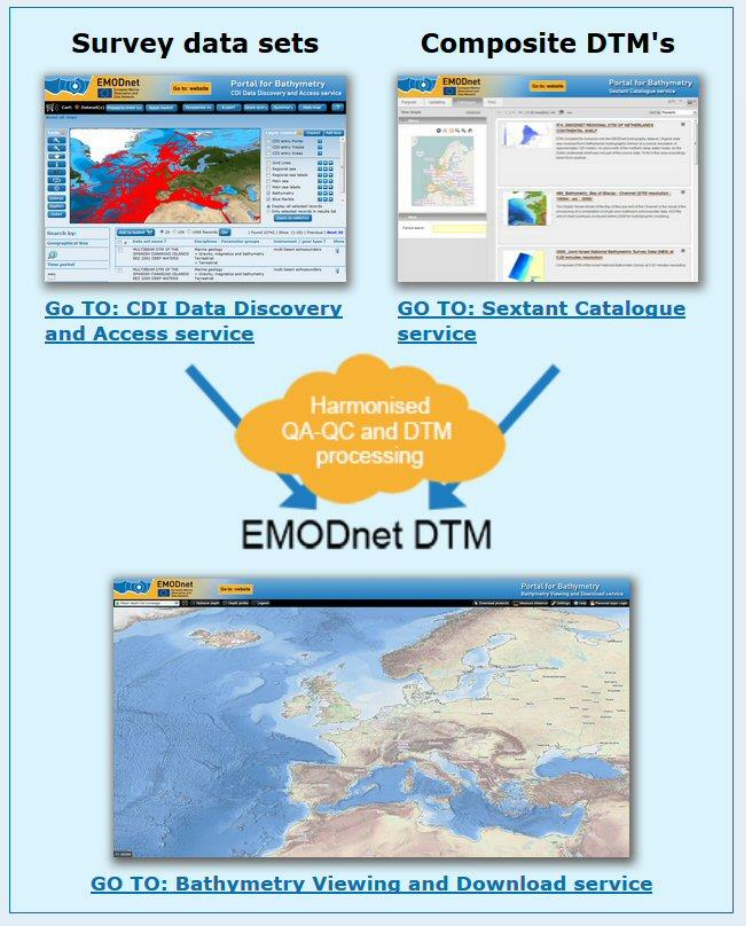


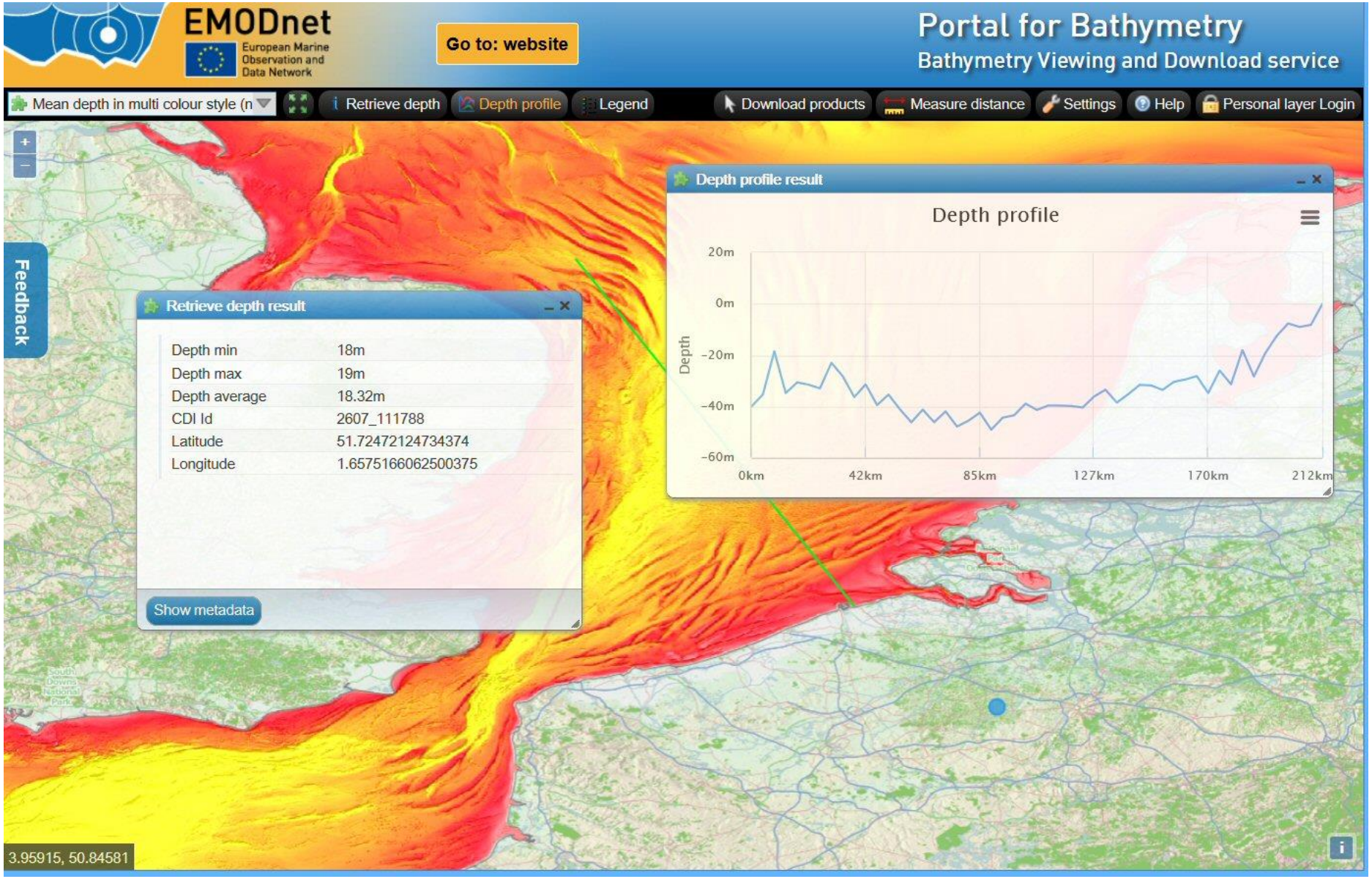
EMODNet Bathymetry

- **Overall objective**: to bring together bathymetric surveys of European seas and to produce, publish and serve a harmonised and medium resolution Digital Terrain Model of all European seas

Present results

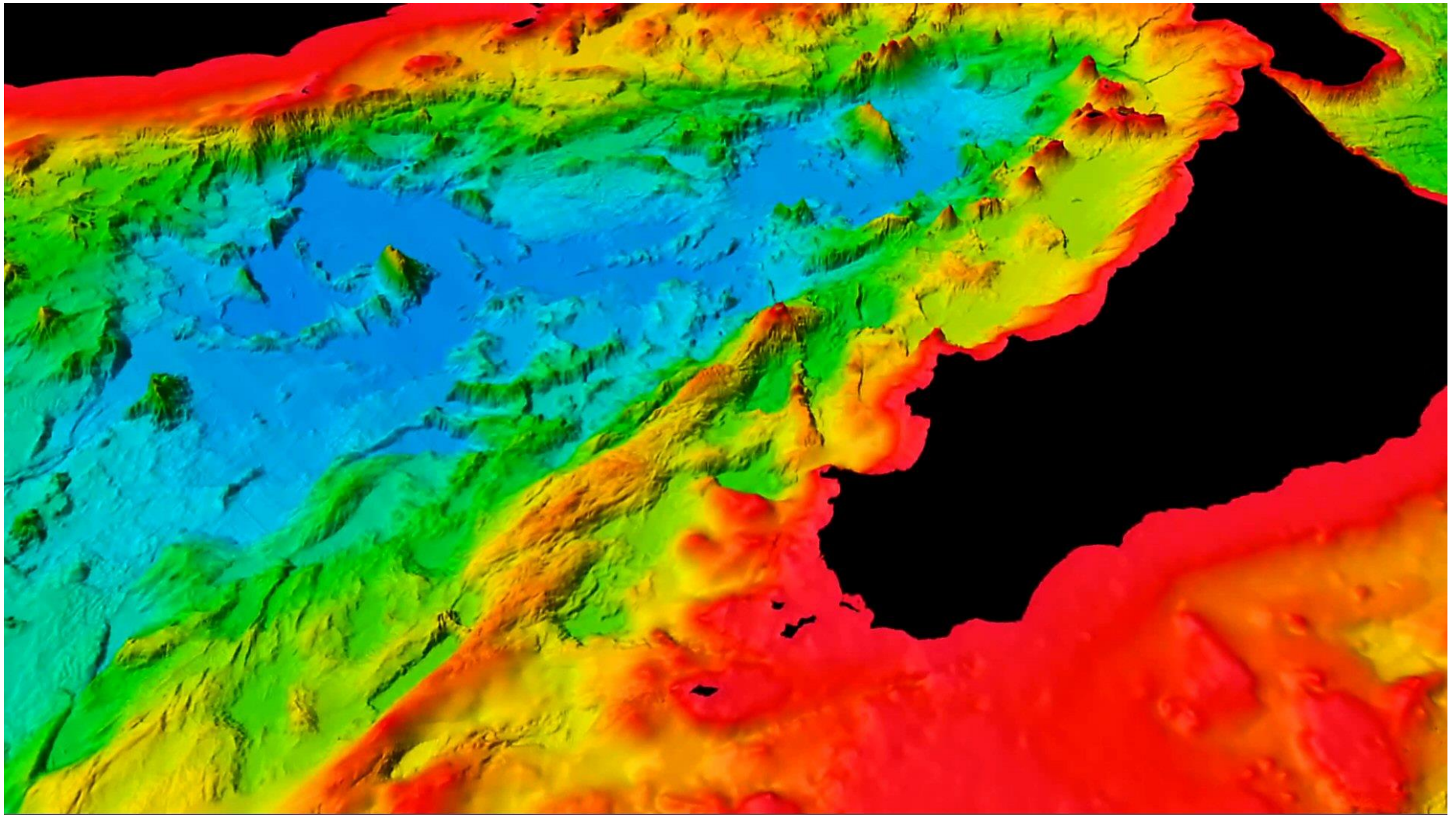
- > 14.500 surveys indexed in CDI
- DTM for all European seas at 1/8*1/8 arc minutes (~230 m)
- DTM freely available
- DTM uses > 7.500 survey data sets and composite DTMs from 31 data providers from 18 countries and GEBCO_2015
- 3 high resolution coastal areas





Retrieve depths incl source reference and downloadable depth profiles

Bathymetric DTM – 3D-Viewer



DTM near Sicily loaded in 3D-viewer

GEBCO – General Bathymetric Chart of the Oceans (IHO – IOC) and EMODnet Bathymetry DTM – example in Tyrrhenian Sea near Sicily – Italy and South Italy – resolution EMODnet is 16 times higher

EMODNet ingestion and safekeeping of marine data (recent!)

