EOxServer

Web Coverage Service 2.0 MapServer Implementation

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2012-06-08 HMA AWG Meeting

Outline

- Illustration of EO-WCS Proposition and Principles
- Reference Implementation of WCS 2.0 and EO-WCS 1.0 based on MapServer and EOxServer
  (Results and Conclusions from O3S Project)

Please check also "WCS Standardization & Reference Implementation" presentation by EOX at 2012-02-15 HMA AWG Meeting for:

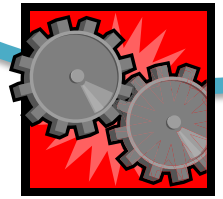
- Status and Ongoing Work of (EO-) WCS Specification and Standardization

The EO WCS Proposition:

User-selected EO Coverages

Services

Products



Load & Complexity

EO-WCS Demo – the Data

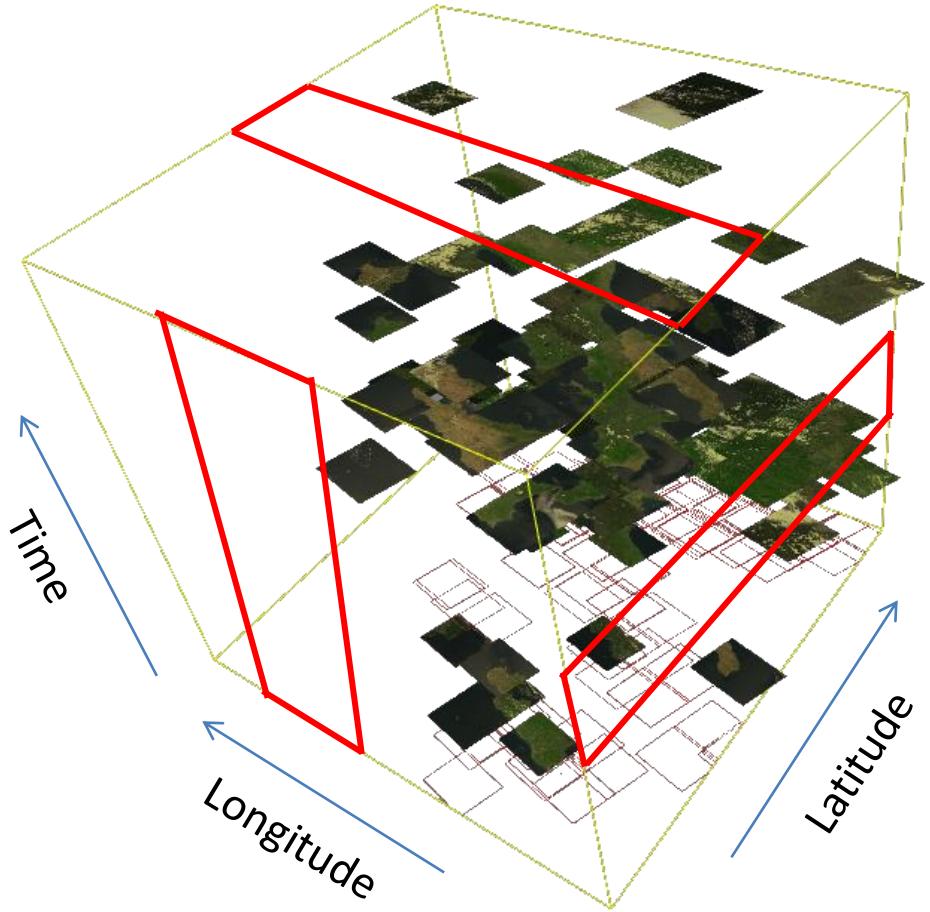


IMAGE2009 "Data Cube"

Data © GMES, availability FTP@CDS

IRS-p6/Resourcesat-1 with gap filling by Spot-4/-5, HR2 25 m, SWIR, VNIR, orthorectified, cloud <5% per country, EU 38, multiple coverages collected from mid 2008 to mid 2009

Registered into EOxServer for demo: 227 Scenes, 60 Gbyte: 4 band originals and 3 band RGB

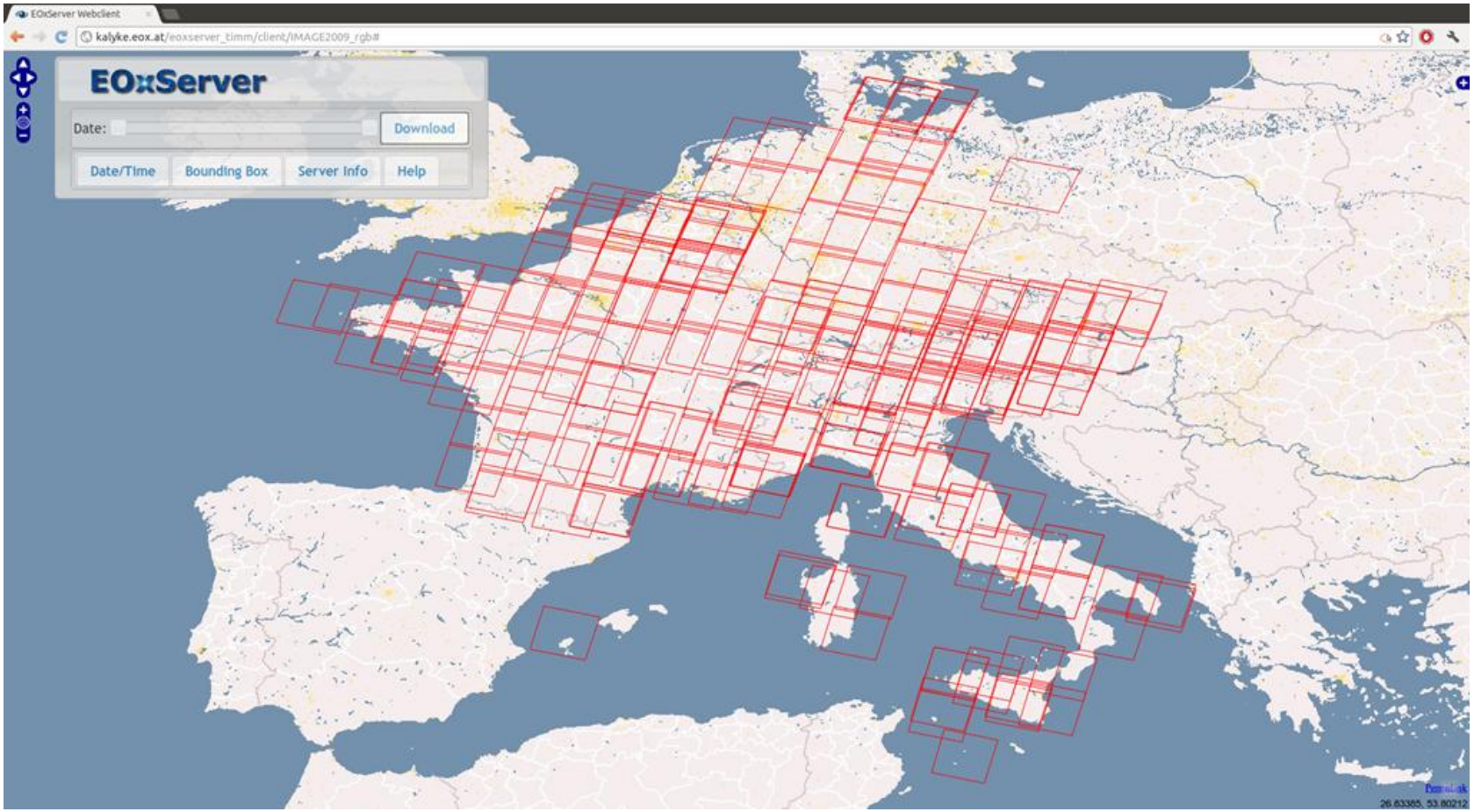
3D "Aquarium" courtesy FP7 EarthServer project

