CryoLand – Copernicus Service Snow And Land Ice

Geoportal Demonstration

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CryoLand Project Summary

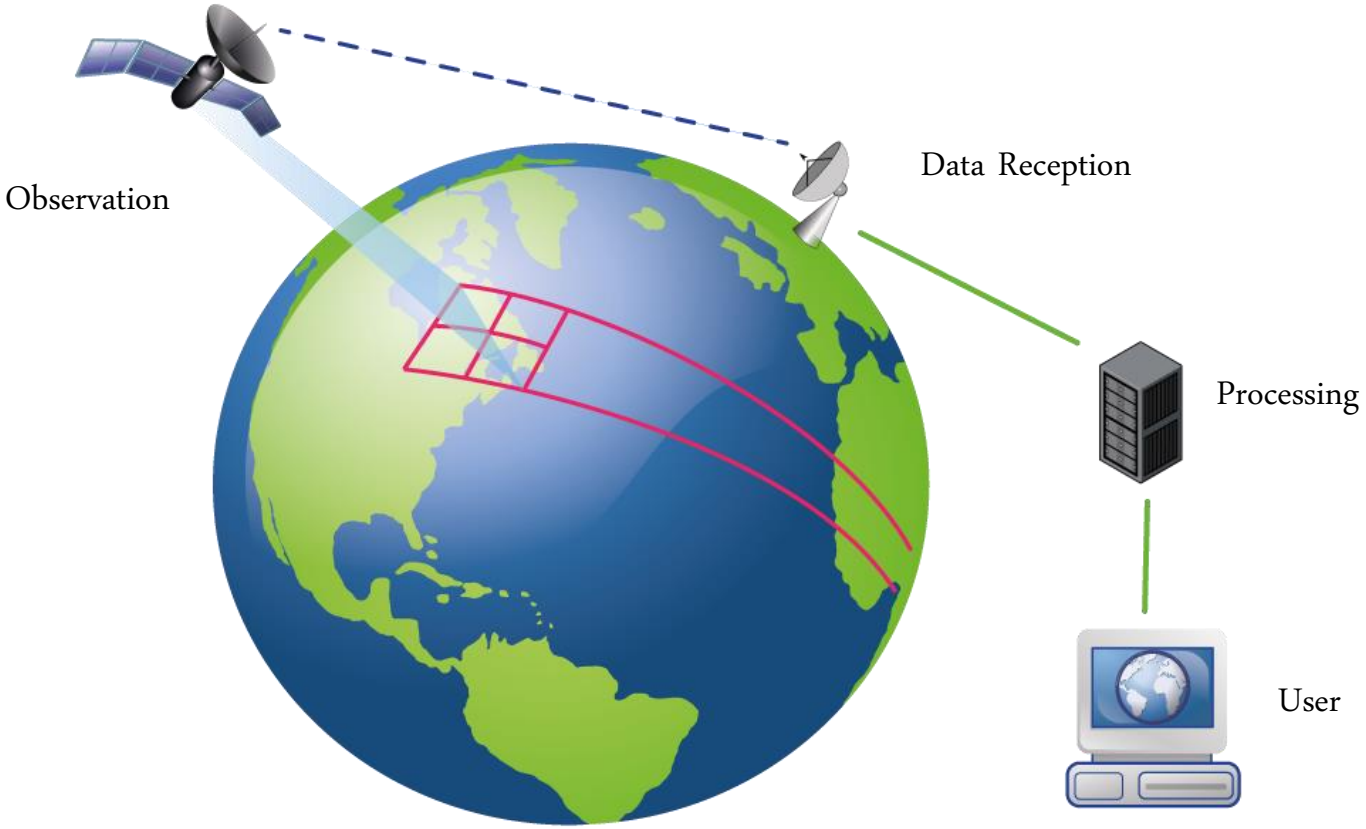
- A Collaborative Project (2011-2015) funded by the EU under the 7th Framework Program (Project number:262925)

- To develop, implement and validate **a standardized and sustainable online service** on snow and land ice monitoring within GMES/Copernicus

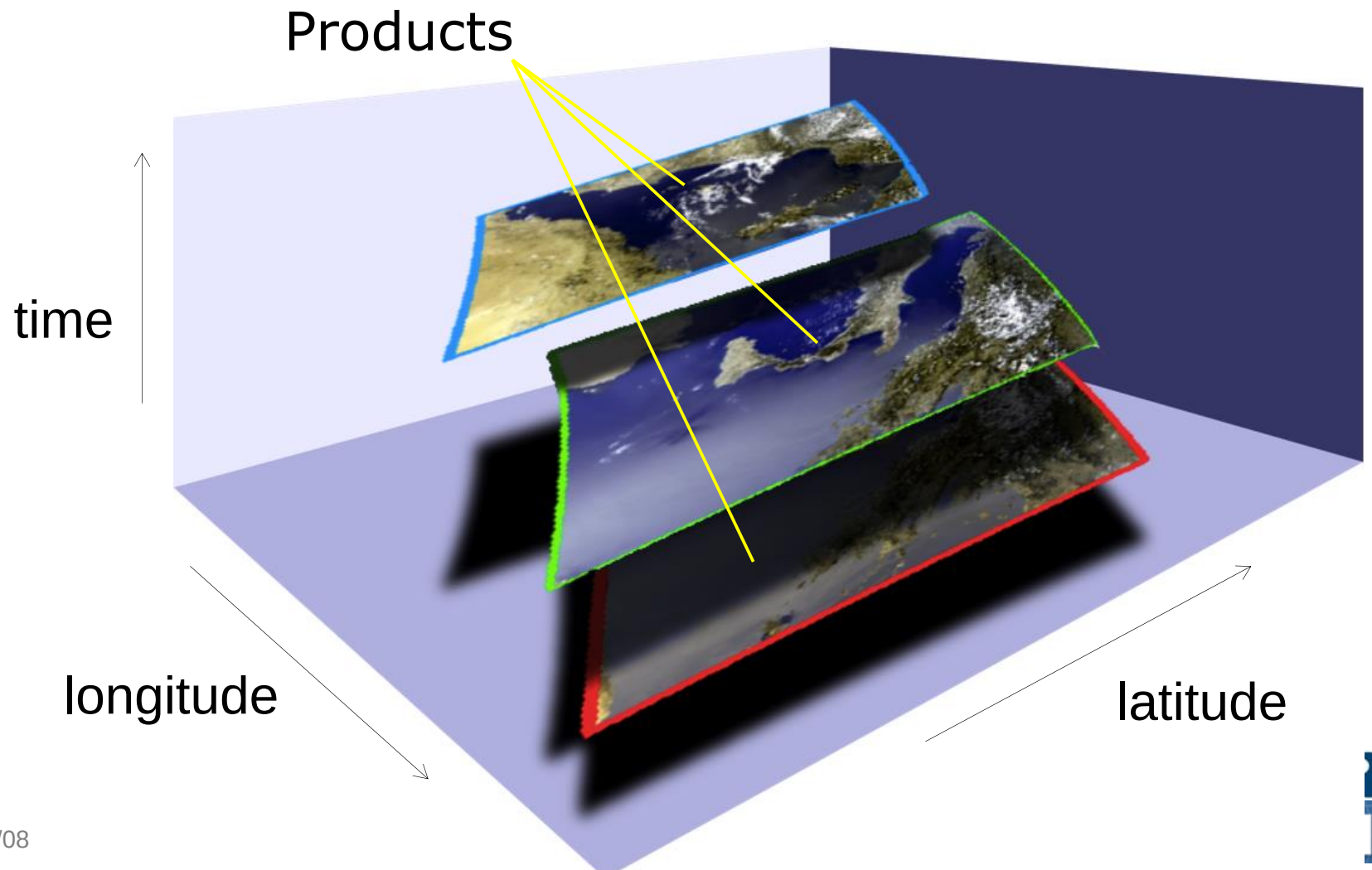
- Provides geospatial products on the **seasonal snow cover, glaciers, and lake / river ice** derived from **EO satellite data** in response to user needs