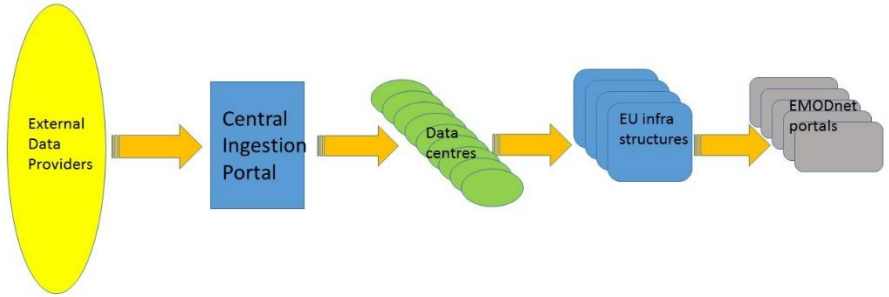
Aim: To develop and operate a new EMODnet portal with services that facilitate data holders from public and private sectors to submit marine data sets for further processing and safekeeping by data repositories and subsequent distribution through EMODnet thematic portals

Context:

- Data repositories are existing data managing organisations in EMODnet such as NODCs, Hydrographic Offices, Geological institutes, Biological institutes, etc

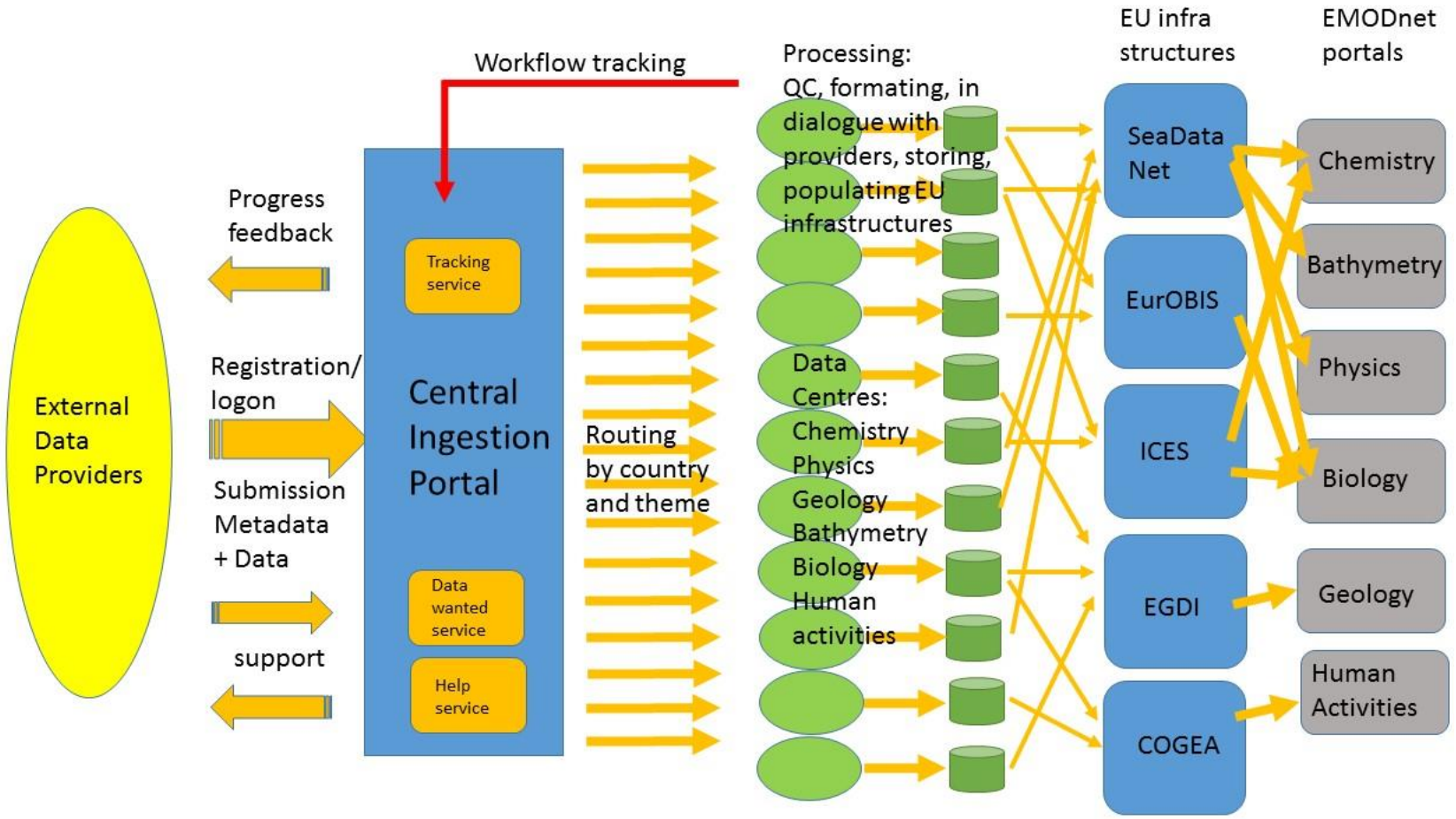
- Primary focus is on data providers and their data sets that are not yet handled and part of the mainstream processes of these data repositories

=> https://www.emodnet-ingestion.eu



Data flow detailed as pathways

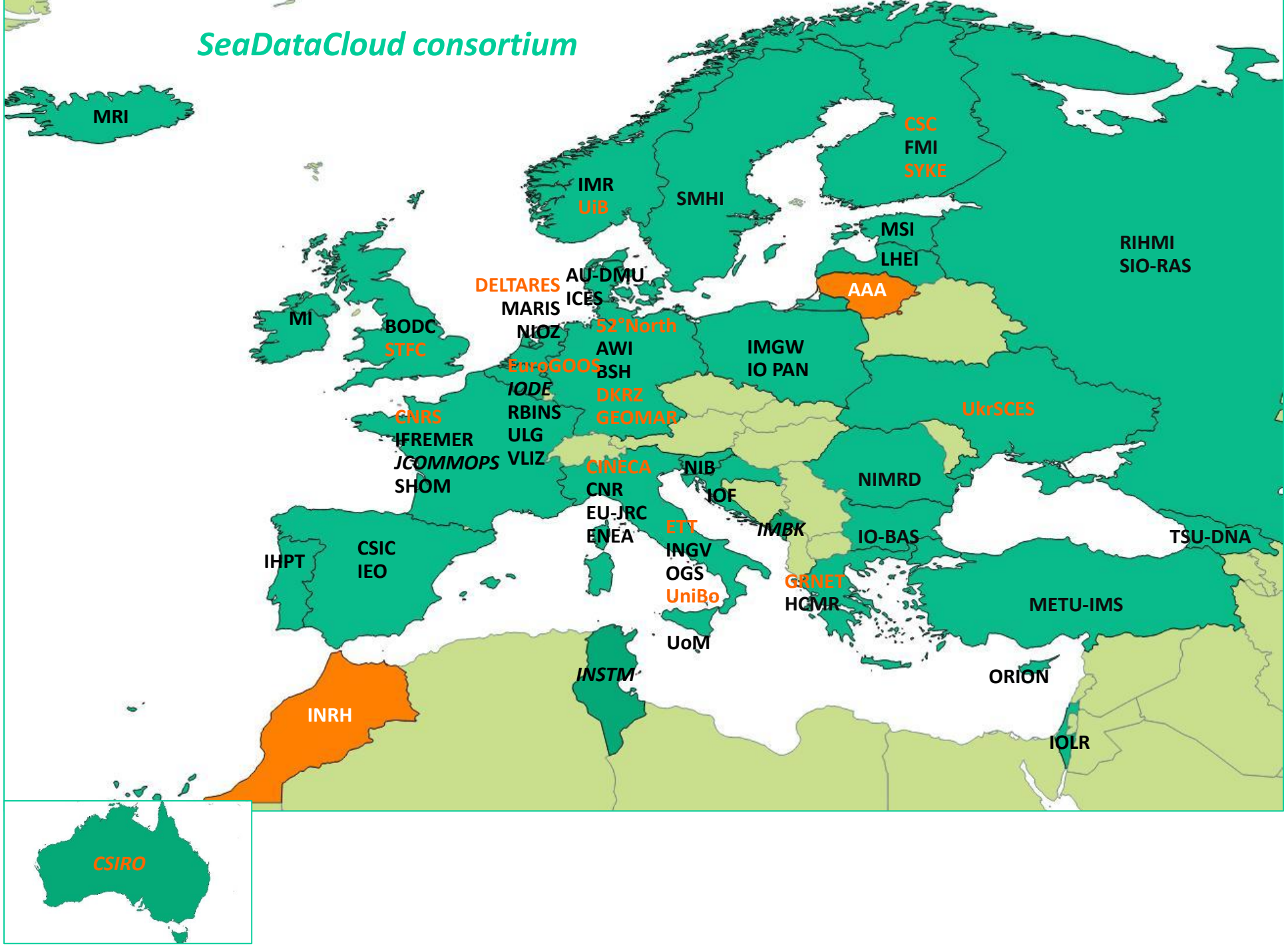
Pathways will be implemented to forward submitted data to the appropriate data repository that will take care of processing, QC and formatting for local storage and publishing, followed by population in the European infrastructures that are driving the EMODnet thematic portals



Example case NL

- Data: WOZEP (partly existing windfarms, partly new)
- Data submitters: Havenbedrijf + windfarms
- Data center: Deltares (QC and harmonisation)
- Phase I: publication as is.
- Phase II: via OpenEarth and APIs to EurOBIS and SeaDataNet.

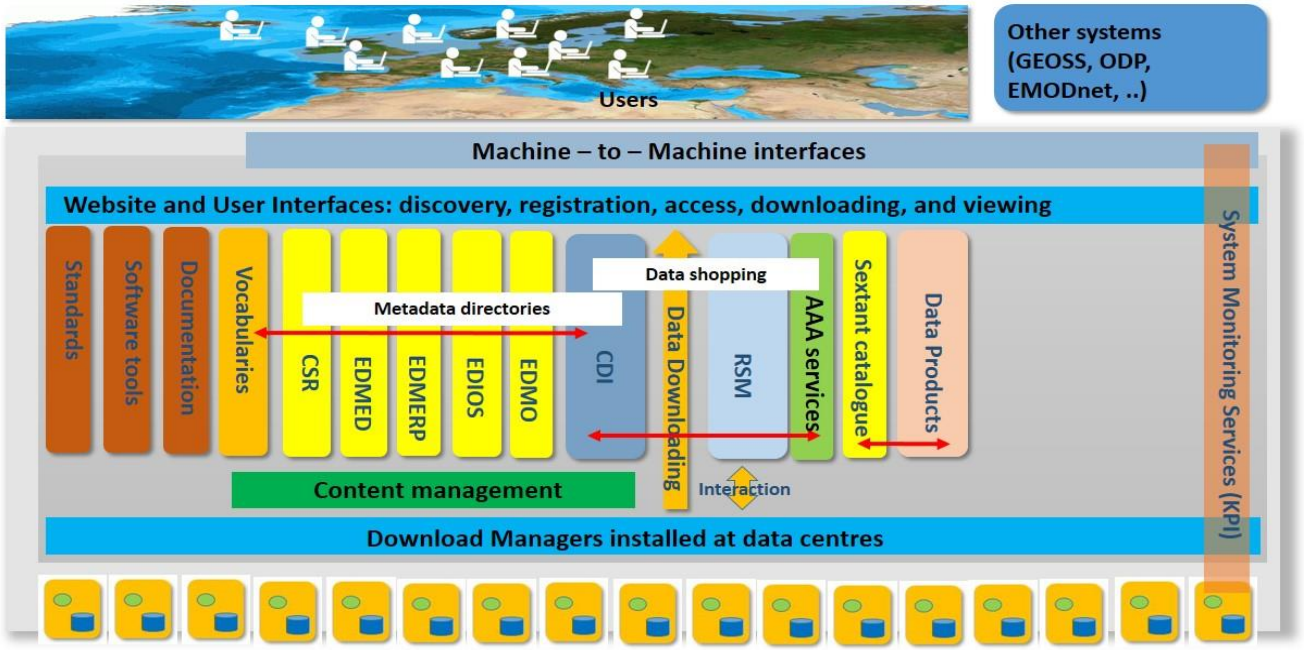
Internationale ontwikkelingen: SeaDataCloud