EO-WCS Demo – the Client

- The EOxServer Embedded Client allows to illustrate EO-WCS principles:
  - WMS Request/Response for discovering/viewing coverages
  - WCS Request/Response including all possible EO WCS operations and parameter specifications
  - Open/Save of downloaded coverages
- This Client was used to produce the following slides

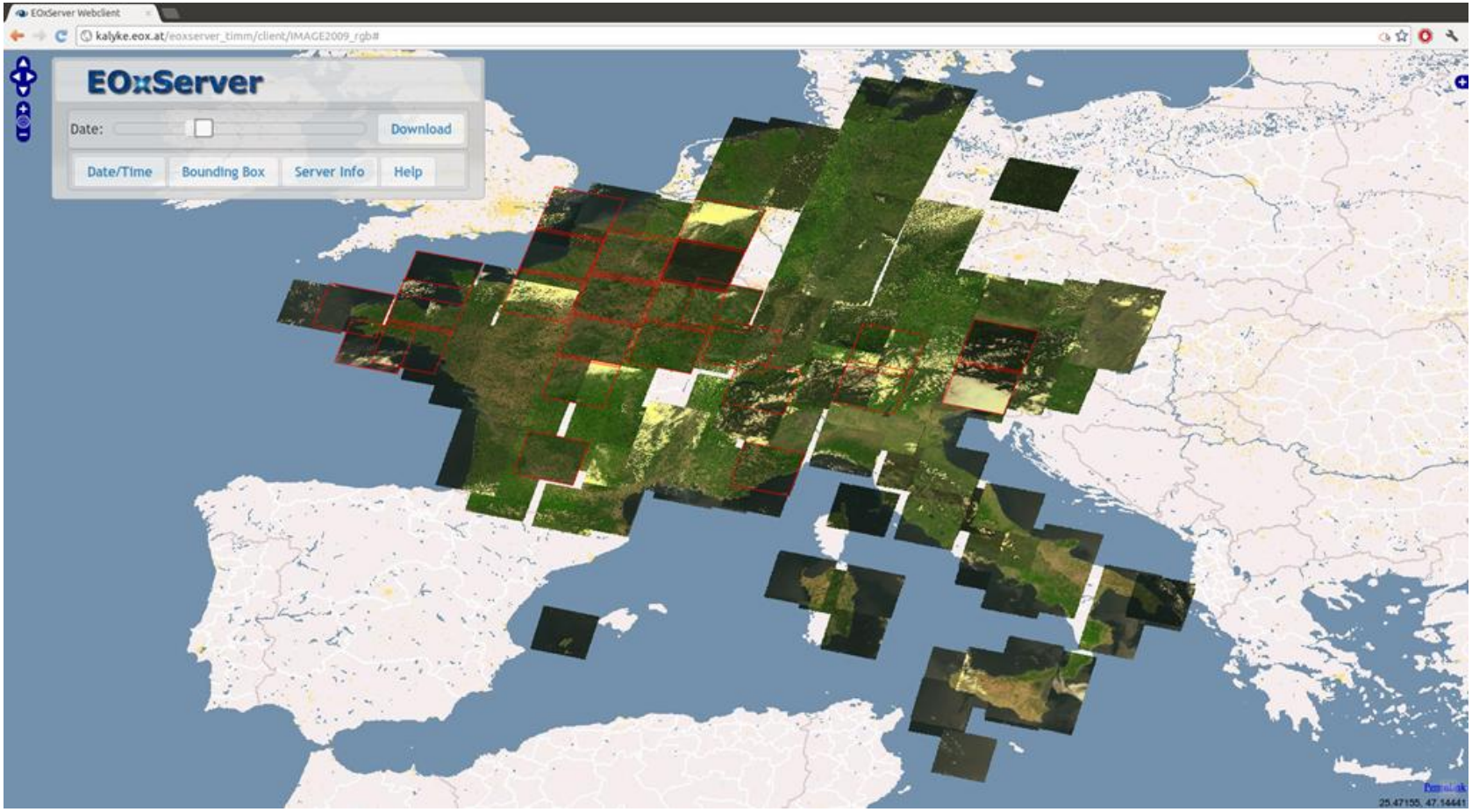
WMS View, Latest Data on Top