- www.cryoland.eu

Earth Observation (EO)



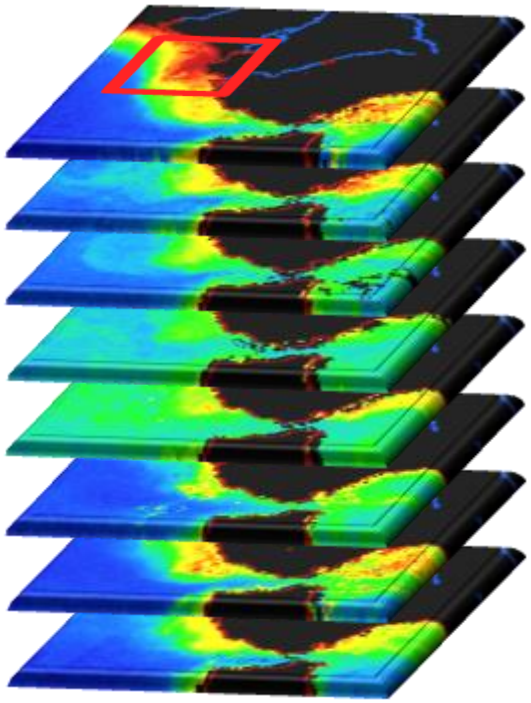
Identification of EO Data



Online Data Access – possible Approaches

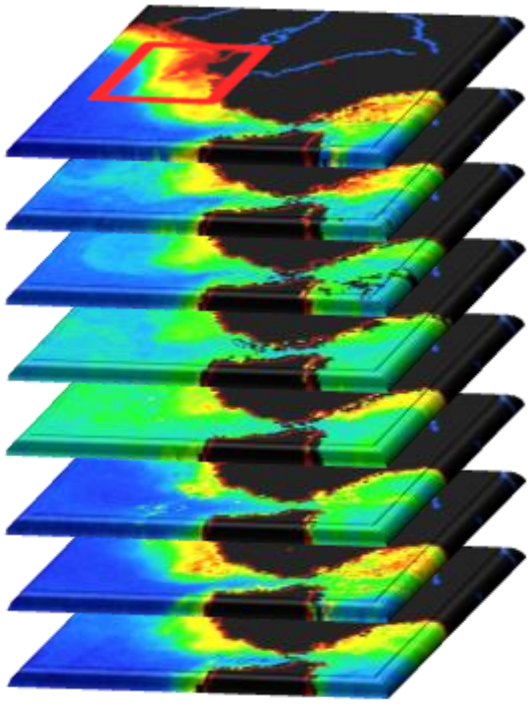
- Classical Approach:
  - Catalogs and
  - FTP Download
- Modern Approach:
  - WMS / EO-WMS Preview and
  - WCS / EO-WCS Download

Online Data Access
- Classical Approach



- Catalog Service:
  - Area of Interest/Time of
  - Interest (AOI/TOI) → List of files
- Per image:
  - – FTP download
  - – Waiting ...
  - – Crop to AOI, Reproject, Reformat
  - – "Throw away" the rest

Online Data Access
- EO-WCS improvements



- GetCapabilities
  - List of available coverages
- DescribeEOCoverageSet
  - AOI/TOI → List of IDs
- per ID
  - GetCoverage with customized:
    - Area of interest
    - Time of interest
    - Format & CRS

CryoLand's Intentions

- Implement interoperable interfaces (utilizing OGC standards)
- Support viewing of available datasets
- Offer easy online data access
- Provide an efficient access to time-series data
- Utilize OpenSource Software
- ®EOxServer

EOxServer 's mission is to provide an **open source** software framework to **ease** the **online provisioning** of large **earth observation data** archives via **open standard** services for efficient exploitation by users

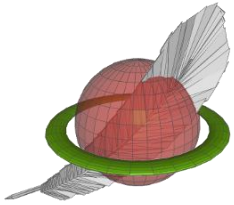
EOxServer Open Source SW

MapServer
open source web mapping

GDAL

OSGeo
Your Open Source Compass

python™



django

PostGIS
Spatial PostgreSQL

jQuery
write less, do more.

geodjango

SQLite

OpenLayers

rasdaman
raster data manager

PostgreSQL
the world's most advanced open source database

GEOS
Geometry
Engine
Open
Source

...

