# WCS Standardization & Reference Implementation

Stephan Meißl, EOX IT Services GmbH
stephan.meissl@eox.at

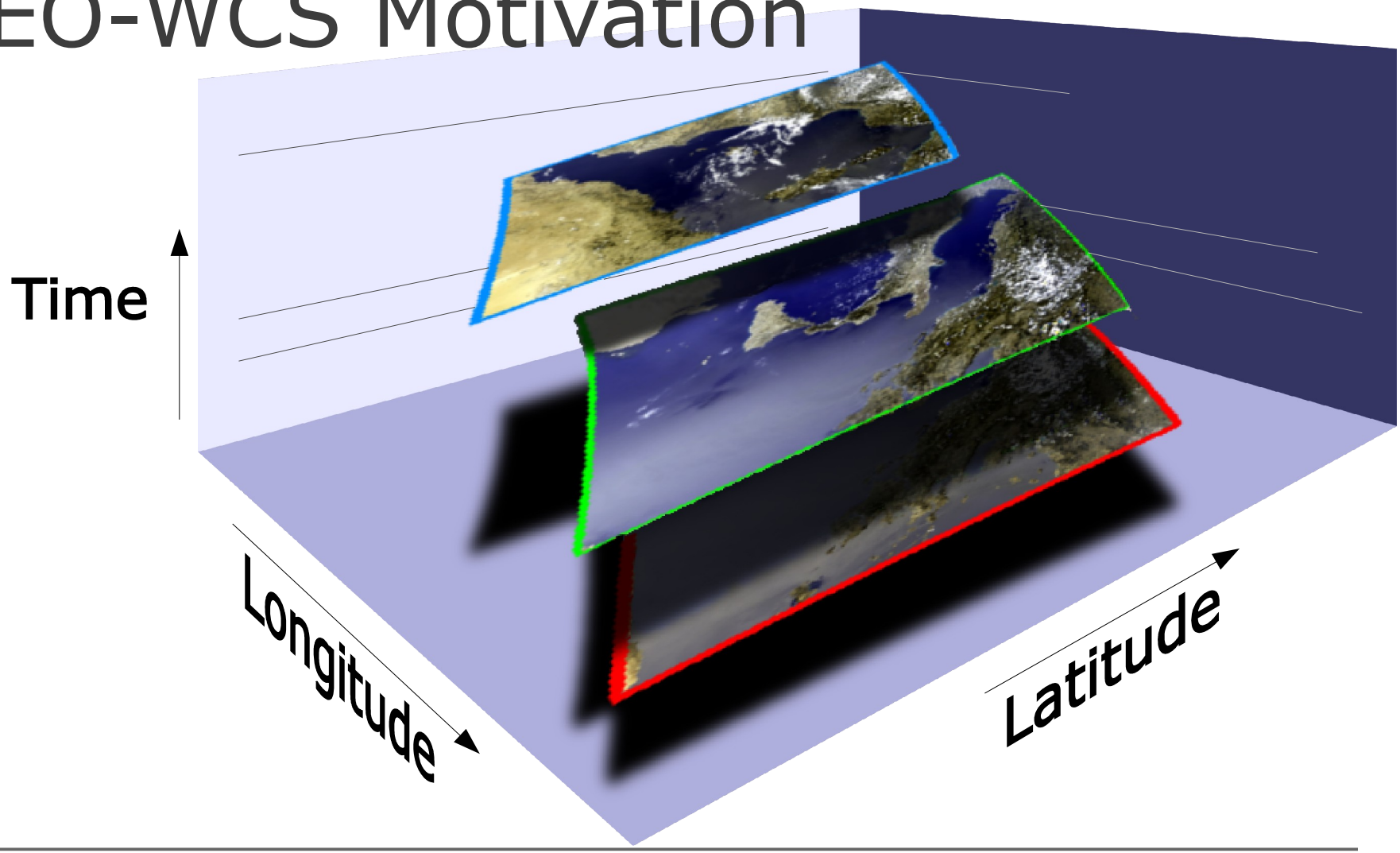
2012-02-15 HMA AWG Meeting

# Outline

- EO Web Coverage Service (EO-WCS) Motivation
- WCS Standardization
  - Current Status
  - Ongoing Work
  - Future Work
- Reference Implementation
  - Integrated Usage of EO-WMS & EO-WCS
  - MapServer, EOxServer, etc.