WMS View, Outlines

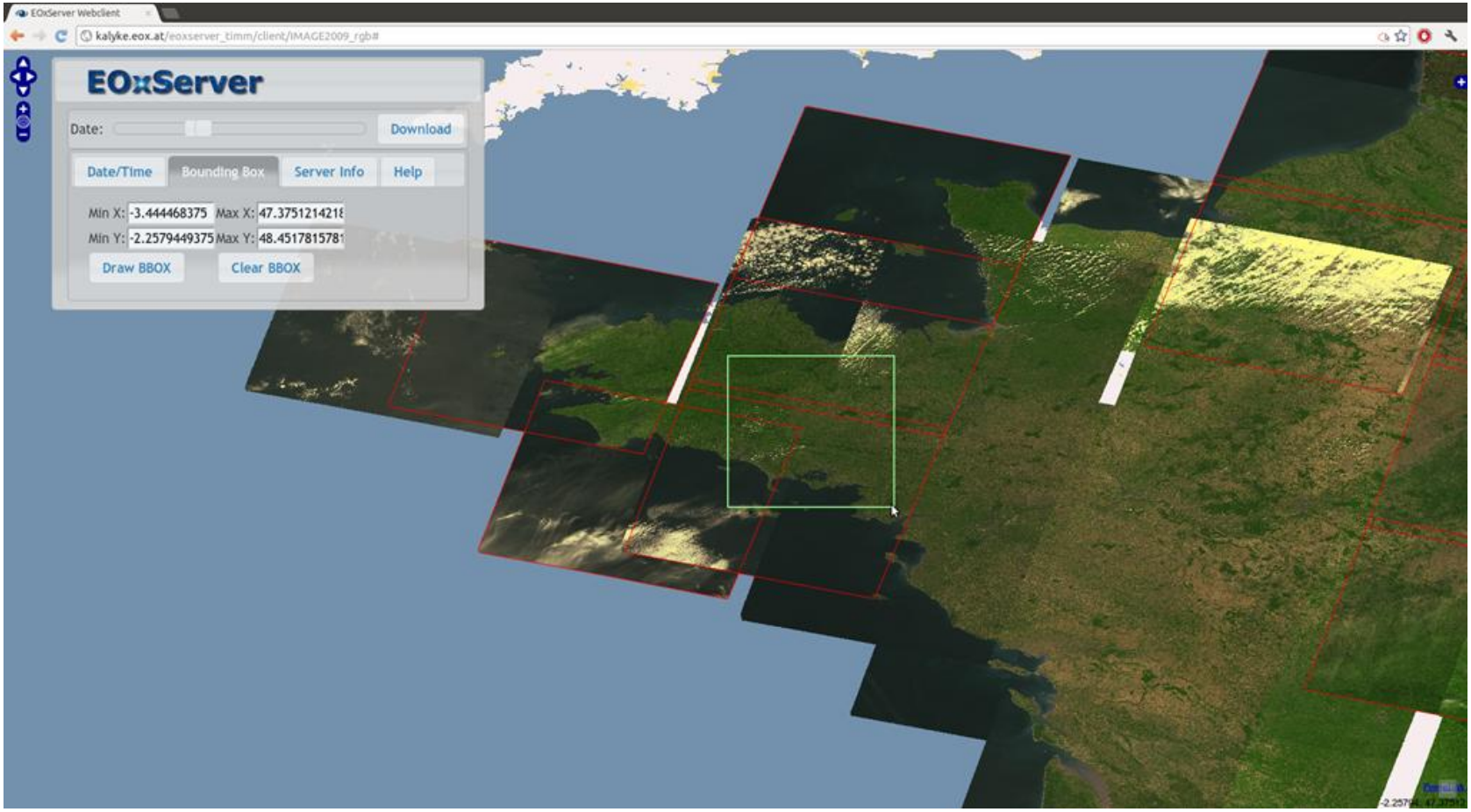


WMS View, Combined

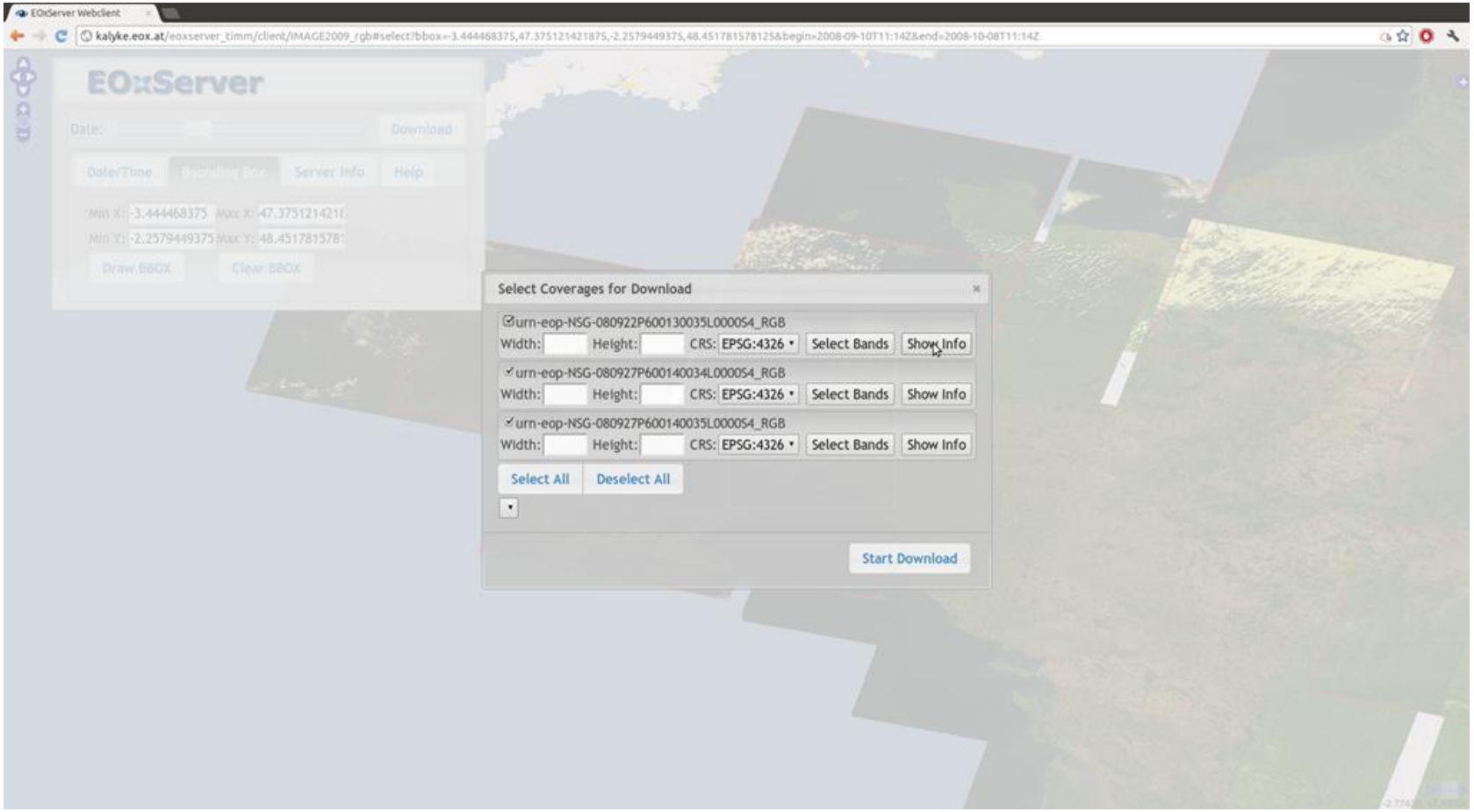
ToI Subsetting



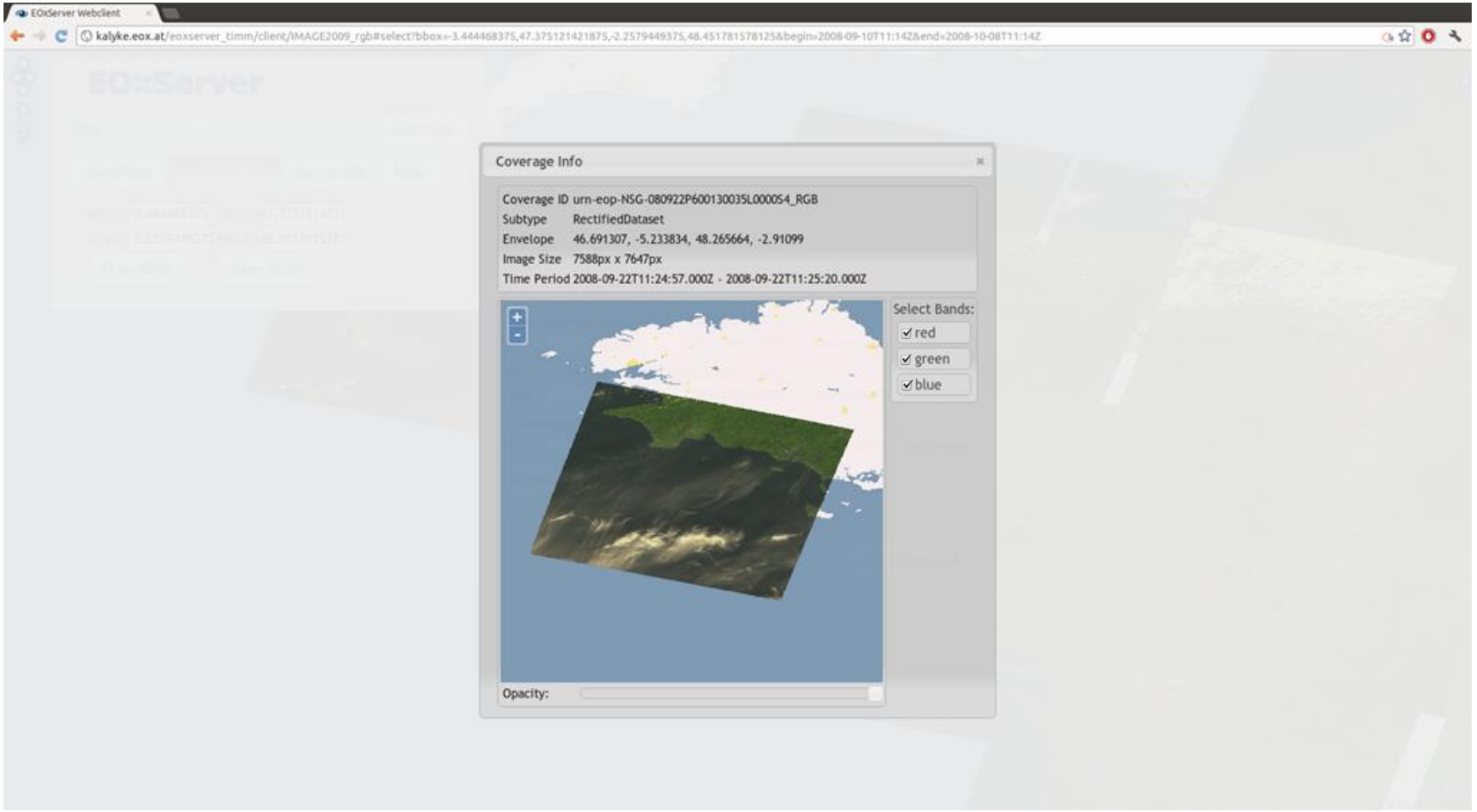
AoI Subsetting



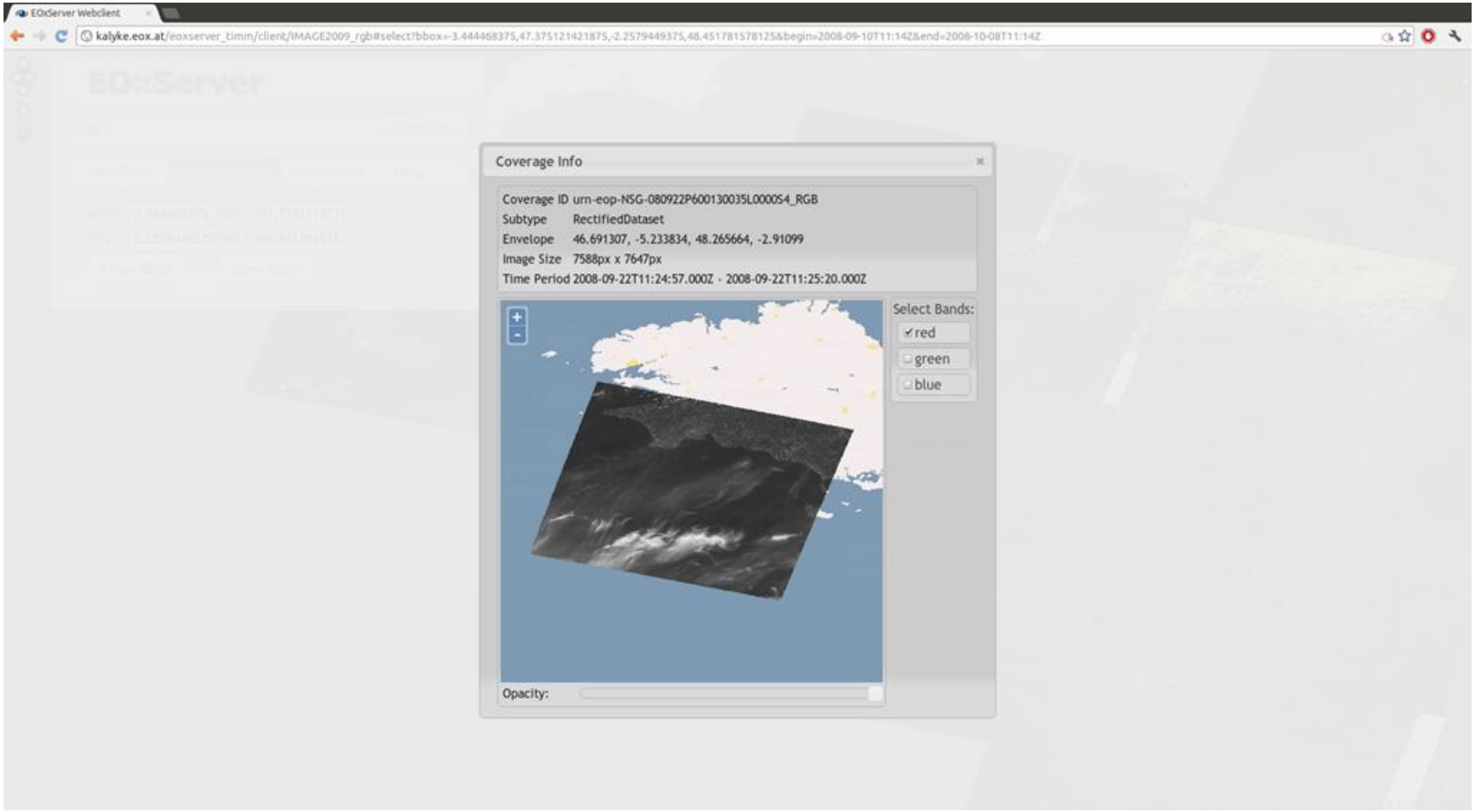
Dataset and CRS Selection



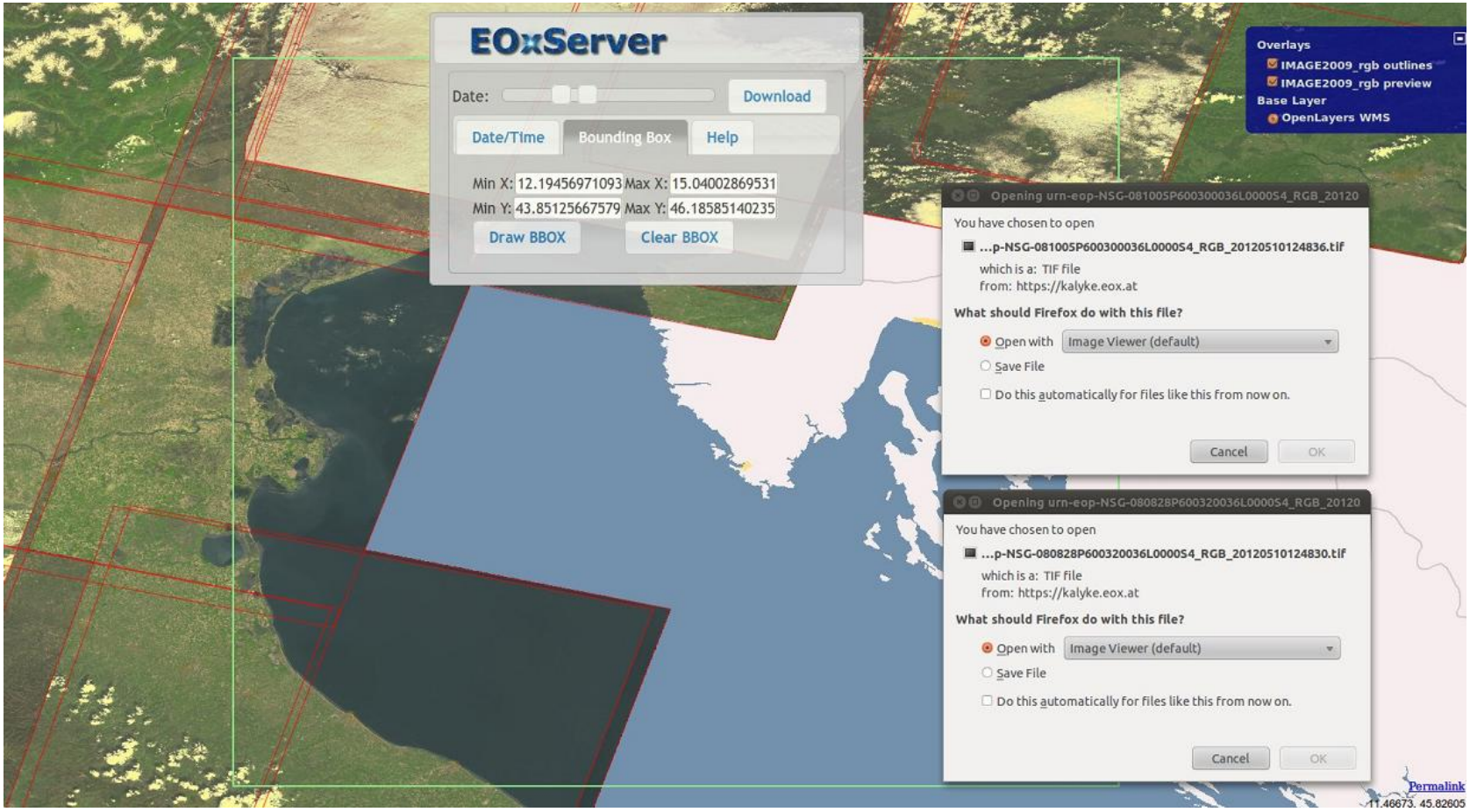
Band Selection



Band Selection

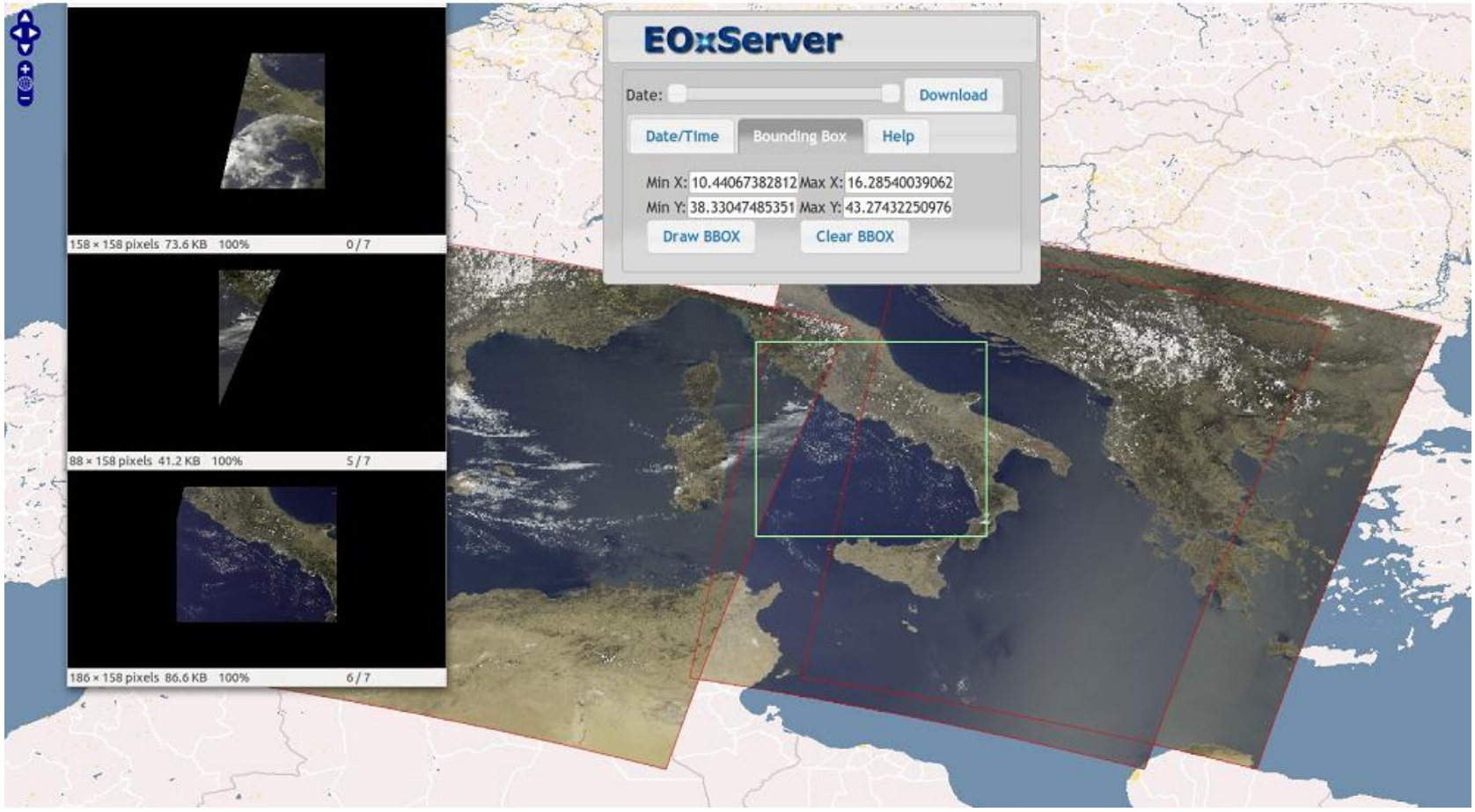


Open/Save of Downloads