EOxServer Architecture

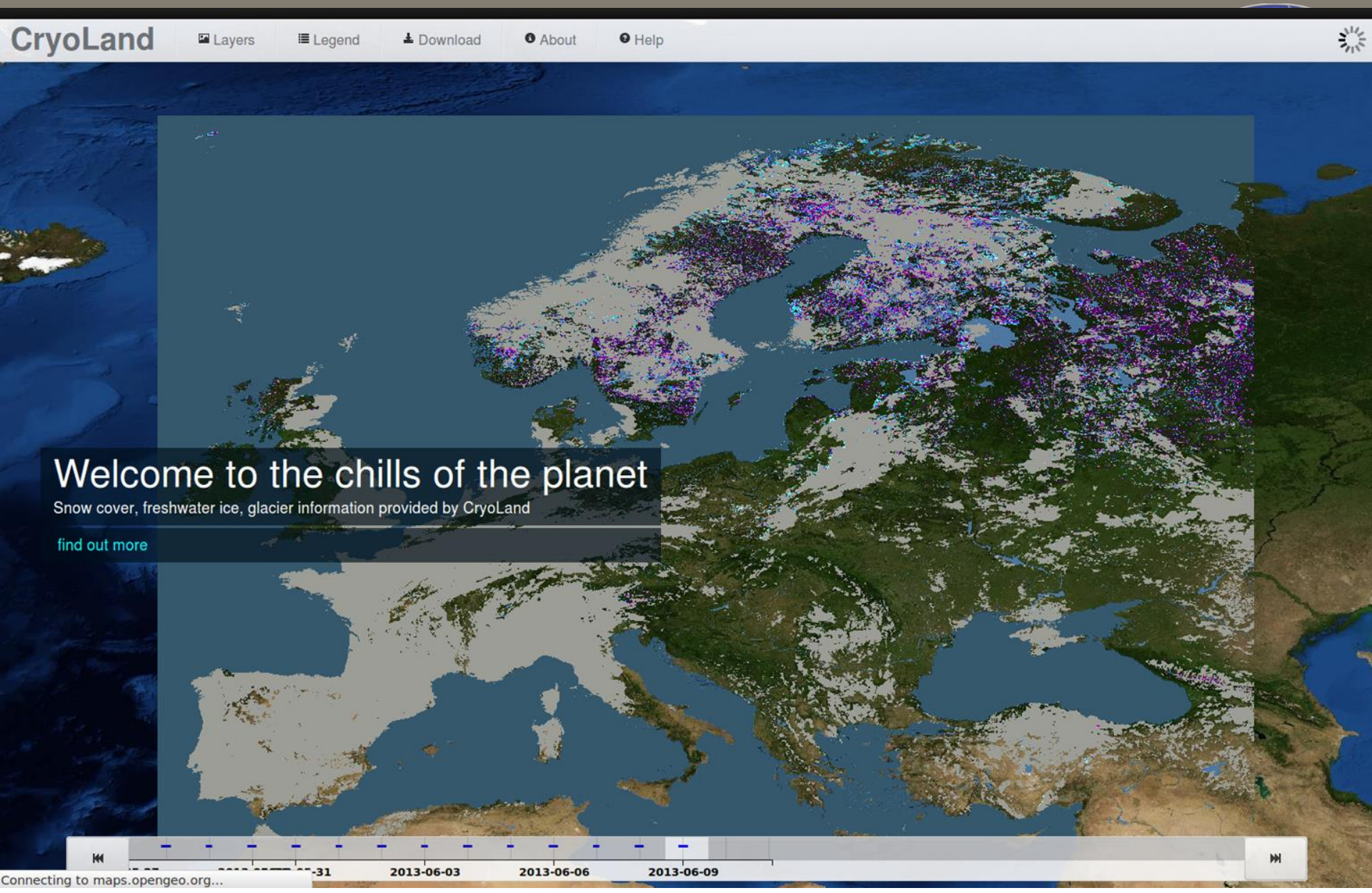
- Scripting Language
  - Python
- Web Framework and Database Abstraction Layer
  - Django / GeoDjango
- WCS and WMS Rendering
  - MapServer through Python MapScript
- Data Processing and Metadata Extraction
  - GDAL