© EOX IT Services GmbH, 2012

# EO-WCS Motivation





© EOX IT Services GmbH, 2012

# WCS – Current Status

- GMLCOV 1.0.0 – Approved
  OGC 09-146r1, OGC GML 3.2.1 Application Schema – Coverages
- WCS 2.0.0 – Approved
  OGC 09-110r3, OGC WCS 2.0 Interface Standard – Core
- KVP, XML/POST, and XML/SOAP protocol binding extensions 1.0.0 – Approved
  OGC 09-147r1, OGC WCS 2.0 Interface Standard – KVP Protocol Binding Extension
  OGC 09-148r1, OGC WCS 2.0 Interface Standard – XML/POST Protocol Binding Extension
  OGC 09-149r1, OGC WCS 2.0 Interface Standard – XML/SOAP Protocol Binding Extension


© EOX IT Services GmbH, 2012

# WCS – Ongoing Work

- GMLCOV 1.0.1 – Submitted for 2-week voting
  OGC 09-146r2, OGC GML 3.2.1 Application Schema – Coverages
  - Adopting three Conformance Classes:
    - *gml* – Pure GML encoding
    - *multipart* – GML header plus standard encoding
    - *special-format* – standard encoding only
  - Correcting *metadata* element used in EO-WCS
  - Various minor corrections like adjusting informative examples to adopted SWE Common standard


© EOX IT Services GmbH, 2012

# WCS – Ongoing Work

- WCS 2.0.1 – Submitted for 2-week voting
  OGC 09-110r4, OGC WCS 2.0 Interface Standard – Core
  - Correcting *Extension* elements needed in EO-WCS
  - Adding *nativeFormat* to coverage description
  - Adding optional *format* and *mediaType* parameters to GetCoverage request; default is native format
  - Adding *CoverageSubtypeParent* to allow introducing new coverage types e.g. in EO-WCS
  - Various minor corrections and clarifications


© EOX IT Services GmbH, 2012

# WCS – Ongoing Work

- CRS Extension – Submitted to TC for public comment period
  OGC 11-053, OGC WCS 2.0 CRS Extension
  - Adds optional *subsettingCrs* and *outputCrs* parameters to GetCoverage request; default is native CRS
  - Defines crs-gridded-coverage Conformance Class for RectifiedGridCoverages and ReferenceableGridCoverages used in EO-WCS


© EOX IT Services GmbH, 2012

# WCS – Ongoing Work

- KVP and XML/POST protocol binding extension corrigenda – Final editing for SWG vote
  - KVP: SWG discussion finished
  - XML/POST: Only editorial corrections necessary
- GeoTIFF, CF-netCDF, and JPEG2000 Encoding extensions – Drafts available
  - Need adoption of discussions
  - Need adjustments to latest WCS standards
- HDF Encoding extension – Editor invited


© EOX IT Services GmbH, 2012

# WCS – Ongoing Work

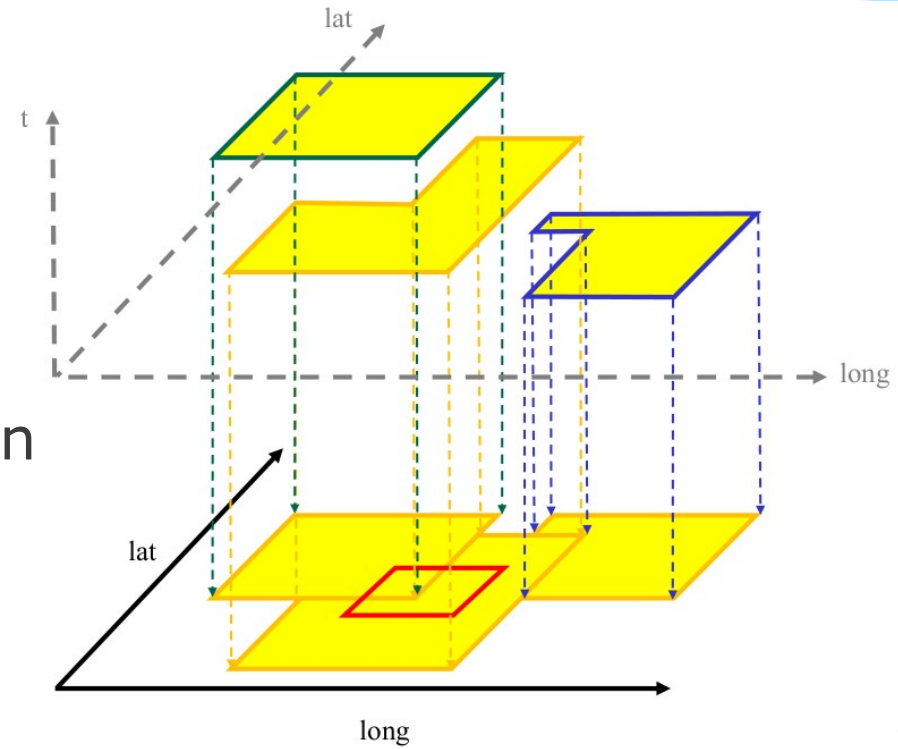
- EO-WCS 1.0.0 – Public comment period passed
  OGC 10-140, OGC WCS 2.0 Application Profile - Earth Observation
  - One comment received
  - Adjustments to GMLCOV and WCS corrigenda