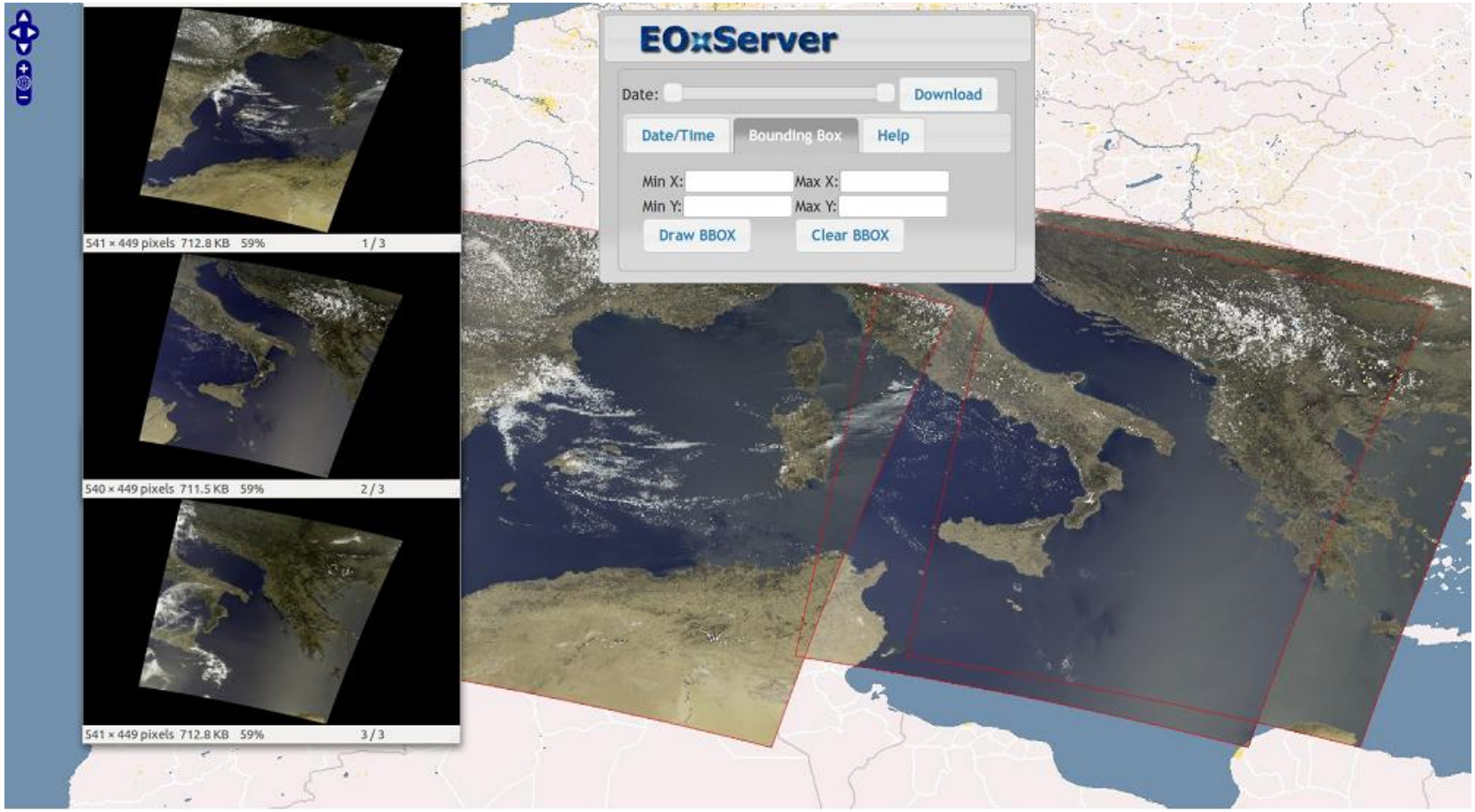


Downloads Clipped to AoI

Downloads Clipped to AoI



Downloads of Full Scenes



EO-WCS Terminology

- "RectifiedGridCoverage"
  Illustrated in the foregoing demo: geo- or ortho-rectified scenes clipped to AoI or as full scenes intersecting the AoI downloaded as separate files
- "RectifiedStitchedMosaic"
  Geo- or ortho-rectified scenes stitched together (latest on top, no radiometric adjustment), clipped to AoI, and downloaded as single file
- "ReferenceableGridCoverage"
  Original image geometry, nonetheless AoI selection is possible via geographic coordinates
- "DescribeEOCoverageSet"
  Spatio-temporal search on metadata, an additional WCS operation

EO-WCS Standardization

- EO-WCS 1.0.0 – Public comment period passed of "OGC 10-140, OGC WCS 2.0 Application Profile - Earth Observation"
  - One comment received
  - Adjustments to GMLCOV and WCS corrigenda
- Ready for voting
- Further conformance testing scheduled in OWS-9

Reference Implementations

- MapServer Release 6.0
  - WCS 2.0.0 via KVP & XML/POST
  - Anticipating future extensions (CRS, Scaling & Interpolation, Band subsetting, Encodings)
- EOxServer Release 0.2
  - EO-WCS 1.0.0 & EO-WMS on top of MapServer
- **SOAP Proxy**
  - Proxy to add XML/SOAP for WCS & EO-WCS