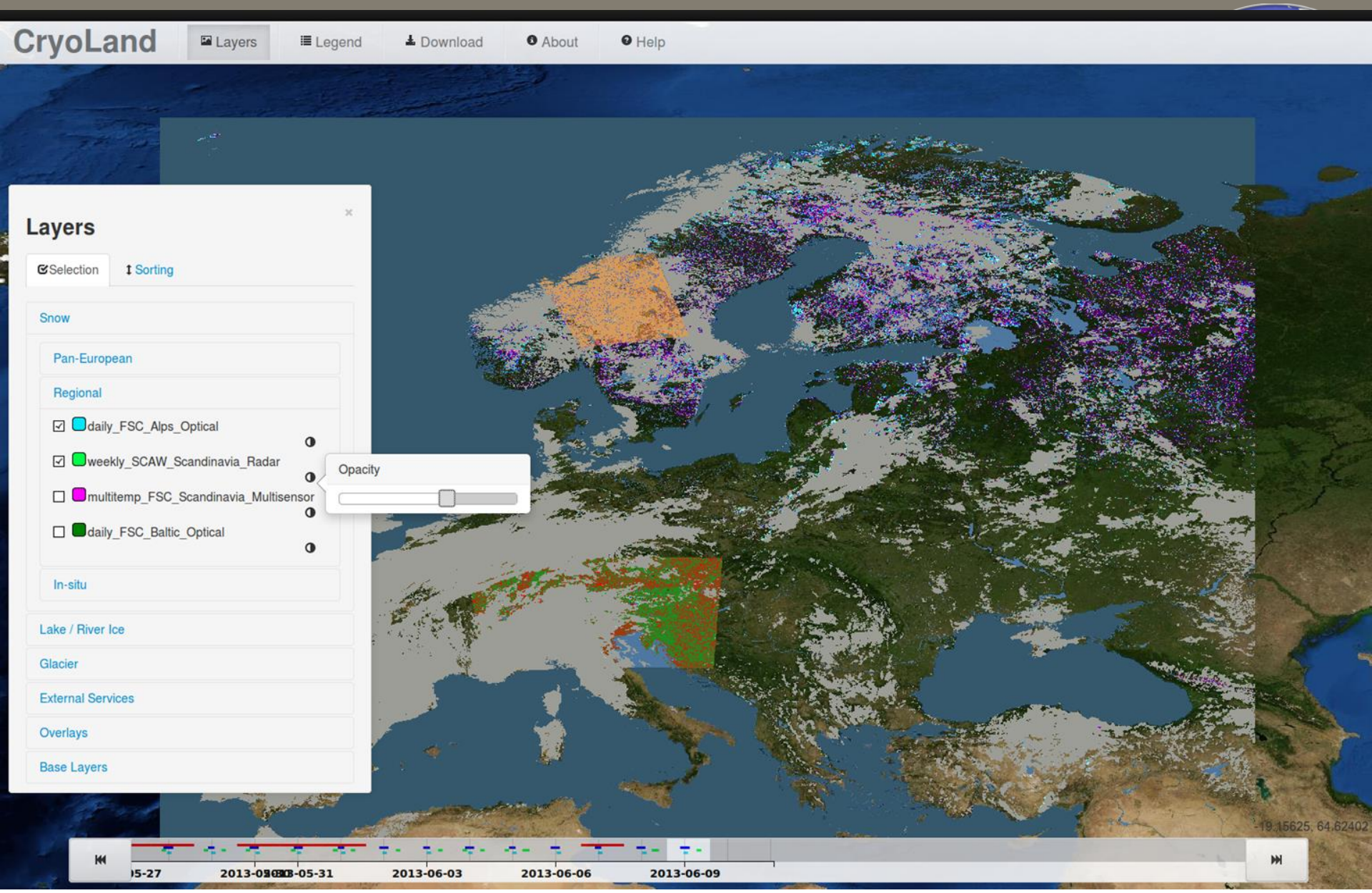
Advantages of the EOxServer Approach

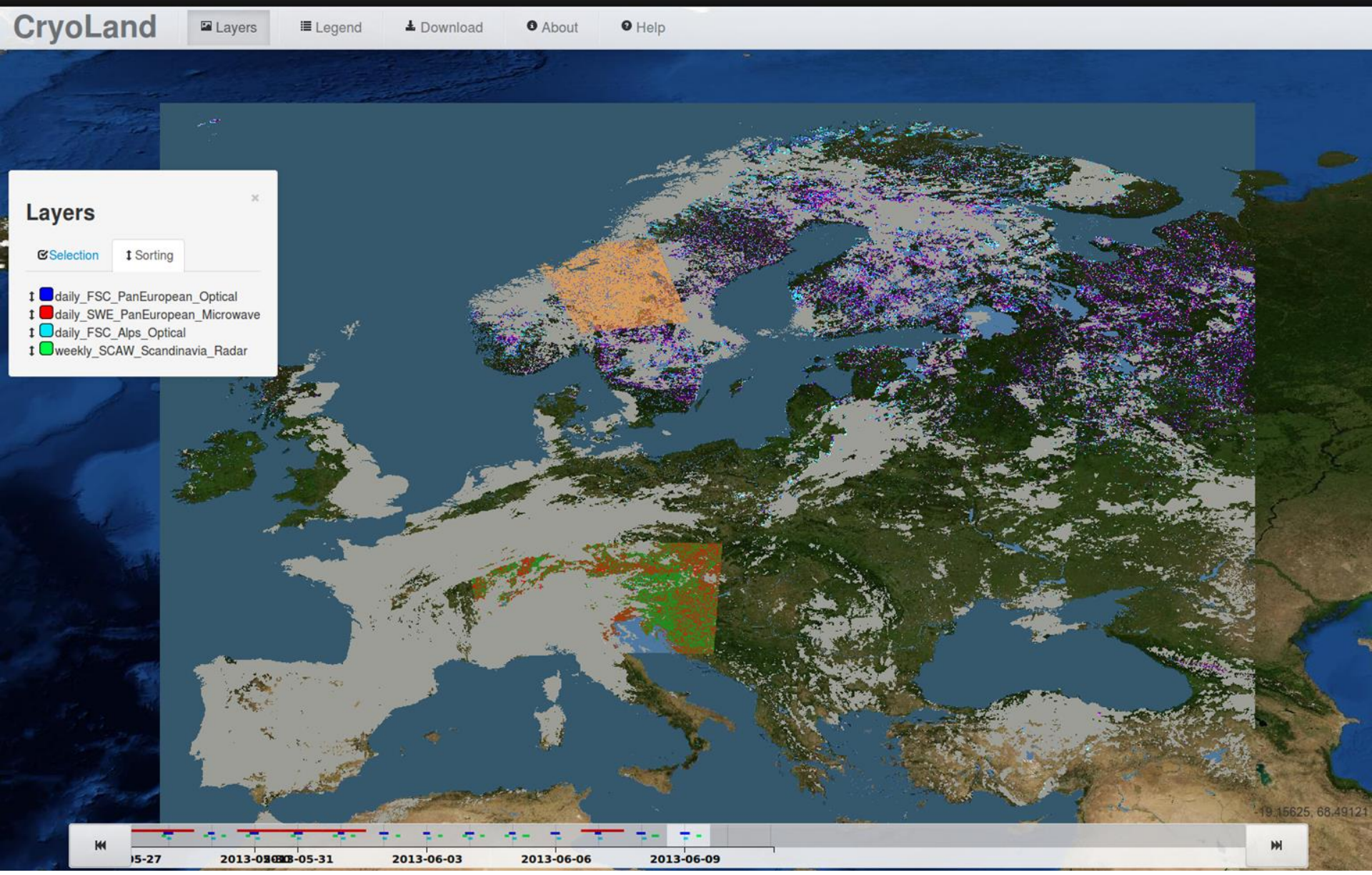
- Intuitive Combination of WMS and WCS
- WCS reduces Bandwidth Requirements at Provider's-side
- WCS Reduces Load on the Client Side
- User's receive only data they need/requested
  - the desired AOI
  - the desired TOI
  - in the desired CRS
  - in the desired File-Format