    → ready for voting


© EOX IT Services GmbH, 2012

# EO-WCS

- EO Coverages
  - Rectified- or Reference-ableGridCoverages plus EO Metadata (Acquisition time, Footprint, etc.)
  - Dataset
  - StitchedMosaic – Homogeneous grouping




- DatasetSeries – Heterogeneous grouping
- DescribeEOCoverageSet operation – Spatio-temporal search on metadata

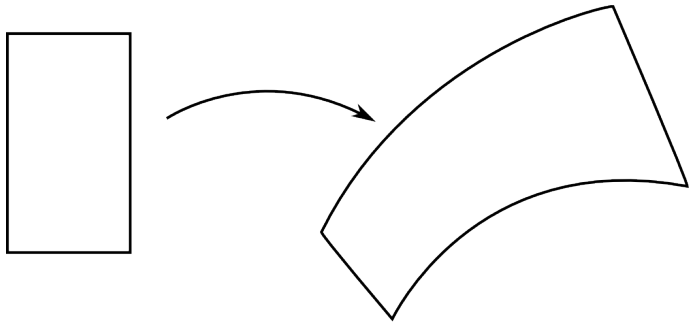

© EOX IT Services GmbH, 2012

# WCS Future Work

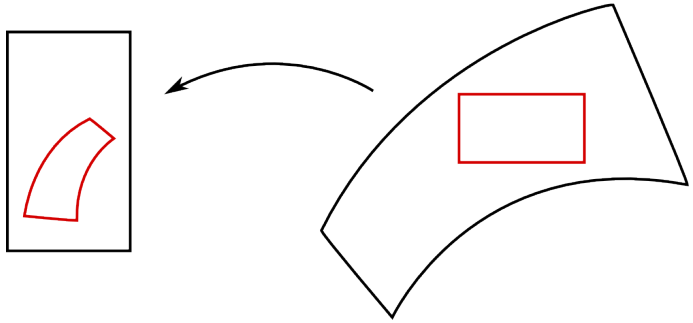
- XML/SOAP protocol binding extension corrigendum
  - Experience from implementation in O3S
- WCS Transactional (WCS-T)
  - Experience from implementation in O3S
- Band subsetting, Scaling & Interpolation, WCS time handling, WCPS, etc.
- ReferenceableGridCoverages and other additional coverage types
  - First implementation available from O3S


© EOX IT Services GmbH, 2012

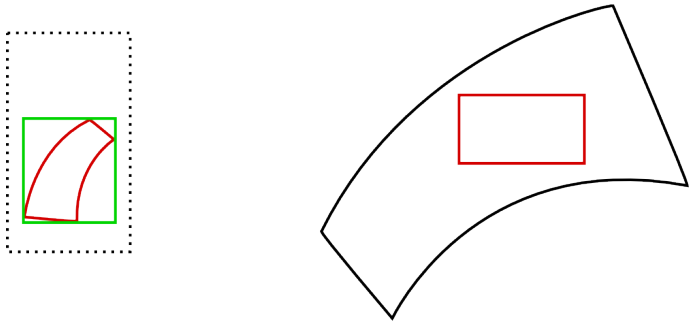
# Use Case for Referenceable-GridCoverages