Results of ESA GSTP-5 Activity

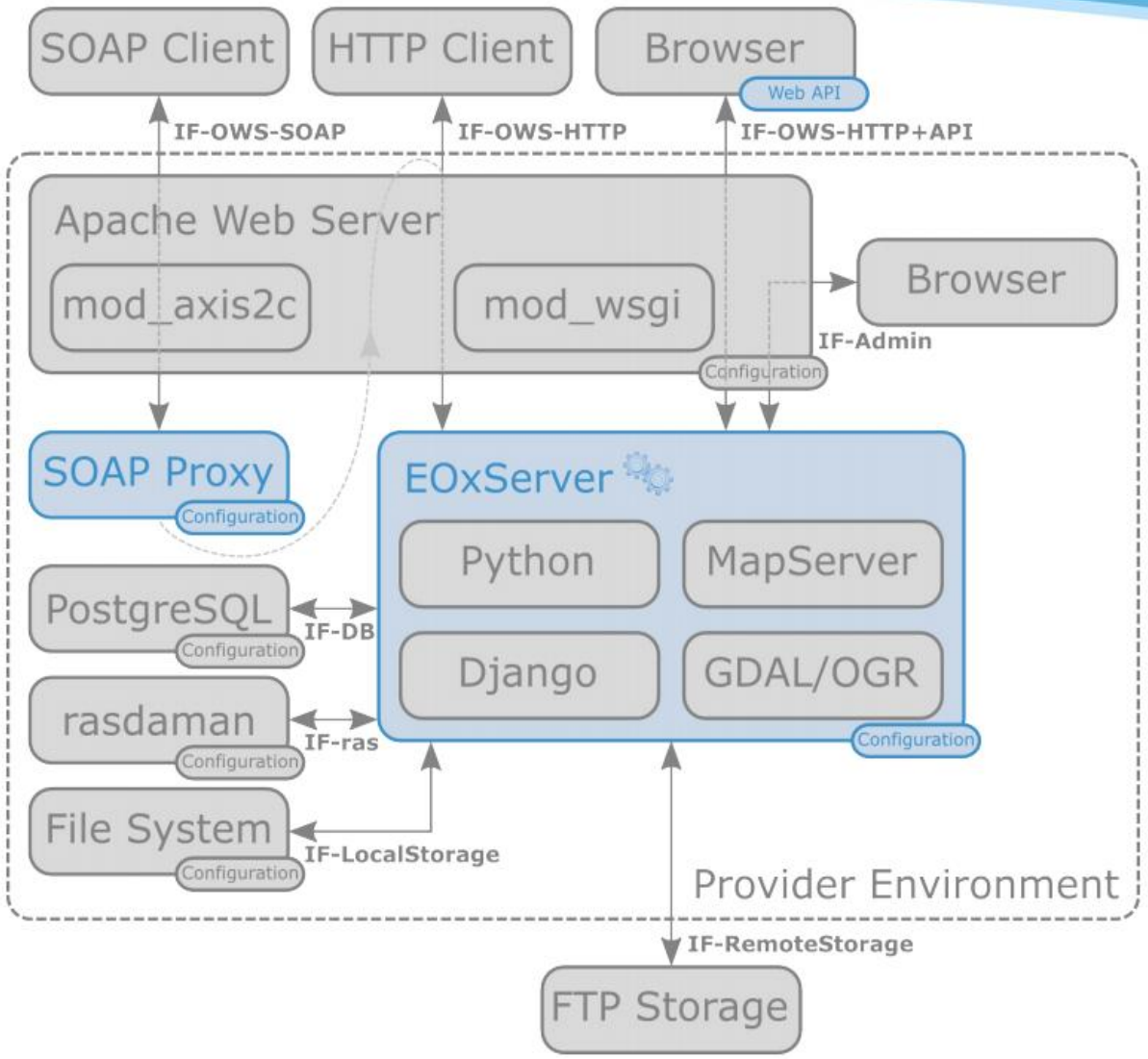
O3S

Open-Standard Online Observation Service

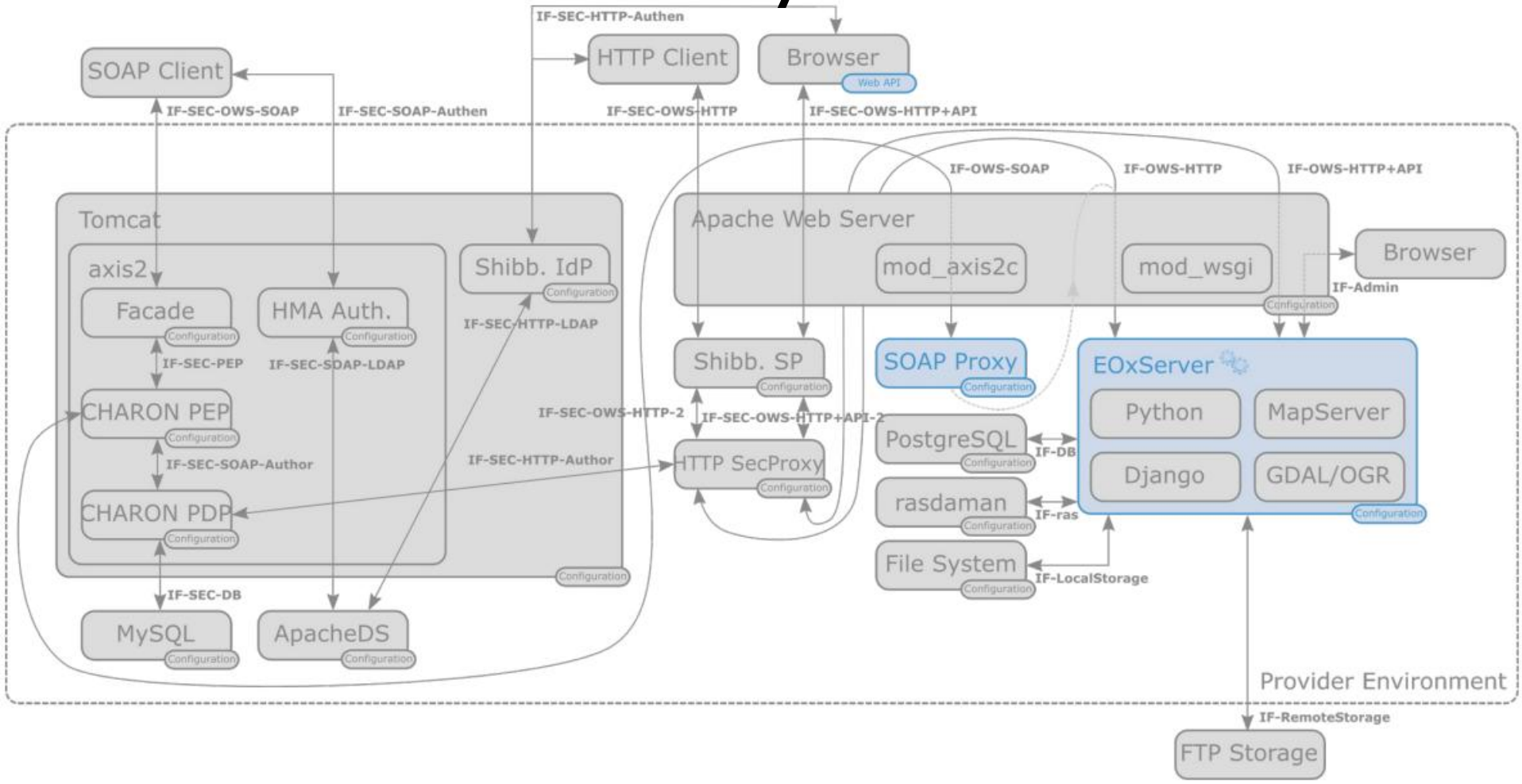
EOxServer in Brief

- MIT-style license and based on Open Source SW
- Version 0.2.0 released on May 4th 2012
- WCS, EO-WCS, WMS, EO-WMS, WCS-T (synchronous & asynchronous)
- Rectified- & ReferenceableGridCoverages
- Client for demonstrating integrated usage of EO-WMS & EO-WCS (used for generation of above EO WCS demo slides)
- Admin app & Log viewer
- Command line tools: "eoxserver-admin.py create_instance …", eoxs_add_dataset_series, eoxs_register_dataset, eoxs_synchronize
- Python Package Index (PyPI)Rectified- and ReferenceableGridCoverages
- DatasetSeries and StitchedMosaics
- Integration with security system (IDMS)

O3S Software System (excl. IDMS)



O3S Software System



EOxServer

Search

logged in as meissls | Logout | Preferences | Help/Guide | About Trac

Wiki | Timeline | Roadmap | Browse Source | View Tickets | New Ticket | Search | Admin

Start Page | Index | History | Last Change | Rename page

Welcome to the EOxServer Open Source Project

EOxServer is a server for Earth Observation (EO) data

EOxServer's mission: ***To provide an Open Source software framework to ease the online provision of big Earth Observation data archives via Open Standard services for efficient exploitation by users.***

Welcome to the EOxServer Open Source Project
- EOxServer is a server for Earth Observation (EO) data
- EOxServer Technical Details
- EOxServer Wiki
  - Testing
  - User Notes
  - Developer Notes