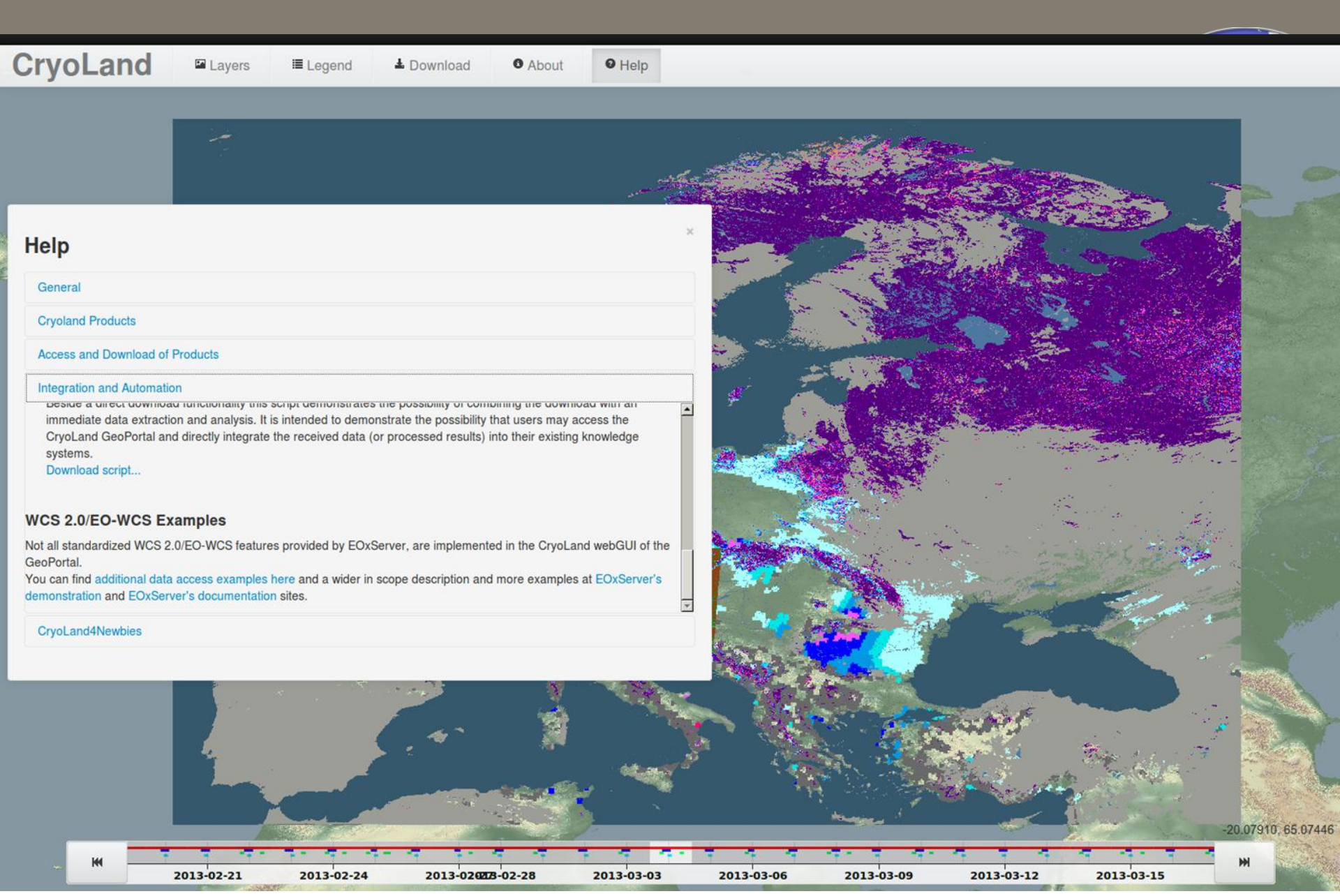
CryoLand's Approach – OGC Services offered

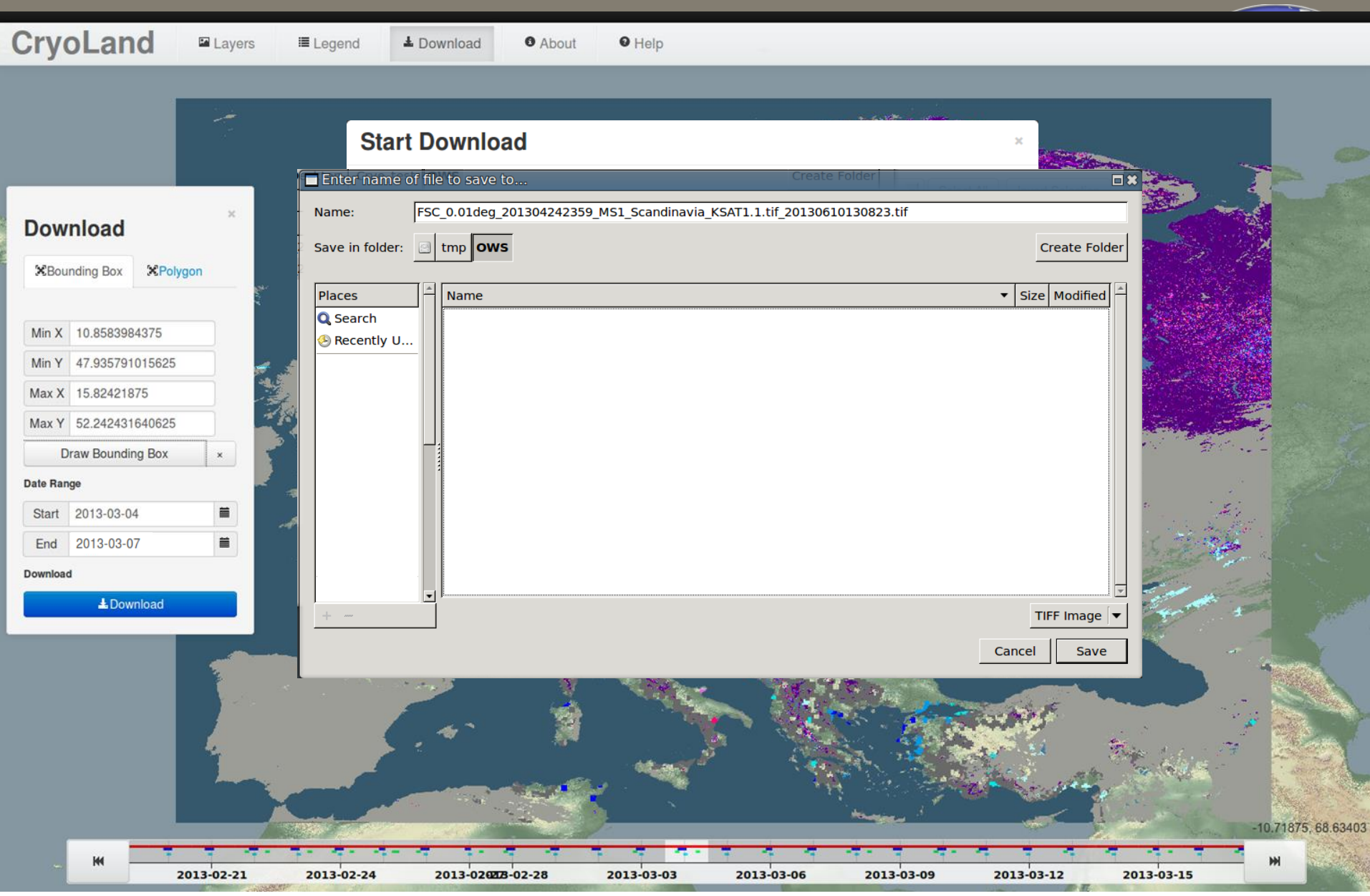
- View
  - WMS (1.0, 1.1, 1.3) / EO Appl. Profile for WMS 1.3 (EO-WMS 0.3.3)
  - Support for WMTS (Caching)
  - GeoPortal / import into GIS / direct access e.g via a script
- Access (Download)
  - WCS (1.0, 1.1, 2.0) / EO Appl. Profile for WCS 2.0 (EO-WCS 1.0)
  - via GeoPortal / direct access e.g via a script