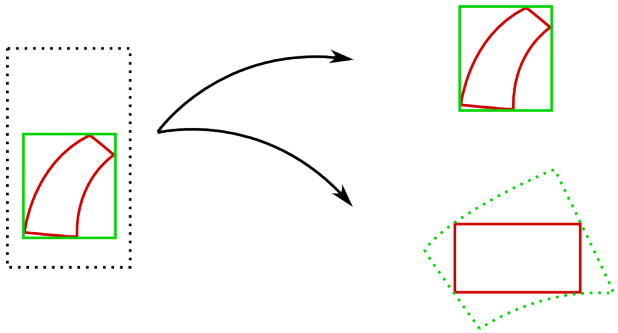
WMS GetMap
(georeferencing and reprojecting using GCPs)



WCS GetCoverage
AOI subsetting

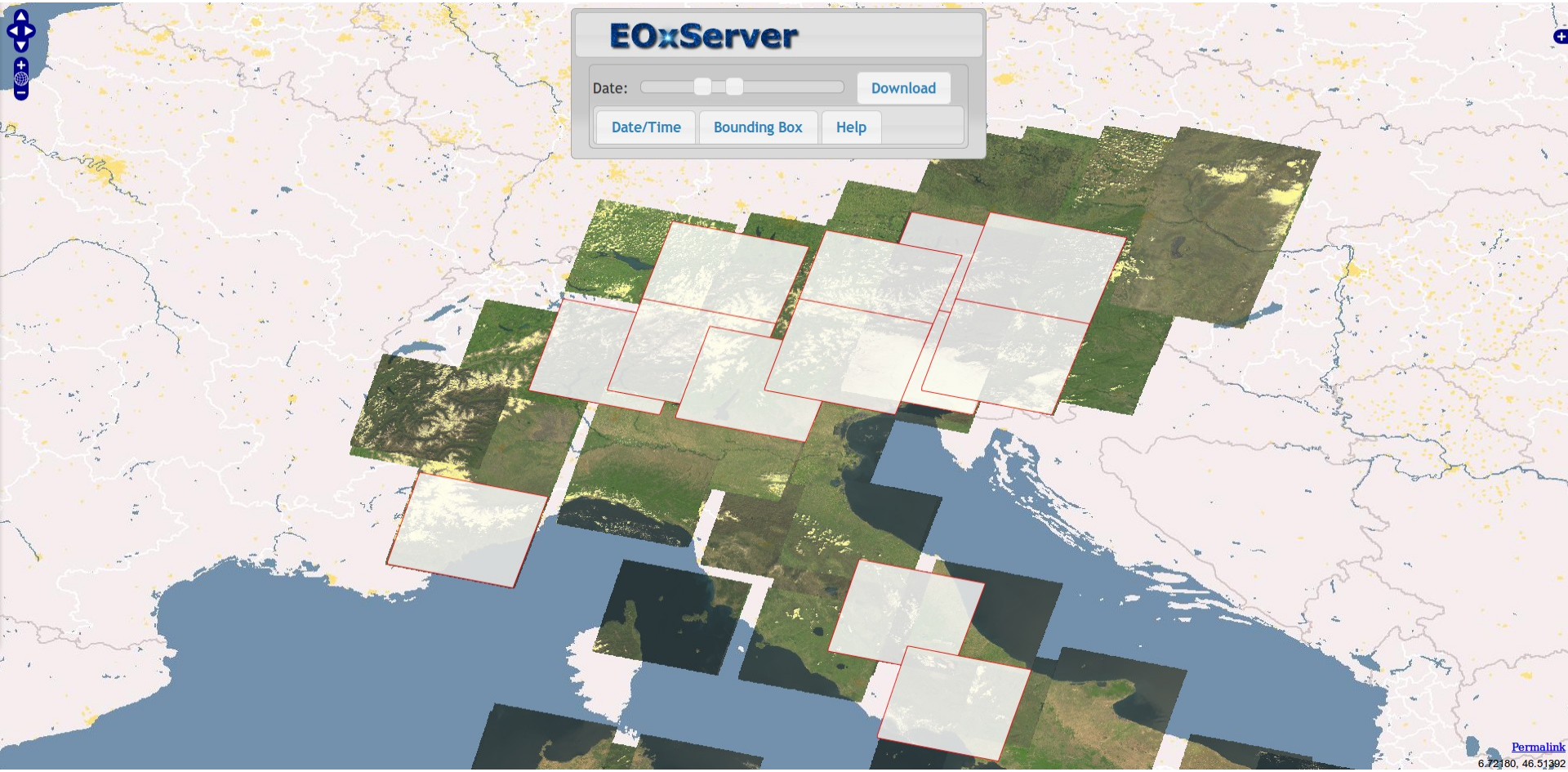


Bounding box subsetting



WCS GetCoverage response
 * ReferenceableGridCoverage
or
 * RectifiedgridCoverage
   (georeferencing and reprojecting using GCPs)