SeaDataCloud consortium
MRI
IMR
UiB
SMHI
CSC
FMI
SYKE
MSI
LHEI
RIHMI
SIO-RAS
AAA
DELTARES
AU-DMU
ICES
MARIS
NIOZ
MI
BODC
STFC
52°North
AWI
BSH
DKRZ
GEOMAR
EuroGOOS
IODE
RBINS
ULG
VLIZ
IMGW
IO PAN
UkrSCES
CNRS
IFREMER
JCOMMOPS
SHOM
CINECA
CNR
EU-JRC
ENEA
NIB
IOF
NIMRD
IMBK
ETT
INGV
OGS
UniBo
IO-BAS
TSU-DNA
IHPT
CSIC
IEO
GRNET
HCMR
METU-IMS
UoM
INSTM
ORION
INRH
IOLR
CSIRO

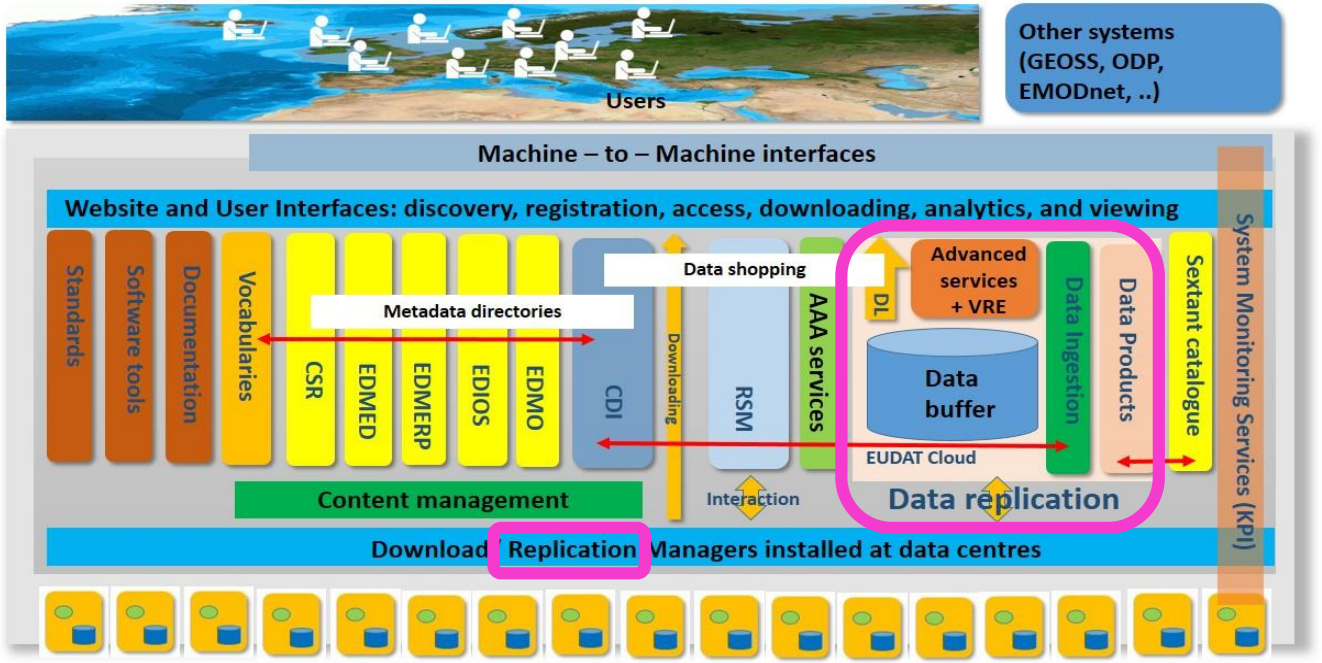
SeaDataCloud – Highlights planned activities

- Improve services to user and data providers
  - Utilise the benefits of a cloud environment with high performance computing to improve the performance of the CDI data access services
  - Develop online services to visualise and process data, in order to preview, subset, format, or analyse data of interest
  - Develop a Virtual Research Environment (VRE) to facilitate collaborative and individual research by users
  - Provide customized services (MySeaDataCloud services) to let users have his/her search profile, receive alerts on new available data, ingest and manage their own data sets

Present SeaDataNet architecture

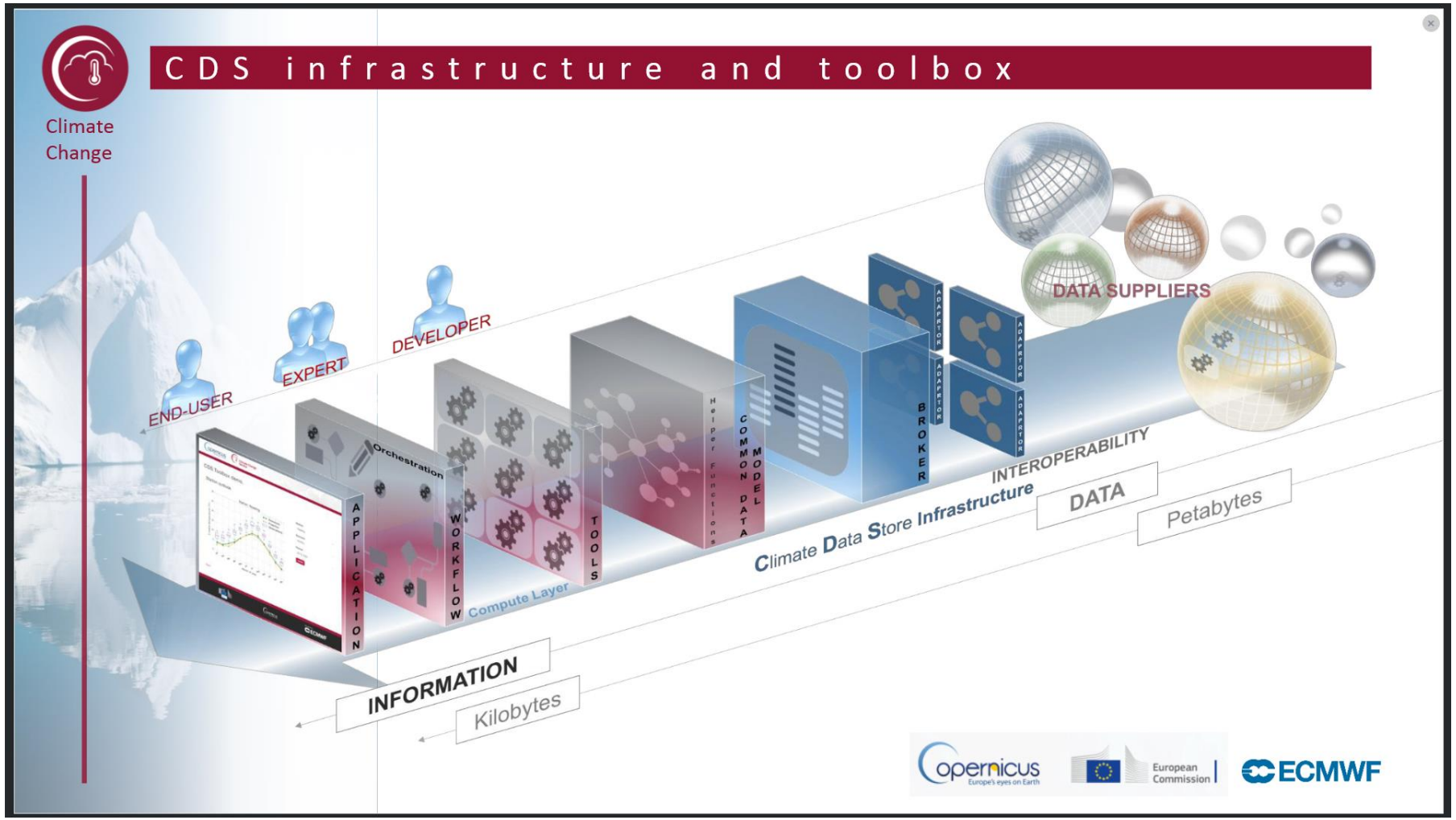


Planned upgraded architecture with data replication, advance services and VRE in the cloud



Data collection by in situ sensors and remote sensing

Parallel with the climate data domain



Bron: C3S – Jean-Noel Thepaut

2. Clouds en Virtual Research Environment

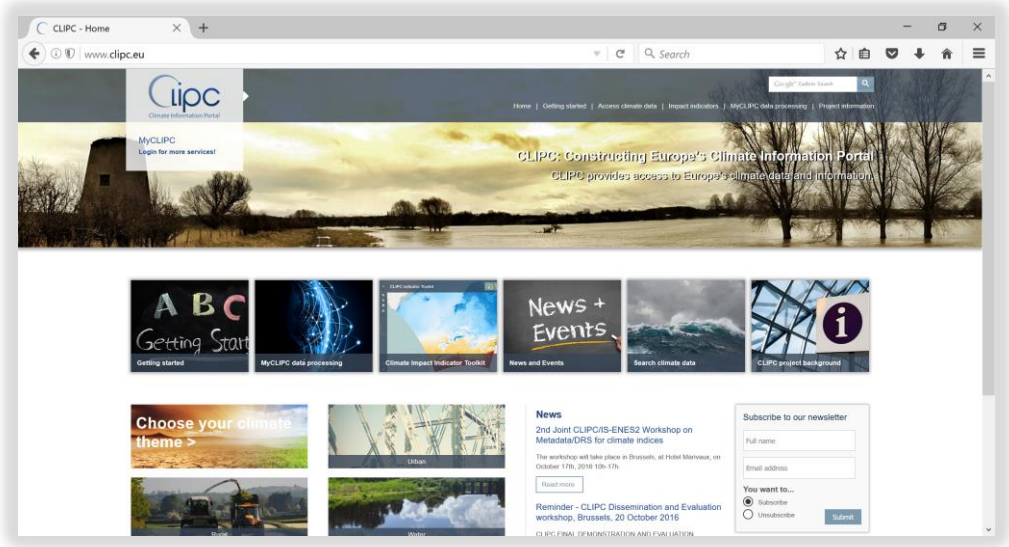
Voordeel van een cloud

- Service platform naast de data
- Grote databestanden geen probleem
- Processing van data snel en on the fly
- Hergebruik van de resultaten, downloadbaar, deelbaar
- Grote capaciteit tegen relatief lage kosten
- Inmiddels veel aanbieders, waaronder Google, Amazon

Gebruik van de cloud voor research

- Gebruikers: Onderzoekers, consultants, engineers industrie
- Voorwaarde: Data goed georganiseerd, geharmoniseerd qua format
- “Een eigen omgeving voor research”:
  - Aanbieden goede gevalideerde datasets met juiste metadata
  - Processing services: Te gebruiken via “i-Notebooks” of in meer gebruiksvriendelijke wizards
  - Toevoegen eigen datasets
  - Collaborative working environment
  - Output kunnen opslaan, downloaden, delen, publishing (DOI) hergebruiken, visualiseren