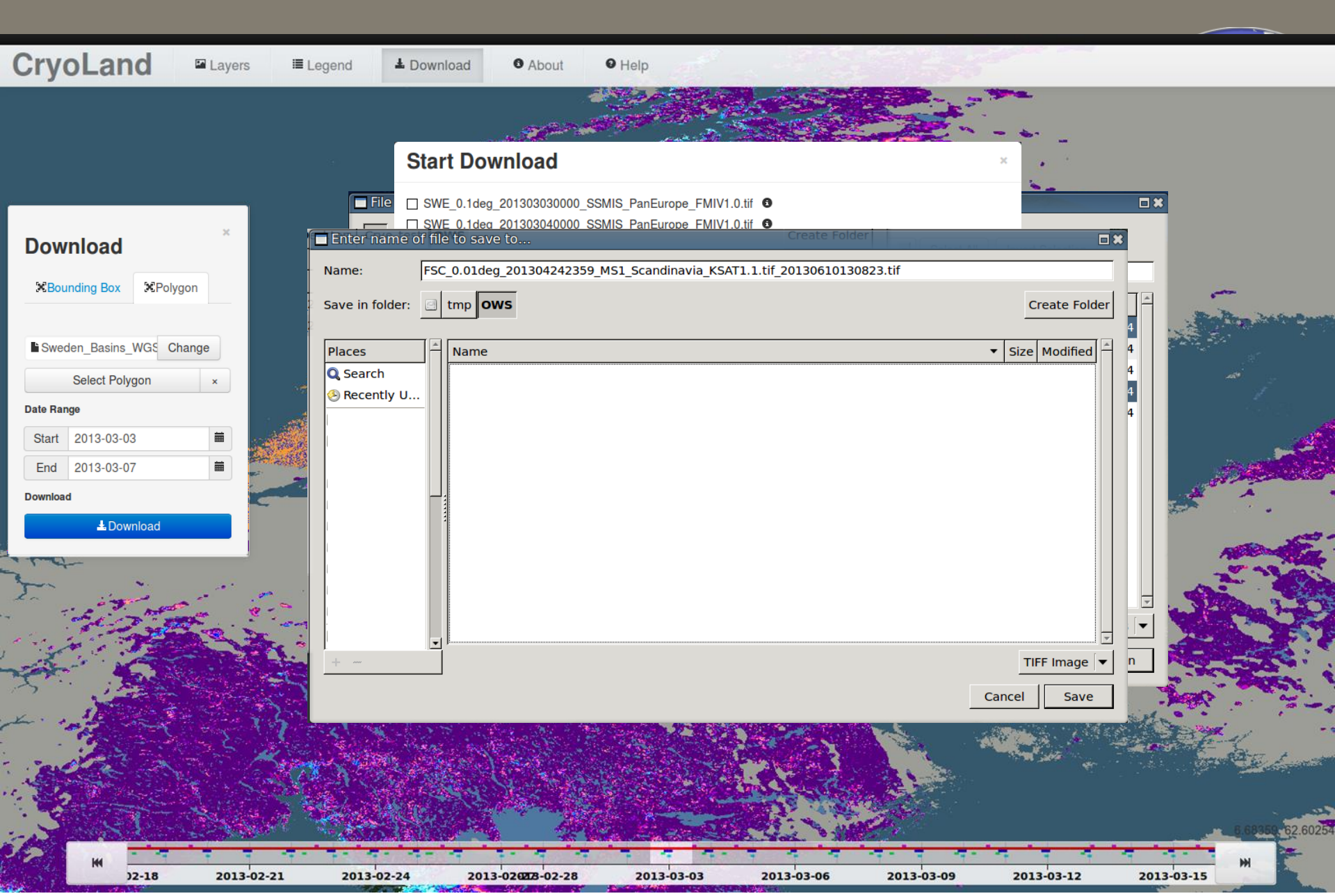




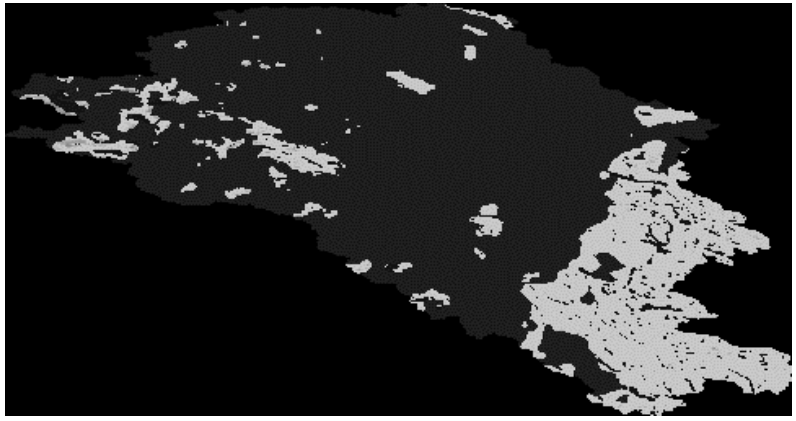




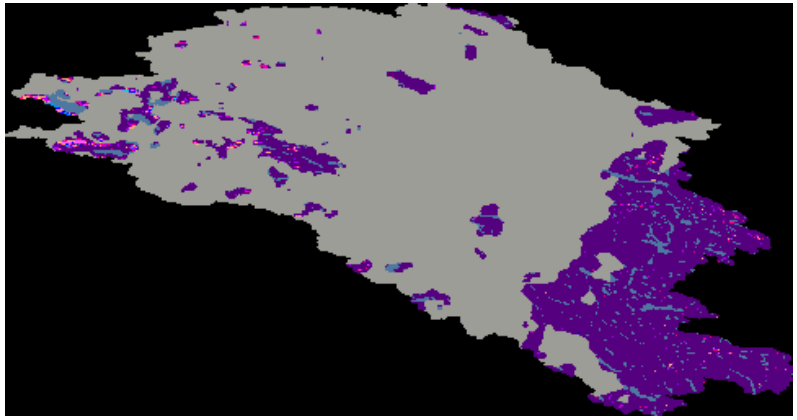


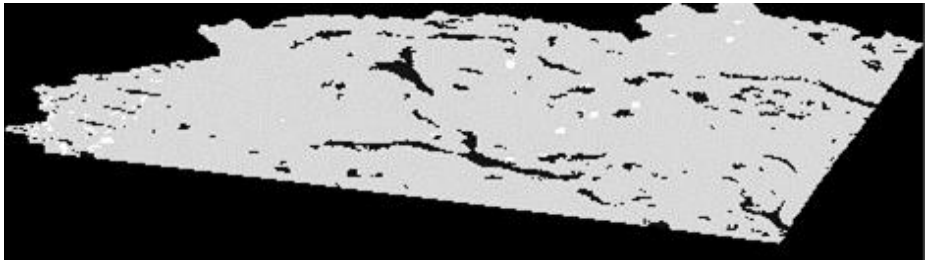


Shapefile Data Access Results

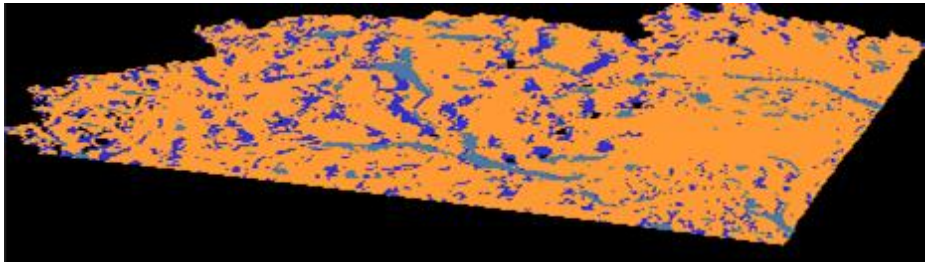


FSC_0.01deg_201303030745MOD_panEU_ENVEO

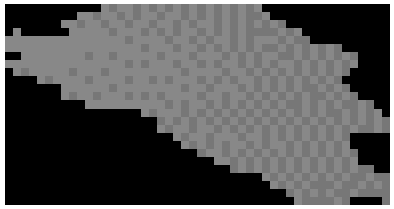




SCAW_0.005deg_201303070548_RSAT2_Scandinavia_KSAT



SWE_0.1deg_201303030000_SSMIS_PanEurope_FMI



CryoLand – Direct Access

Example requests:

http://neso.cryoland.enveo.at/examples.html

- **EO-WMS / WMS**
  - **GetCapabilities**:

    http://neso.cryoland.enveo.at/cryoland/ows?Service=WMS&Version=1.3.0&Request=GetCapabilities

  - **GetFeatureInfo**:

    http://neso.cryoland.enveo.at/cryoland/ows?SERVICE=WMS&VERSION=1.3.0&REQUEST=GetFeatureInfo&LAYERS=daily_FSC_PanEuropean_Optical_outlines&QUERY_LAYERS=daily_FSC_PanEuropean_Optical_outlines&BBOX=32,-5,61,38&FEATURE_COUNT=10&INFO_FORMAT=text/plain&HEIGHT=650&WIDTH=990&CRS=EPSG:4326&X=321&Y=322

  - **GetMap**:

    http://neso.cryoland.enveo.at/cryoland/ows?Service=WMS&Version=1.3.0&Request=GetMap&layers=FSC_0.005deg_201203070926_MOD_Baltic_SYKE.tif&CRS=EPSG:4326&Width=450&Height=420&Format=image/png&Transparent=true&BBOX=42.0,15.0,60.0,42.0

  - **GetMap** - DatasetSeries:

    http://neso.cryoland.enveo.at/cryoland/ows?Service=WMS&Version=1.3.0&Request=GetMap&Layers=daily_FSC_PanEuropean_Optical&CRS=EPSG:4326&Width=450&Height=420&Format=image/png&Transparent=true&BBOX=42.0,15.0,60.0,42.0