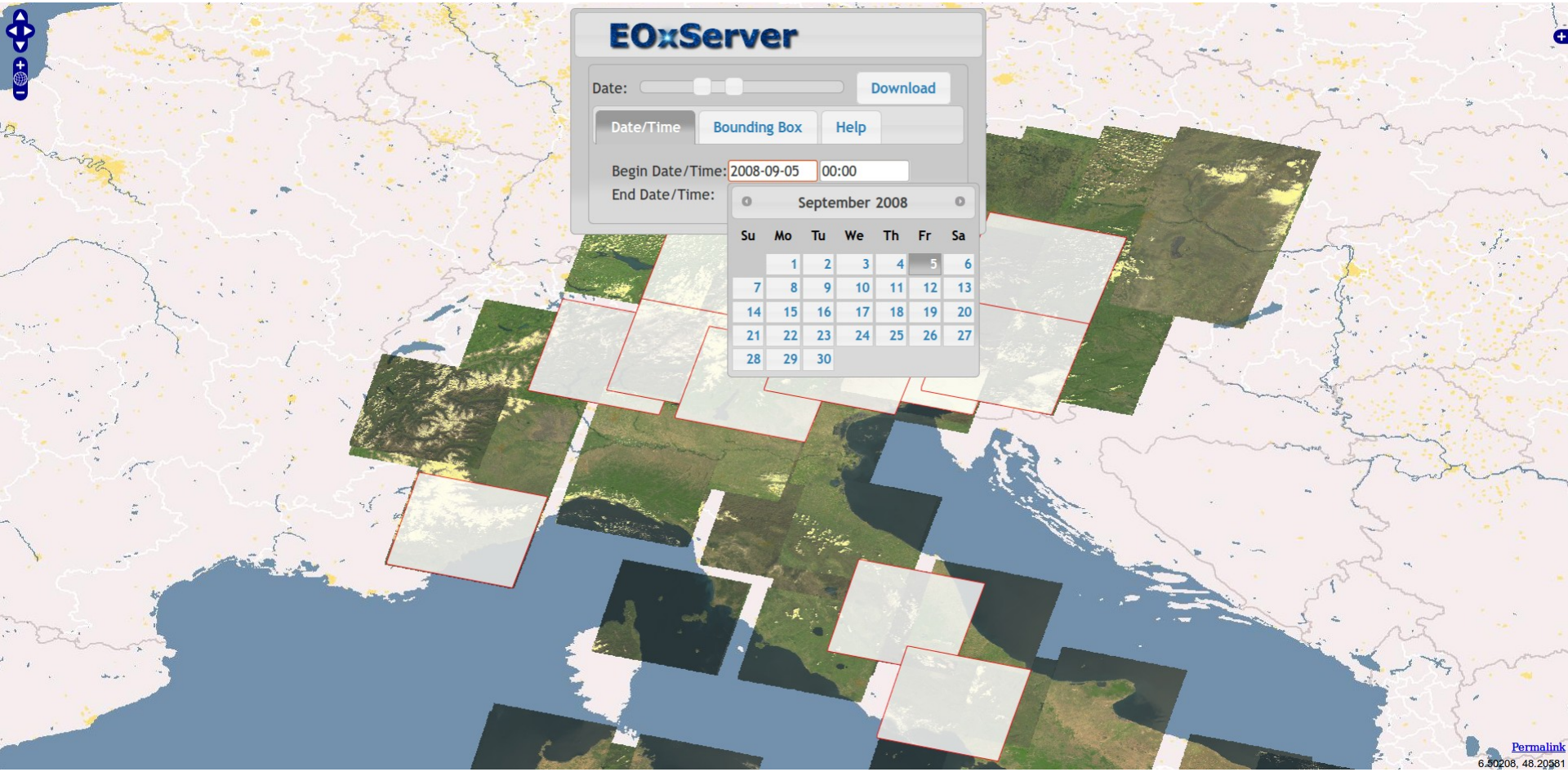
# EO-W*S Client – Date Slider





© EOX IT Services GmbH, 2012