- Open Source: MIT-style license
- software framework: Entirely based on Open Source (Python, MapServer, Django, GDAL, etc.)
- ease online provision: Admin GUI and command line data registration
- big Earth Observation data archives: Operators register existing raster data archives
- Open Standard services: Open in the sense of freely available; Open Geospatial Consortium (OGC); WMS, WCS, EO-WMS, EO-WCS
- efficient exploitation by users: User defined sub-setting; view and download

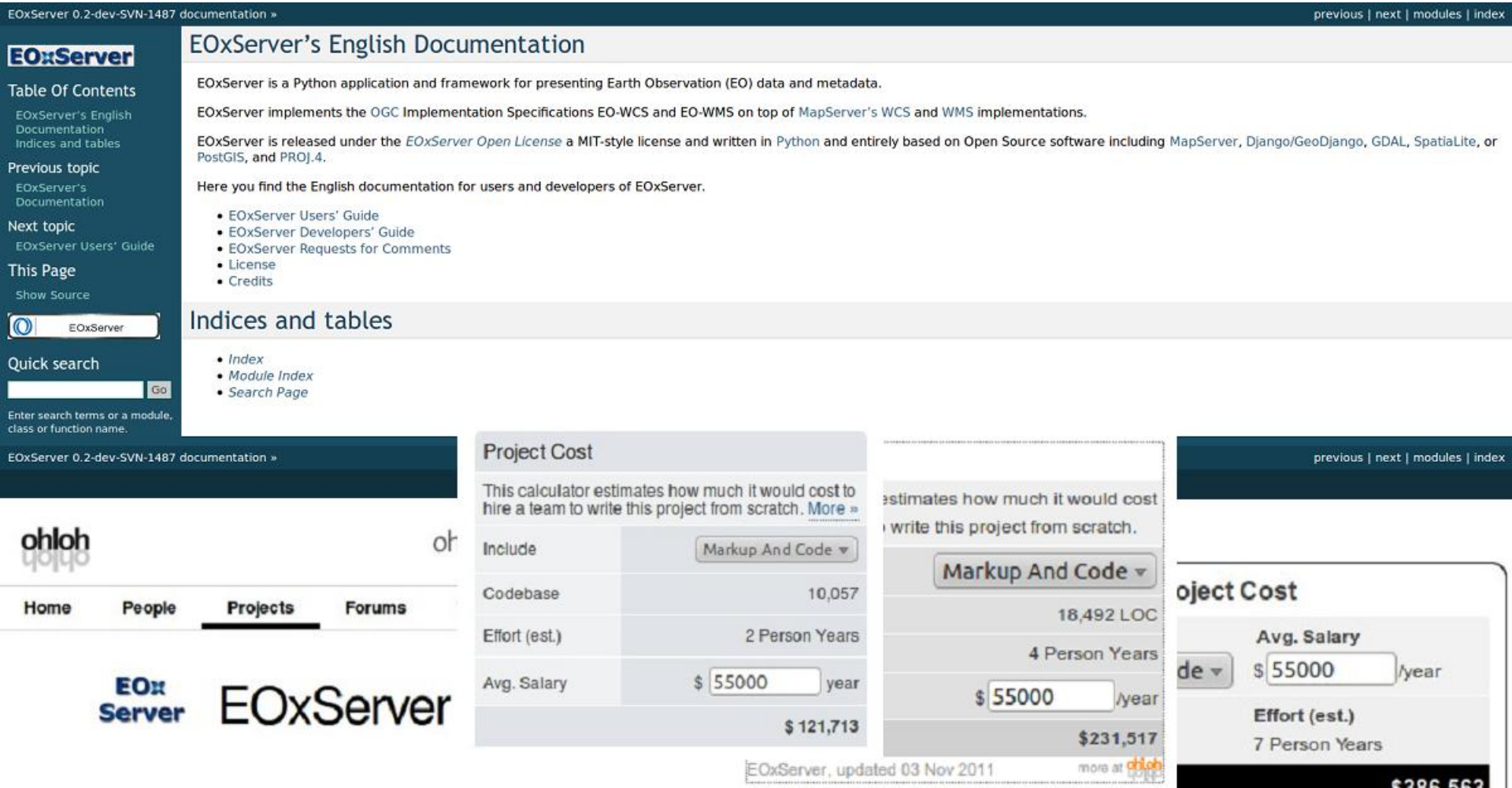
Download EOxServer

EOxServer Documentation (pdf)

EOxServer Demonstration (Explanations)

EOxServer Mailing Lists

Work on EOxServer has been partly funded by the European Space Agency (ESA) in the frame of the HMA-FO and O3S projects.



http://www.ohloh.net/p/eoxserver

Outlook – Scaling up

- Ongoing deployments of EOxServer etc. in stakeholder projects:
  - EarthServer – "Big Analytics on Big Data" in FP7 INFRA
  - CryoLand - GMES Downstream Service Snow & Land Ice
  - DREAM Online Data Access Server Open Source (Reference Installations at EUSC, ESRIN, and NLR)
- Possible deployments:
  - Front-end to ESRIN Data Farm (GPOD Archive) or other Cloud Archives
  - Dissemination interface for Image20** from CDS
  - Others?
- Multi-party developers team continues to be very active in coordinated Scrum process

Selling the Story

(to decision makers)

- **AWG is invited to make recommendations on how to improve the following two slides**
- The slides are attempting a high-level selling proposition for the implementation of EO-WCS in future Ground Segments (in comparison with today's FTP-based and data-driven workflows)

- The slides were presented at the ESA Technology Transfer Broker Meeting, Vienna, 15 March 2012. EOxServer has been accepted for the Technology Forum Database under ref. 1486 (http://www.technology-forum.com/index.php?id=55&tx_wfqbe_pi1[uid]=763)

The virtual market place TECHNOLOGY FORUM

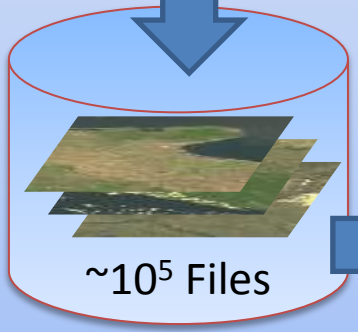
FTP-based, Data Driven

Ground Segment

Earth Observation Payload Data Processing

Wrapping

Catalogue Server



Raw Data

FTP Server

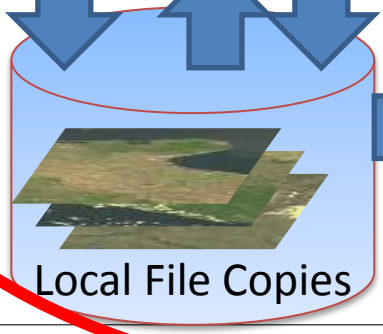
EO Data Users

Data Needed by User

Clipping & Mosaicking

Down-loading

Un-wrapping



File Format Conversion & Transformation to Map System

Load on User Side

(unbearable in Sentinel era)

WCS-based, Demand Driven

Ground Segment

Earth Observation Payload Data Processing

EOxServer

Data Regist-ration

WCS Server

~10^5 Files

Raw Data

Standard Protocol

Down-loading

EO Data Users

Data Needed by User

Load on Provider Side

(comparatively moderate)

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