  - **GetMap** - DatasetSeries and Time:

    http://neso.cryoland.enveo.at/cryoland/ows?Service=WMS&Version=1.3.0&Request=GetMap&Layers=daily_FSC_Baltic_Optical&CRS=EPSG:4326&Width=540&Height=200&Format=image/png&Transparent=true&BBOX=60.0,15.0,70.0,42.0&TIME=2012-03-31T10:07:00Z/2012-04-01T10:15:00Z

- **EO-WCS / WCS**
  - **GetCapabilities**:

    http://neso.cryoland.enveo.at/cryoland/ows?Service=WCS&Version=2.0.0&Request=GetCapabilities

  - **DescribeCoverage** - Dataset:

    http://neso.cryoland.enveo.at/cryoland/ows?Service=WCS&Version=2.0.0&Request=DescribeCoverage&CoverageId=SCA_0.01deg_20120320_MOD_cenEU_ENVEO2.1.00.tif

  - **DescribeEOCoverageSet** - DatasetSeries (e.g. Time Series):

    http://neso.cryoland.enveo.at/cryoland/ows?Service=WCS&Version=2.0.0&Request=DescribeEOCoverageSet&EOID=daily_FSC_PanEuropean_Optical

  - **DescribeEOCoverageSet** - DatasetSeries (e.g. Time Series) - a Slice subset in Time:

    http://neso.cryoland.enveo.at/cryoland/ows?Service=WCS&Version=2.0.0&Request=DescribeEOCoverageSet&EOID=daily_FSC_PanEuropean_Optical&subset=phenomenonTime("2012-03-14T11:00:00Z")

EOxServer

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EOxServer implements the OGC Implementation Specifications EO-WCS and EO-WMS on top of MapServer's WCS and WMS implementations.