Voorbeeld CLIPC: Toolkit voor climate impact



http://www.clipc.eu/

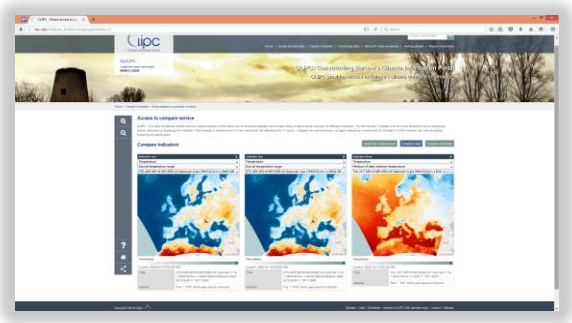
Focus of CLIPC

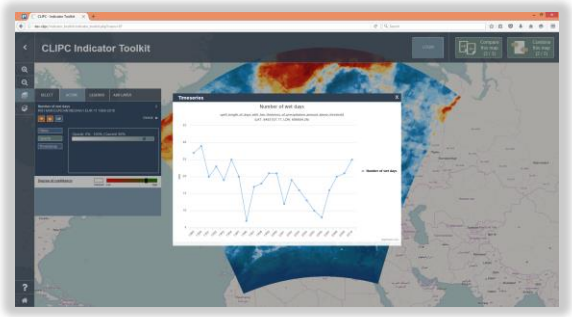
- Aimed at climate scientists, (socio-economic) impact researchers, boundary workers. NOT End-users / decision makers
- Data: Climate observations and projections data and impact indicators
- Standards: Use existing standards, but also expand existing vocabularies and data and metadata standards
- Re-use existing concepts, components and services as much as possible but also innovate

Approach for the toolkit

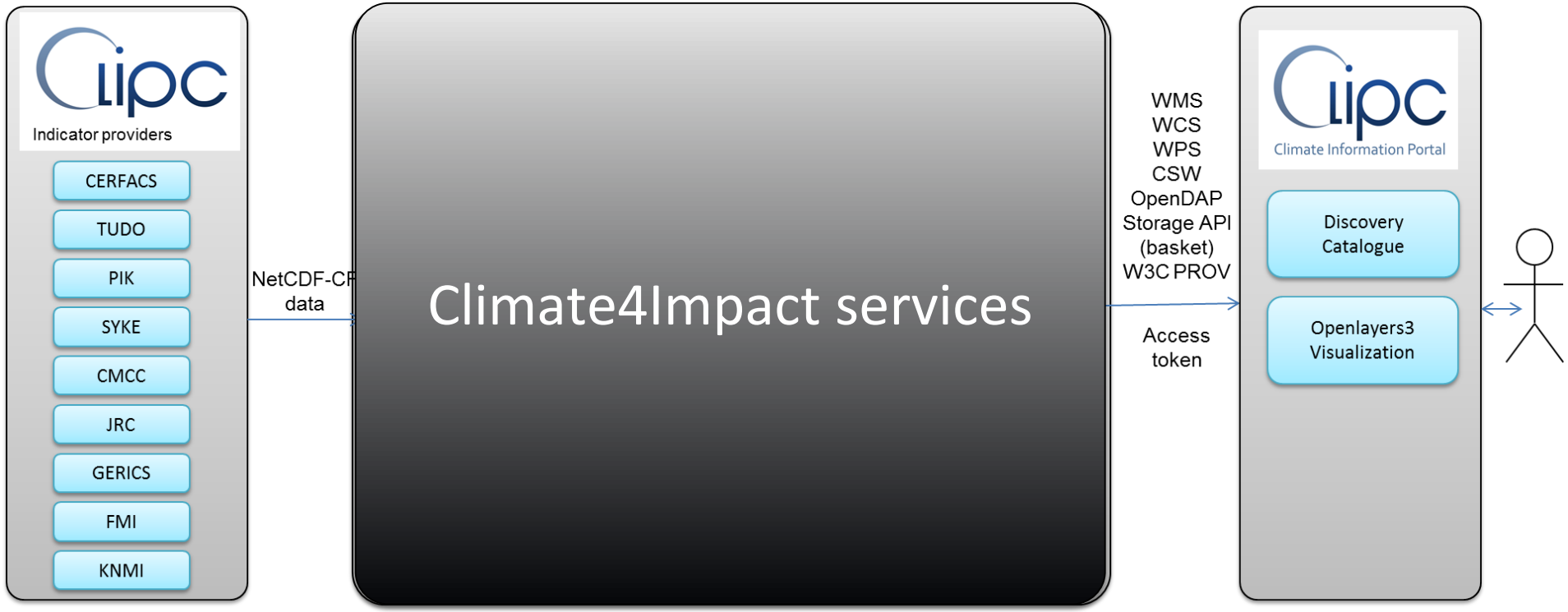
CLIPC discussions have focused on a virtual user “Jake Smart” as a boundary worker
=> “What should he need?”

- The possibility to view set of indicators per theme: Thematic approach
- Function “compare”: compare indicators visually and via metadata.
- Function “combine”: Combine 2 indicators into a third via calculation/algorithm selection
- Explore the datasets (time series, histogram, etc)
- All integrated in one user interface

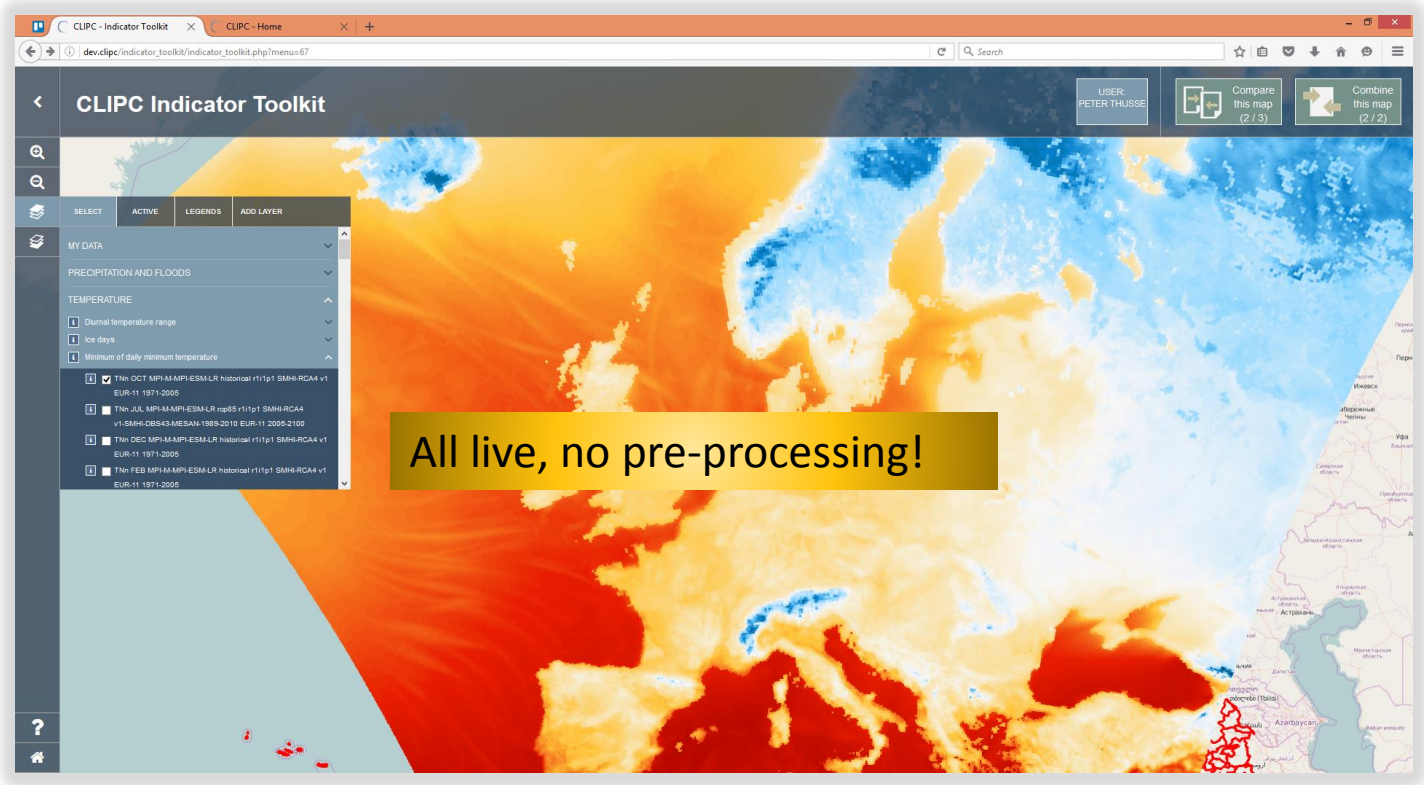




Climate4Impact and CLIPC architecture



Features of the indicator toolkit

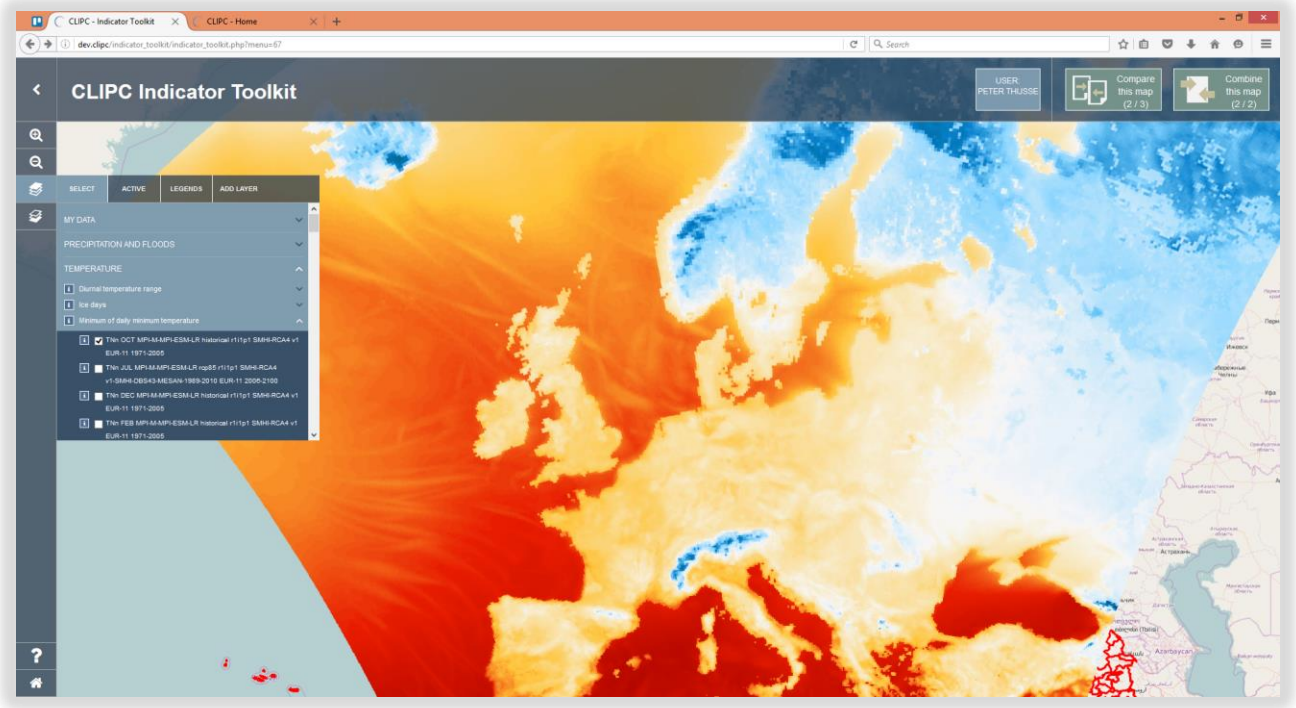


[Probeer het zelf via:
http://www.clipc.eu/indicator_toolkit/indicator_toolkit.php](http://www.clipc.eu/indicator_toolkit/indicator_toolkit.php)

<hierna aantal backup slides>

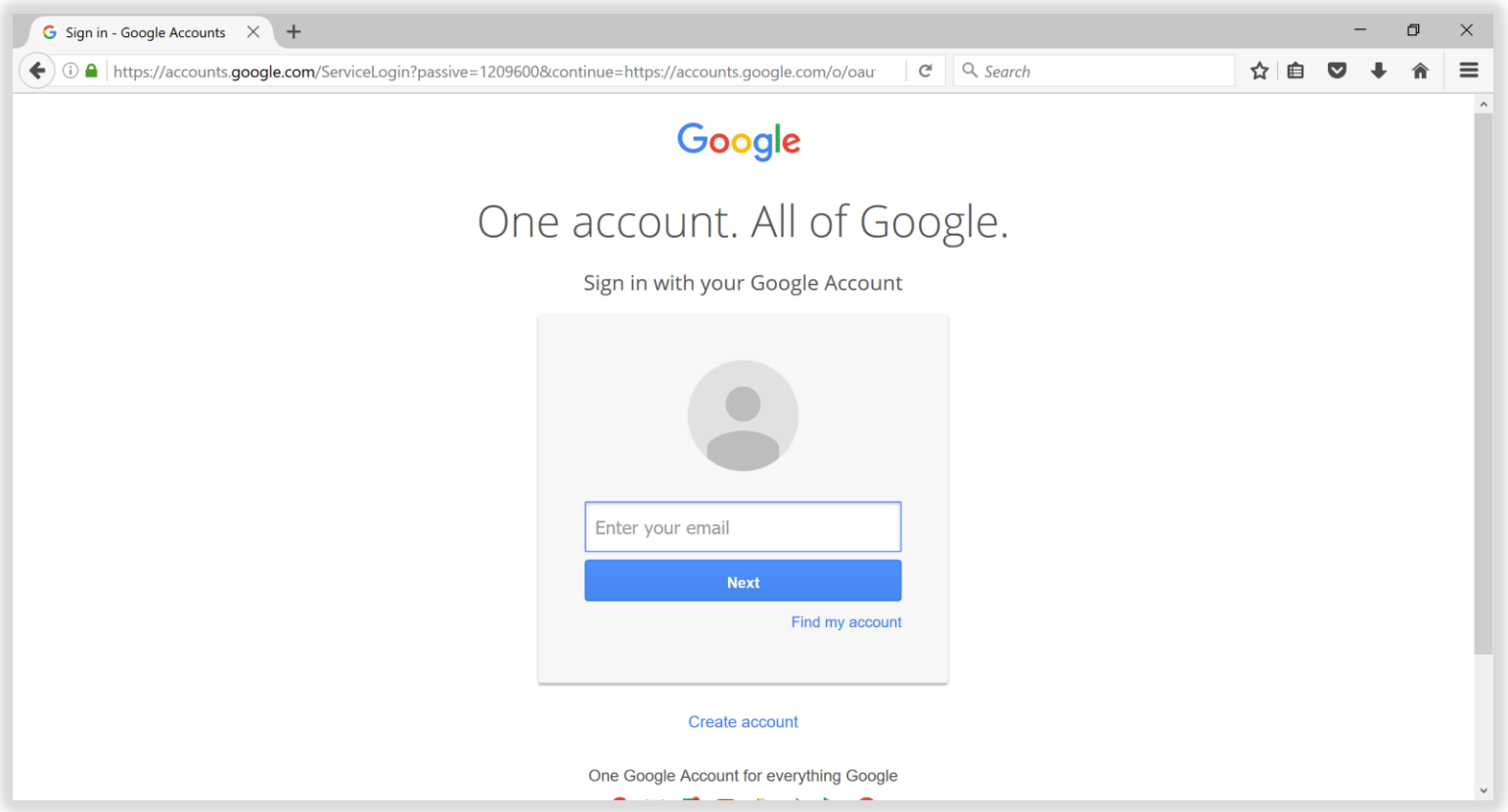
Skip naar laatste slides

Exploring first the indicator toolkit

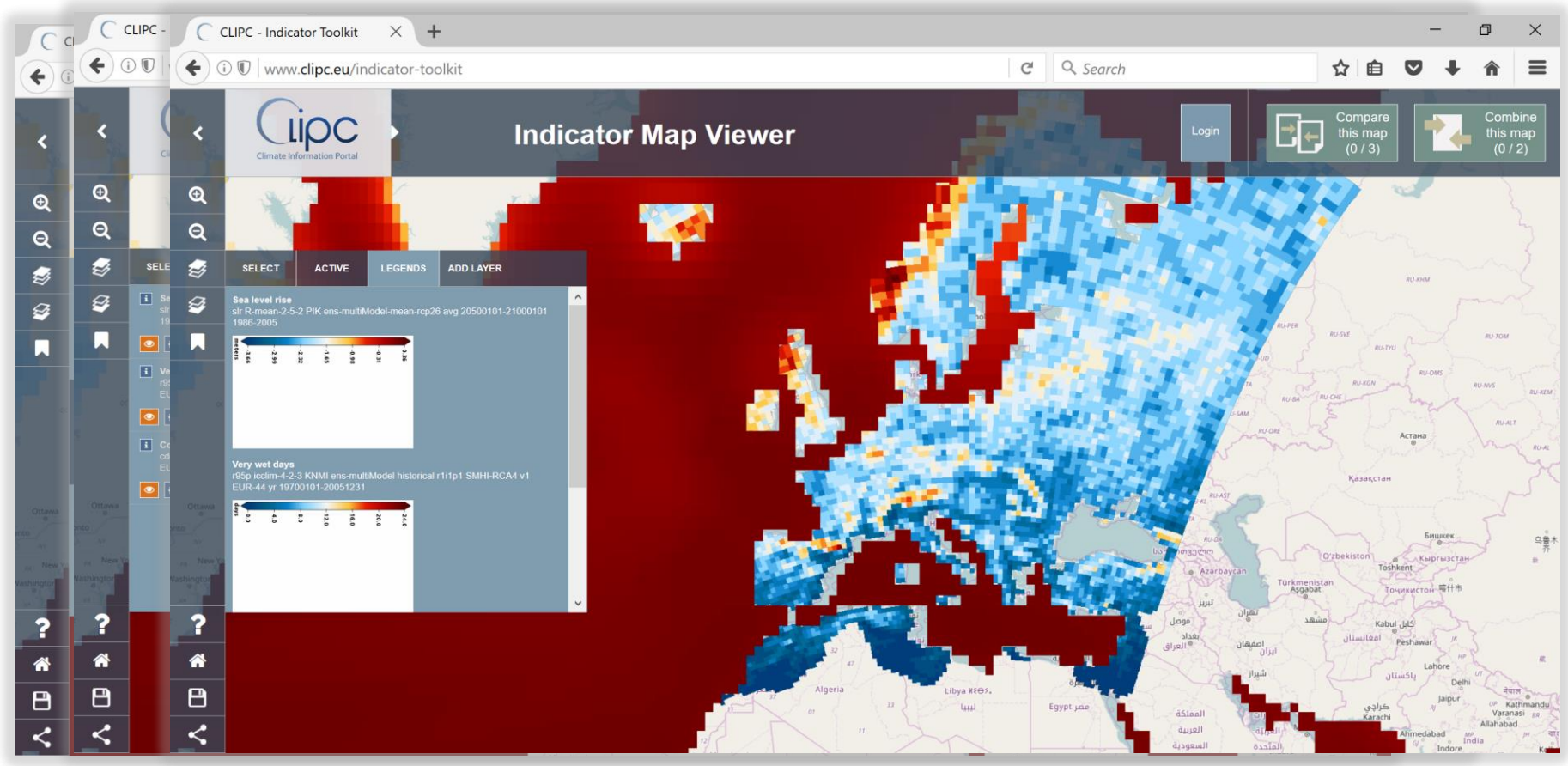


[Try yourself via http://www.clipc.eu/indicator_toolkit/indicator_toolkit.php](http://www.clipc.eu/indicator_toolkit/indicator_toolkit.php)

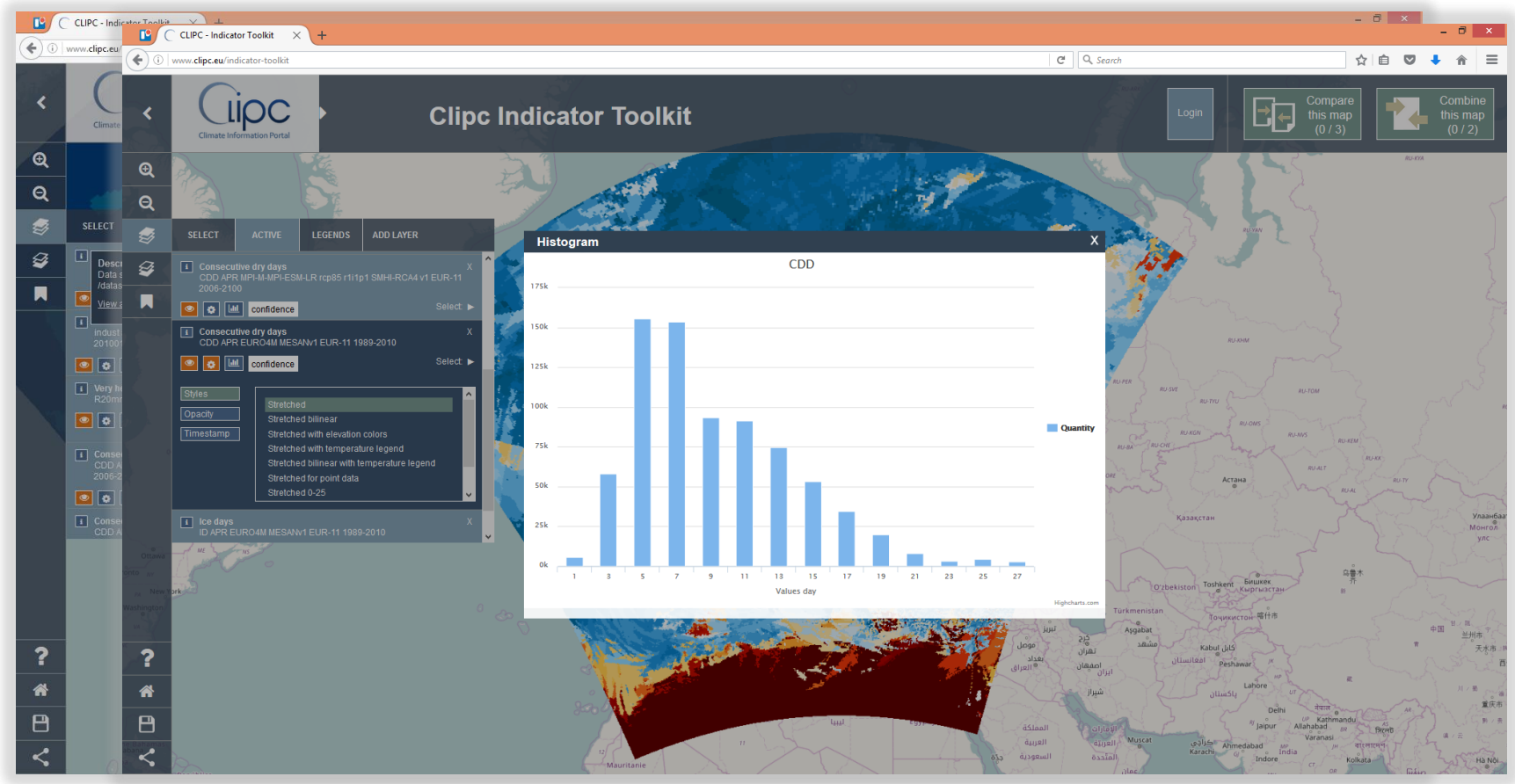
Login


Sign in - Google Accounts
https://accounts.google.com/ServiceLogin?passive=1209600&continue=https://accounts.google.com/o/oau
Search
Google
One account. All of Google.
Sign in with your Google Account
Enter your email
Next
Find my account
Create account
One Google Account for everything Google