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The currently available functionality includes:

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HMA

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Development Activity

Ohloh 8 Developers

Project Cost Calculator

Include: All Code

Average Salary (p: $ 55000

Codebase Size
39,167 lines

Estimated Effort
9 person-years

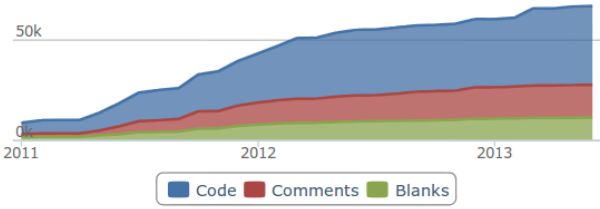
Estimated Cost
$ 506,739 *

*Using the Basic COCOMO Model

Languages

Python	63%	XML	13%
SQL	9%	8 Other	15%

Lines of Code



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EOxServer Development

- Project Steering Committee
- RFCs
- Architectural Design
- SVN Repository and Trac Ticketing System
  - http://eoxserver.org/

- Everybody is invited and welcome to join

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Norrköping, Sweden

ENVEO IT GmbH (Coordinator)

Finnish Environment Institute

Norwegian Computing Center

EOX IT Services

Kongsberg Satellite Services

National Meteorological Administration

Finnish Meteorological Institute

Northern Research Institute

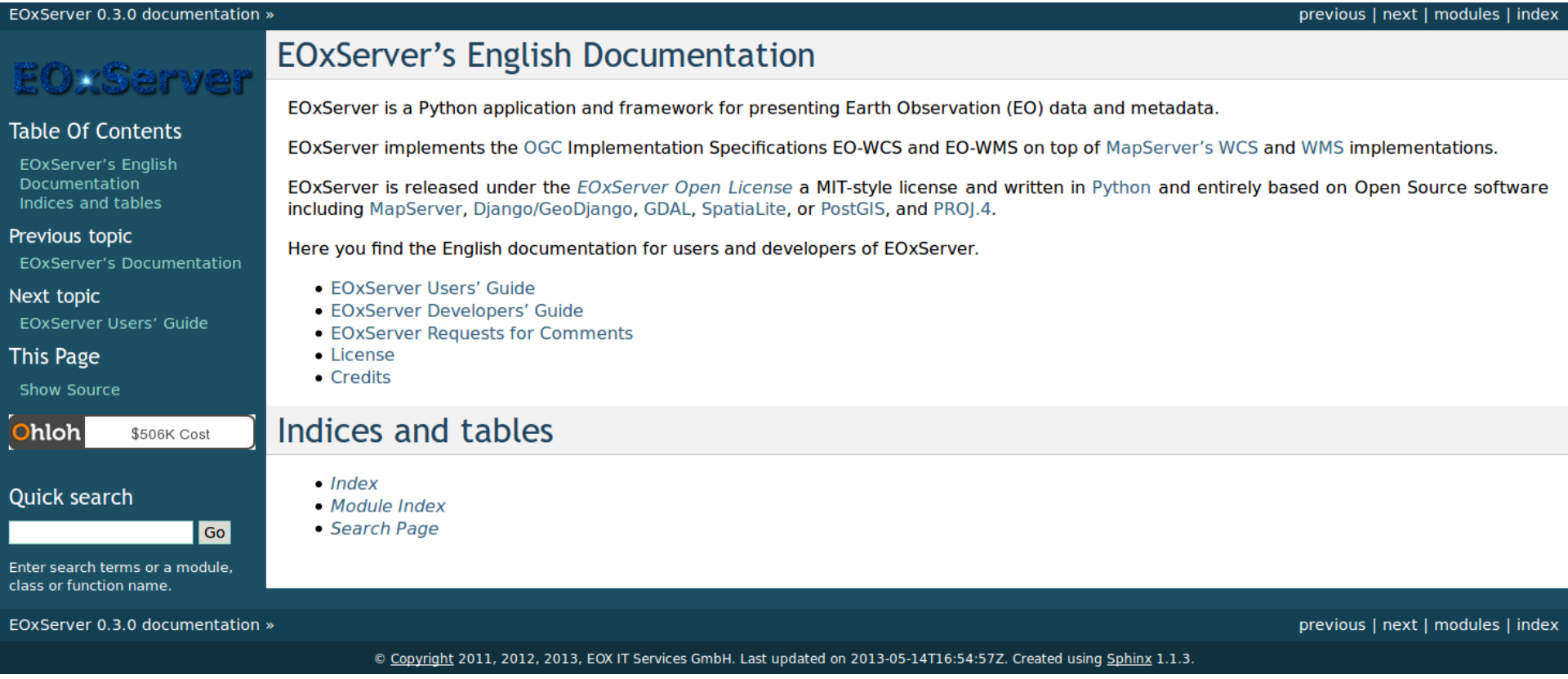
GAMMA Remote Sensing

Swedish Meteorological & Hydrological Institute

EOxServer Operator - Tools

- Command Line Tools
  - Create a new EOxServer Instance
  - Registration of Datasets
  - Registration of Dataset Series
  - Bulk Registration
- Administration Web Client
  - Complete Control over Configuration Database
  - Fine-tune Configuration

EOxServer Documentation



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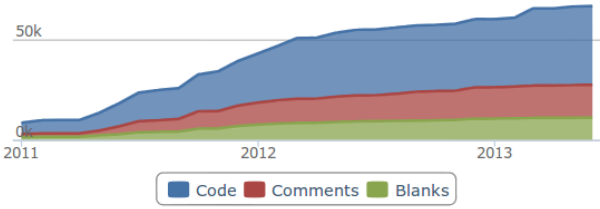

EOxServer Installation

- Current Release: 0.3.0
- Install with pip: pip install eoxserver
- Download the Source from http://eoxserver.org
- Get the latest trunk from http://eoxserver.org/svn
- Documentation
- Bug Reports
- Mailing Lists: users@eoxserver.org, dev@eoxserver.org

EOxServer Deployment

- Every way you can deploy Django
  - CGI, FastCGI, ...
- Recommended: Python WSGI
  - Apache2: mod_wsgi

Optional EOxServer Features

- Identity Management System Integration
- SOAP Proxy for WCS
- Rasdaman Database as a Storage Backend

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