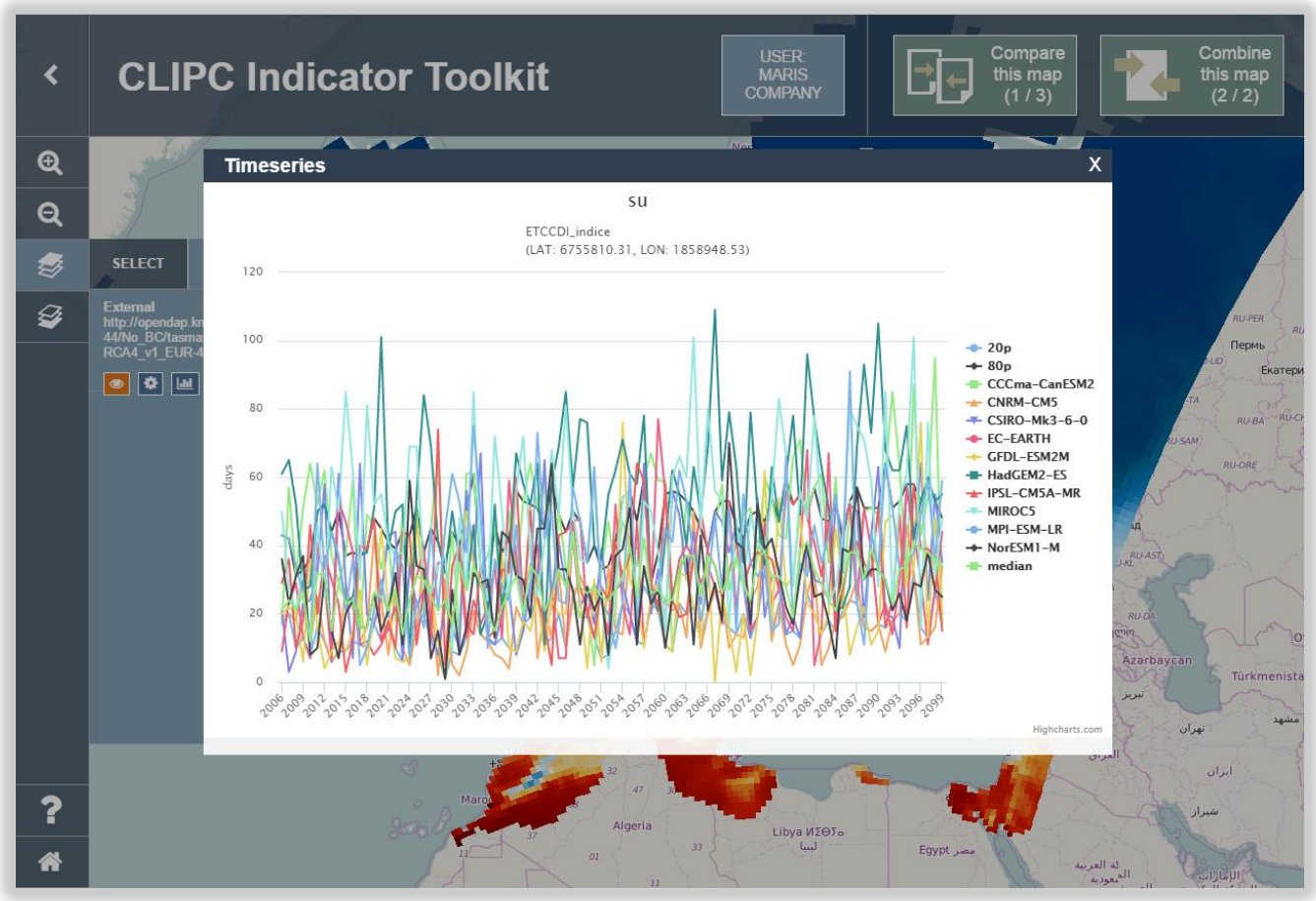
Select and view indicator datasets



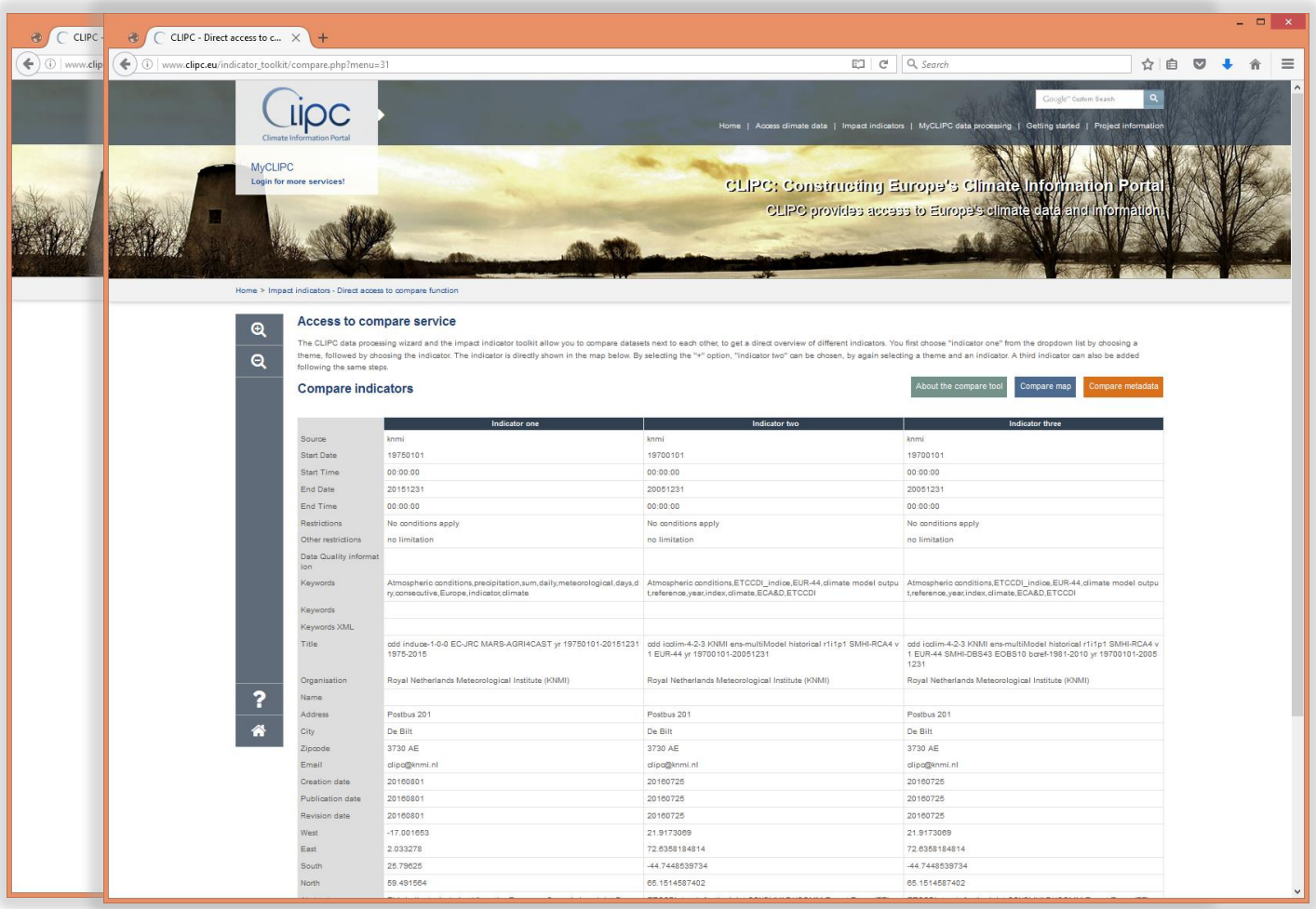
Inspect


Clipc Indicator Toolkit
Login
Compare this map (0 / 3)
Combine this map (0 / 2)
SELECT
ACTIVE
LEGENDS
ADD LAYER
Consecutive dry days
CDD APR MPI-M-MPI-ESM-LR rcp85 r1i1p1 SMHI-RCA4 v1 EUR-11 2006-2100
confidence
Select:
Consecutive dry days
CDD APR EURO4M MESANv1 EUR-11 1989-2010
confidence
Select:
Styles
Opacity
Timestamp
Stretched
Stretched bilinear
Stretched with elevation colors
Stretched with temperature legend
Stretched bilinear with temperature legend
Stretched for point data
Stretched 0-25
Ice days
ID APR EURO4M MESANv1 EUR-11 1989-2010
Histogram
CDD
Quantity
Values day

View timeseries - Ensembles



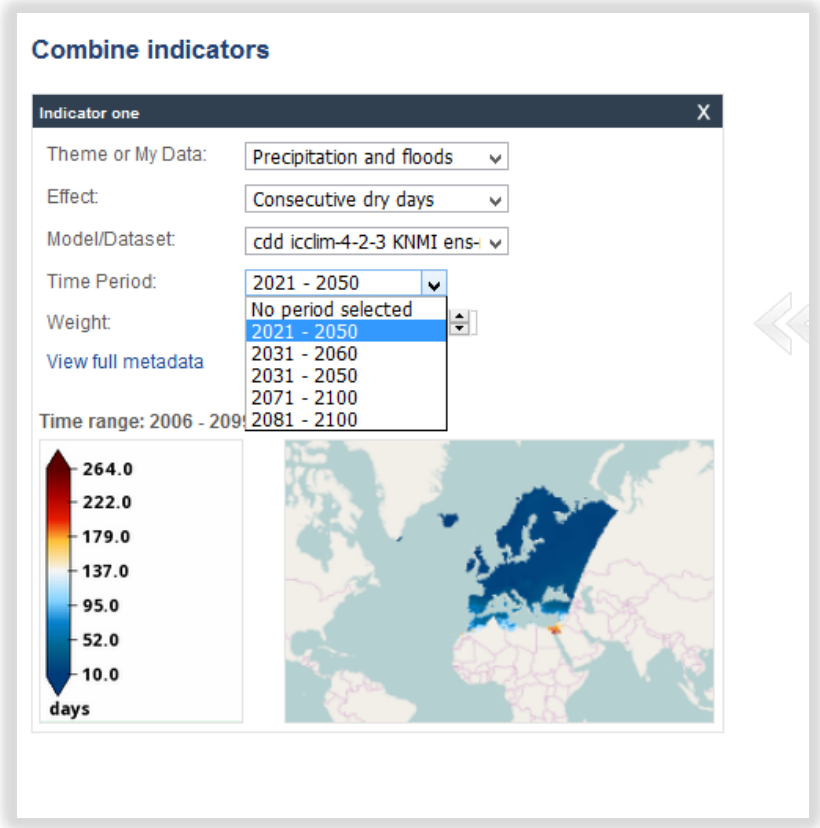
Compare indicator datasets (maps and metadata)



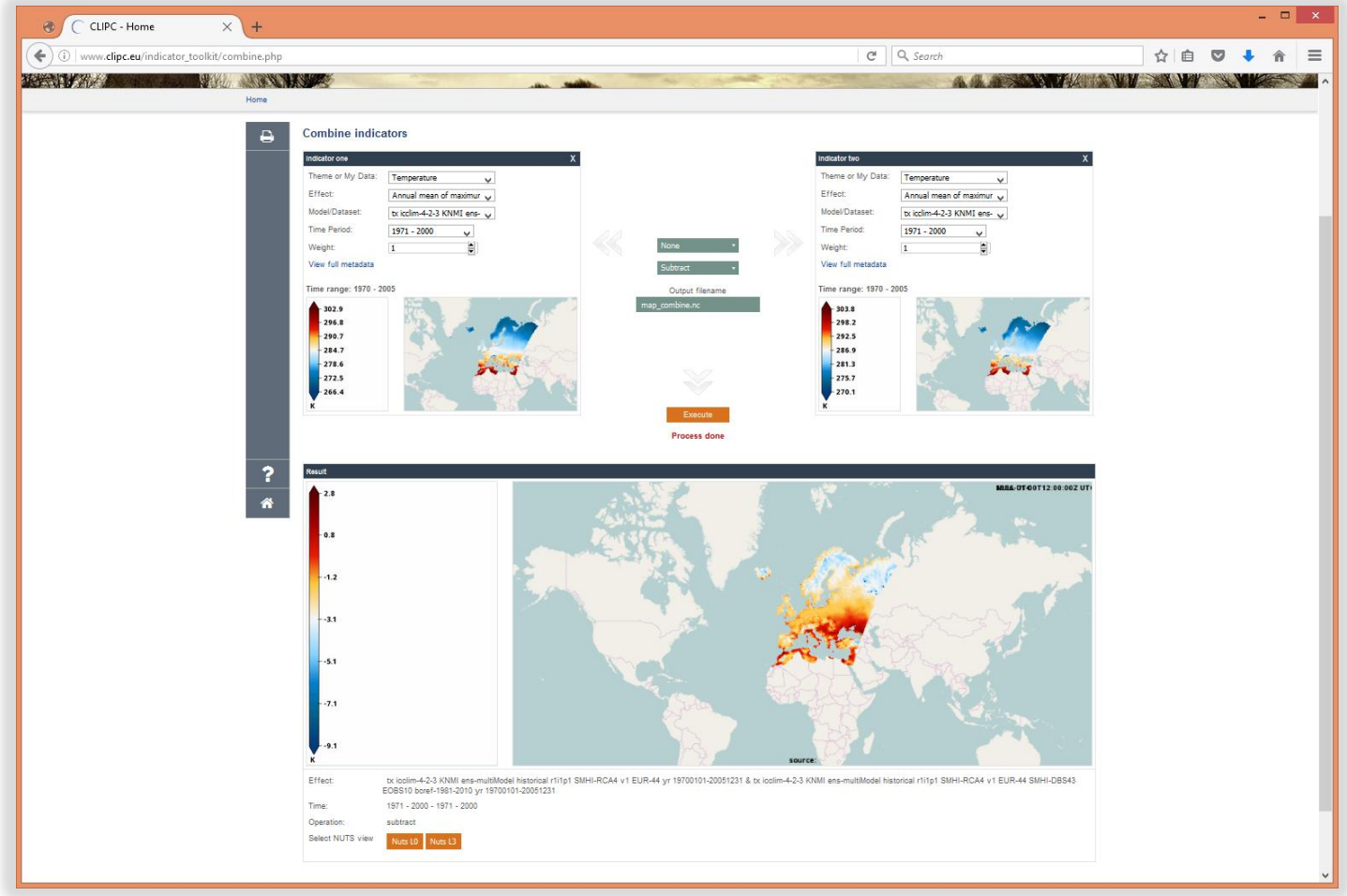
	Indicator one	Indicator two	Indicator three
Source	knmi	knmi	knmi
Start Date	19750101	19700101	19700101
Start Time	00:00:00	00:00:00	00:00:00
End Date	20151231	20051231	20051231
End Time	00:00:00	00:00:00	00:00:00
Restrictions	No conditions apply	No conditions apply	No conditions apply
Other restrictions	no limitation	no limitation	no limitation
Data Quality information			
Keywords	Atmospheric conditions,precipitation,sum,daily,meteorological,day,dry,consecutive,Europe,indicator,climate	Atmospheric conditions,ETCCDI_indice,EUR-44,climate model output,reference,year,index,climate,ECA&D,ETCCDI	Atmospheric conditions,ETCCDI_indice,EUR-44,climate model output,reference,year,index,climate,ECA&D,ETCCDI
Keywords			
Keywords XML			
Title	cdd induce-1-0-0 EC-JRC MARS-AGRI4CAST yr 19750101-20151231 1975-2015	cdd ioclim-4-2-3 KNMI ens-multiModel historical r1i1p1 SMHI-RCA4 v1 EUR-44 yr 19700101-20051231	cdd ioclim-4-2-3 KNMI ens-multiModel historical r1i1p1 SMHI-RCA4 v1 EUR-44 SMHI-DBS43 EOBS10 baref-1981-2010 yr 19700101-20051231
Organisation	Royal Netherlands Meteorological Institute (KNMI)	Royal Netherlands Meteorological Institute (KNMI)	Royal Netherlands Meteorological Institute (KNMI)
Name			
Address	Postbus 201	Postbus 201	Postbus 201
City	De Bilt	De Bilt	De Bilt
Zipcode	3730 AE	3730 AE	3730 AE
Email	clipc@knmi.nl	clipc@knmi.nl	clipc@knmi.nl
Creation date	20160801	20160725	20160725
Publication date	20160801	20160725	20160725
Revision date	20160801	20160725	20160725
West	-17.001653	21.9173069	21.9173069
East	2.033278	72.6358184814	72.6358184814
South	25.79625	-44.7448539734	-44.7448539734
North	59.491564	65.1514587402	65.1514587402

Combine indicators – create time period averages

Calculating averages over 20/30 years on the fly

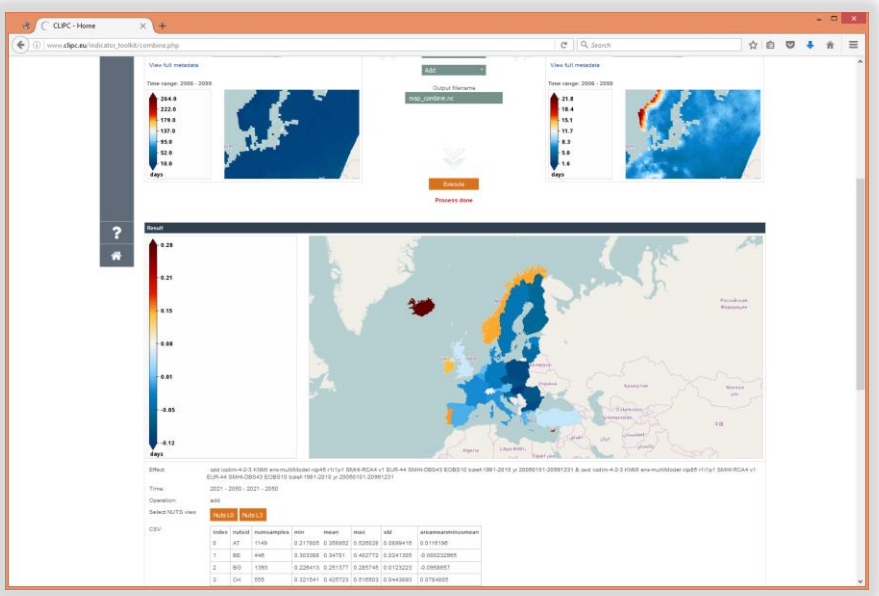


Combine indicators – subtract = difference map

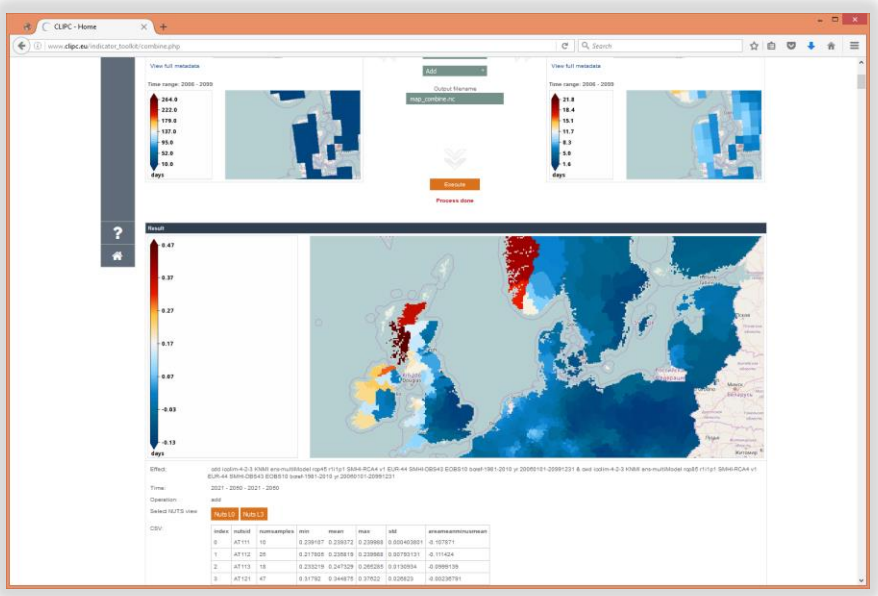


Combine indicators – average the result over areas (NUTS = EU Admin regions)

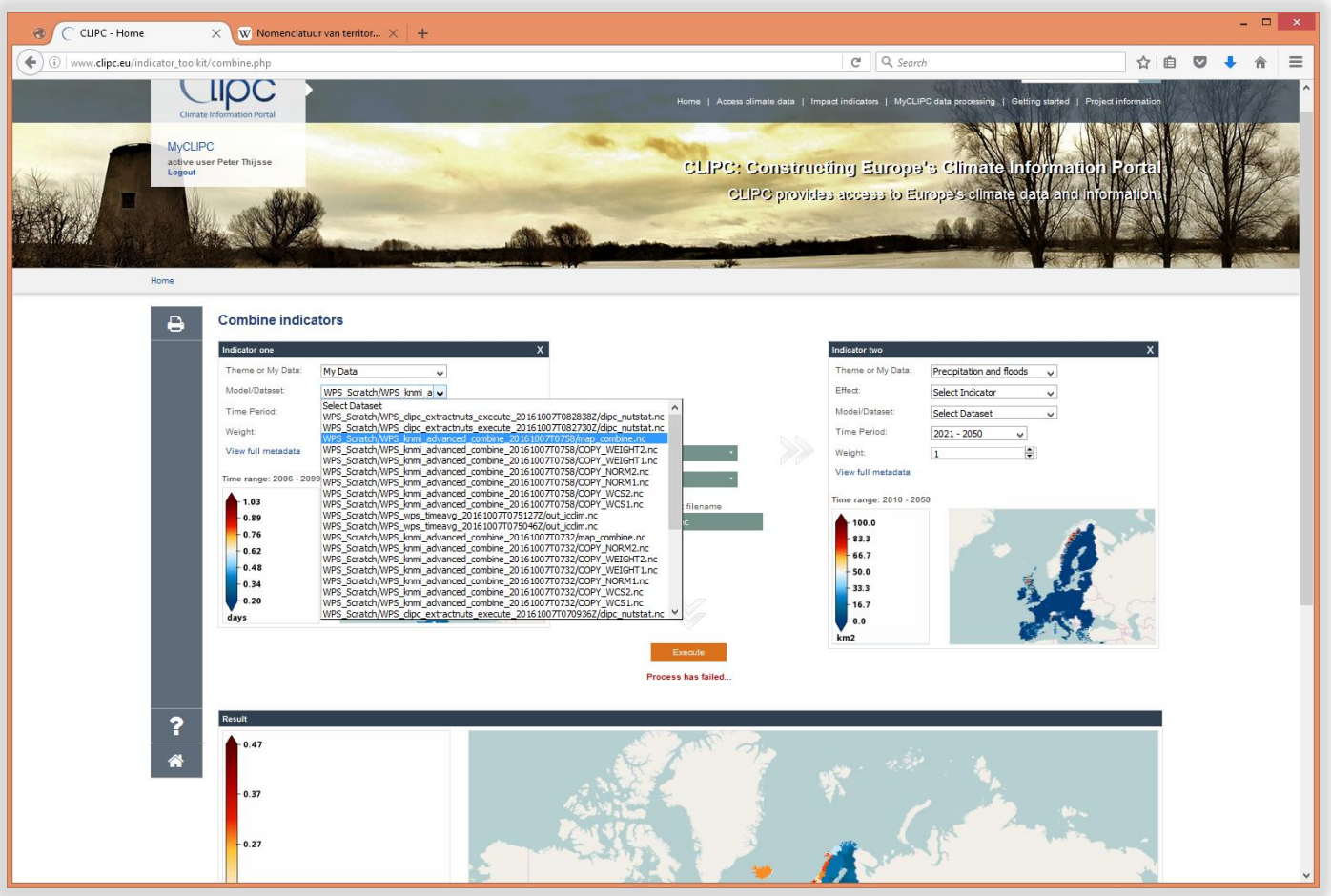
NUTS 0 (Countries)
(Departments)



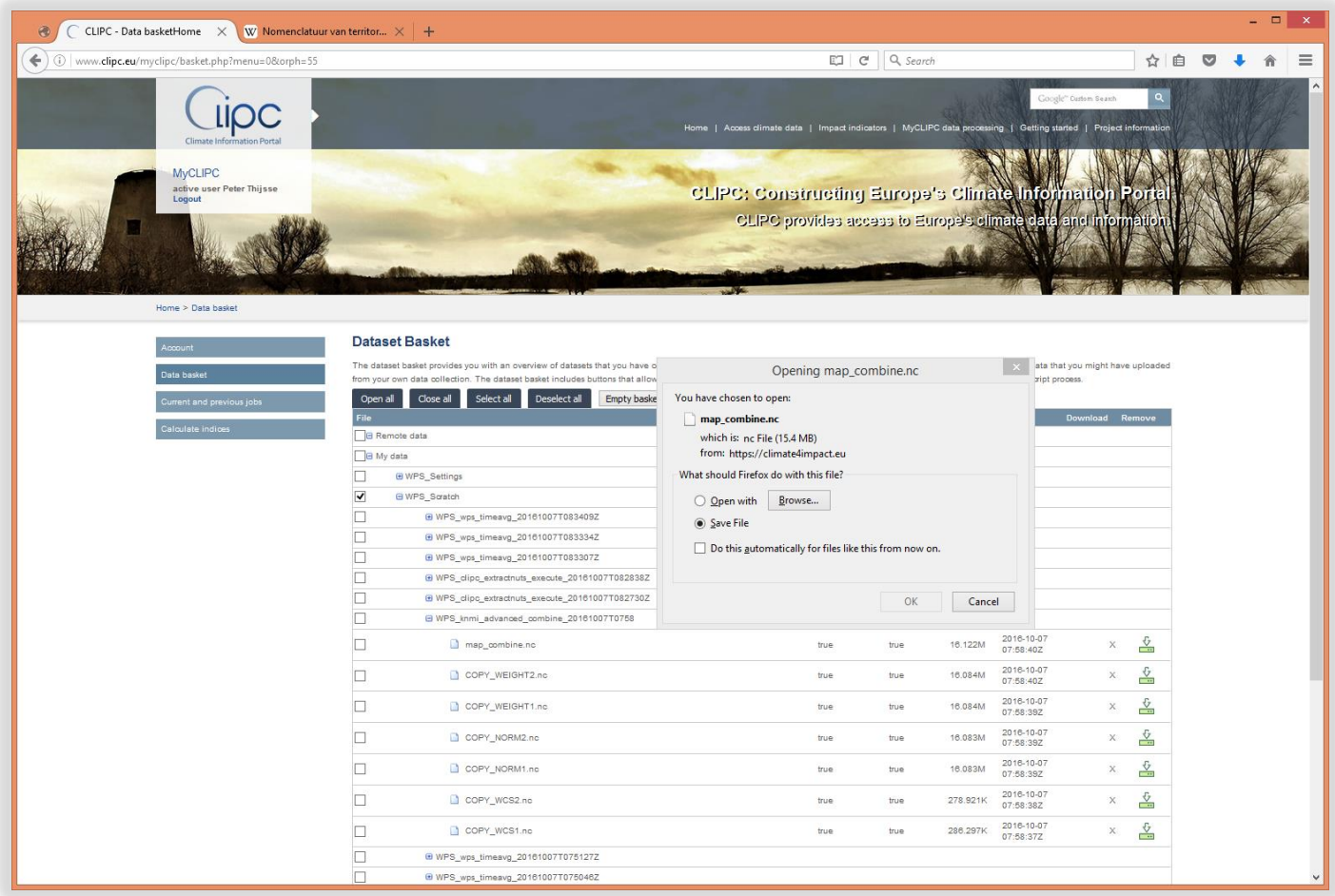
NUTS 3



Re-use your output



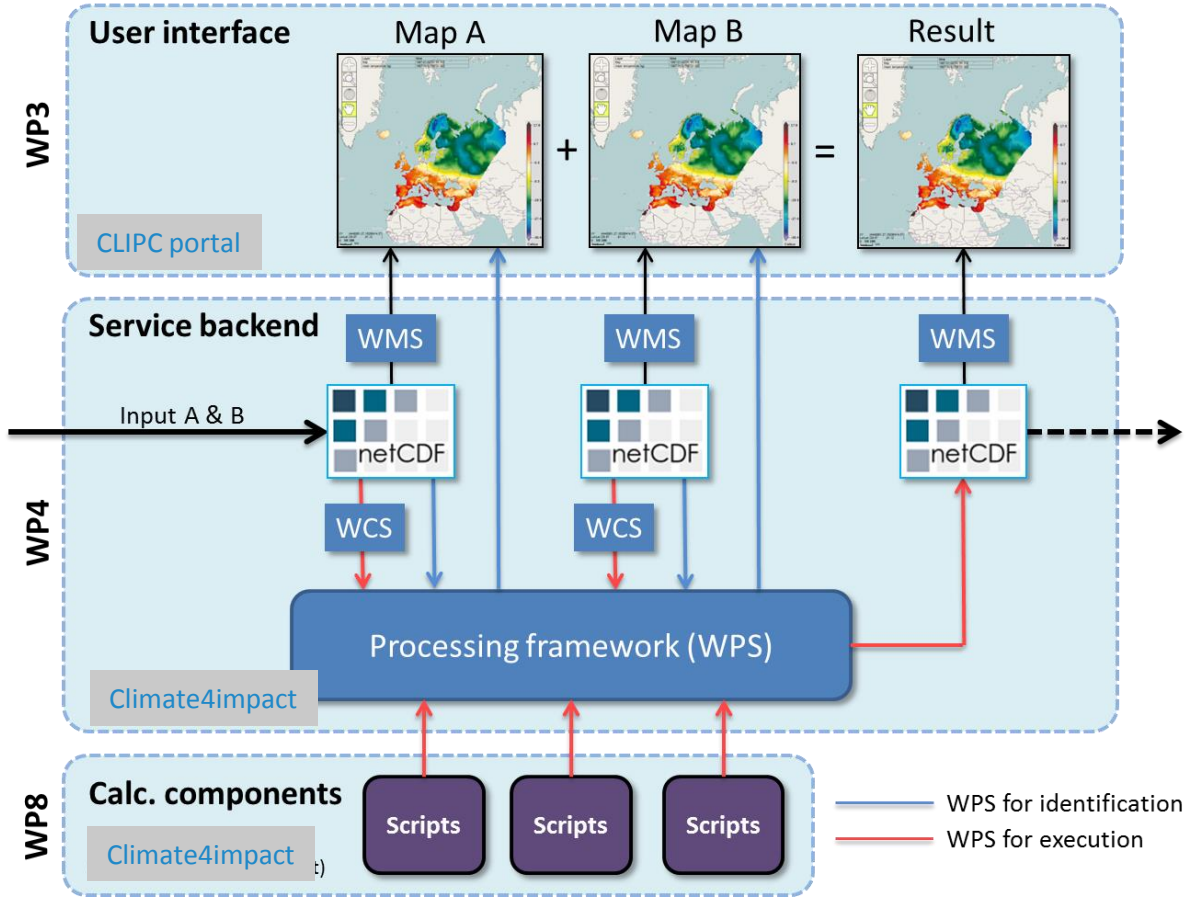
Or download results from your “basket”



Toolkit integration and indicator processing

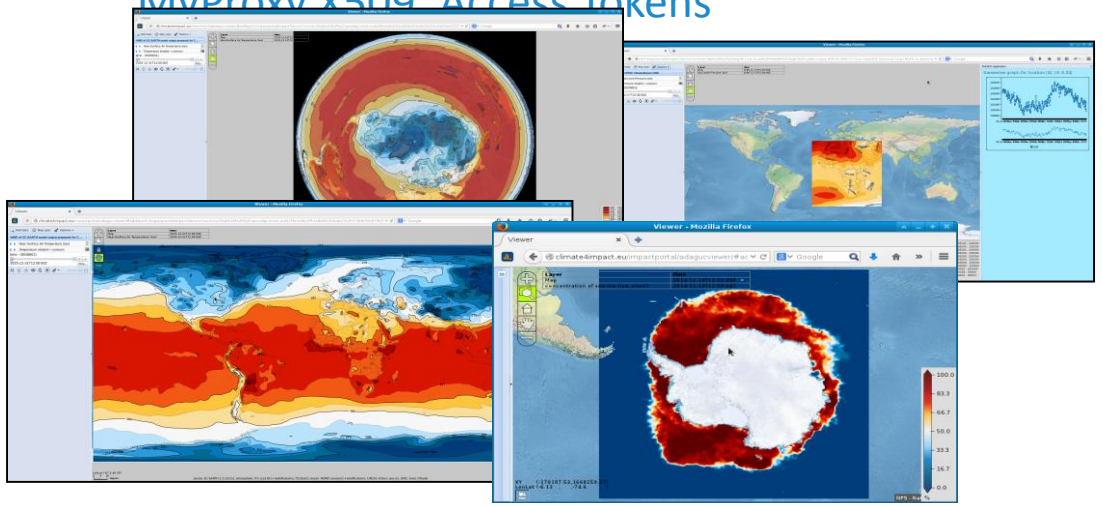
Implementation Framework

- Normalization functions:
  - Linear
  - Standard deviation
  - Min/max
- Calculations supported:
  - Add
  - Subtract
  - Multiply
  - Divide
- Easy extendable with new calculations
- Integrated in portal



Use of open standards and Open Source software:

- Data access over OPeNDAP → THREDDS
- Online analysis using WPS → PyWPS and ICCLIM
- Online visualization using WMS → ADAGUC
- Subsetting using WCS → ADAGUC
- Metadata using CSW → Geonetwork
- Single Sign On → OpenId, OAuth2, delegation using MyProxy X509, Access Tokens



3. Dit kunnen wij toch ook in NL?

Een Nederlandse mariene VRE!

- Datasets vanuit de overheden en research organisaties: Meeste al georganiseerd in Digishape en datastandaarden als Aquo, SDN, ISO e.d. aanwezig
- Expertise aanwezig binnen Digishape (Deltares, Van Oord, MARIS,..) om samen met de dataproviders (RWS, IMARES, NIOZ,..) een showcase voor Nederland te creeren
- Grote voordelen voor BV Nederland
  - Een etalage platform bieden voor mariene data en processing services voor industrie en onderzoek
  - Inzicht geven in de beschikbare mariene data, modellen (bv getijdenmodellen Deltares, etc), en tegelijk kan data vanuit de gehele wereld met de NL data gecombineerd worden om use case applicaties te kunnen uitvoeren

Tijd voor discussie

- Welke toegevoegde waarde biedt een dergelijk VRE?
- Wat zouden goede use cases zijn?
- En onvermijdelijk: Wie zou dit kunnen financieren?