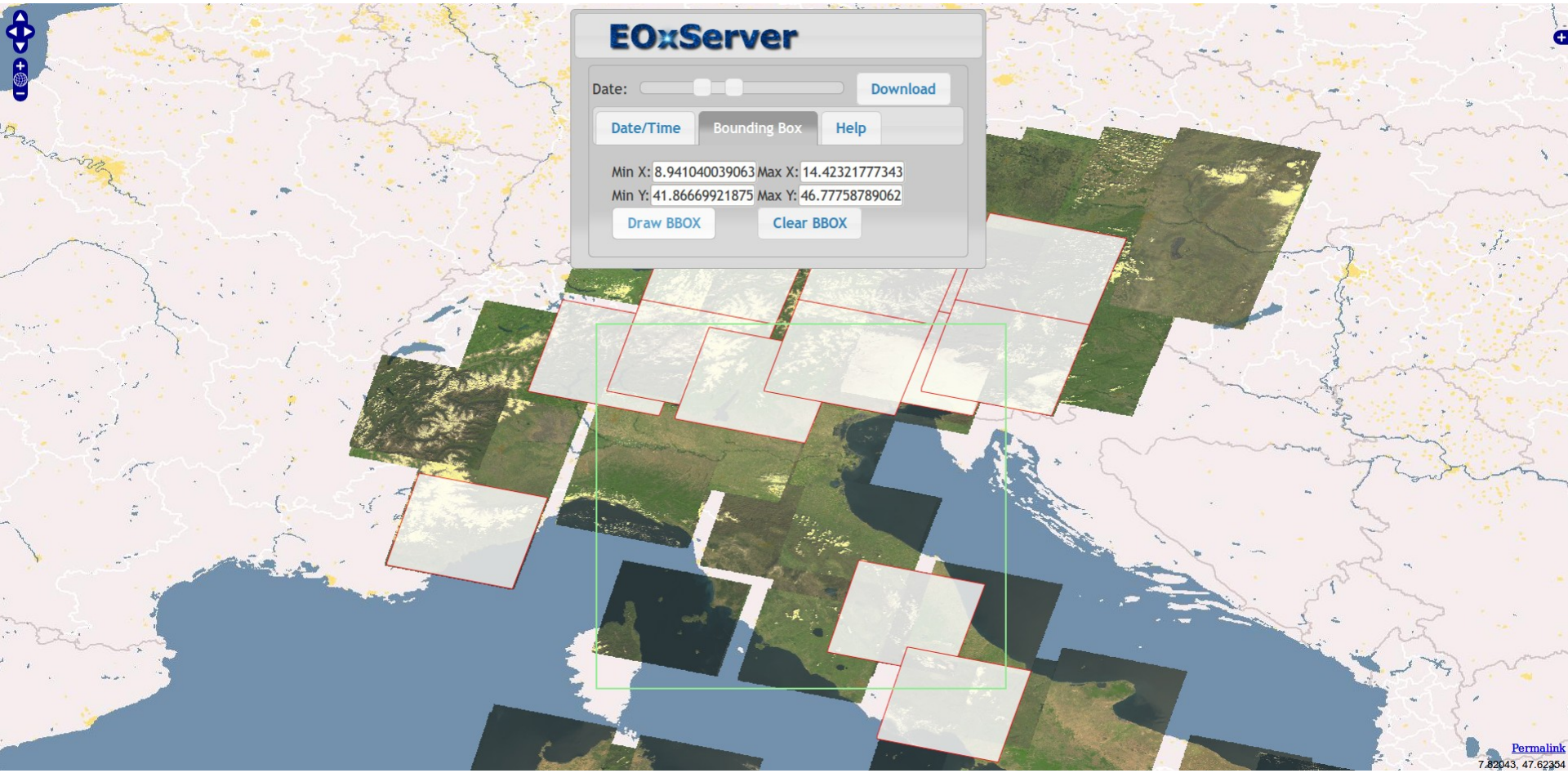
# EO-W*S Client – Date Picker





© EOX IT Services GmbH, 2012

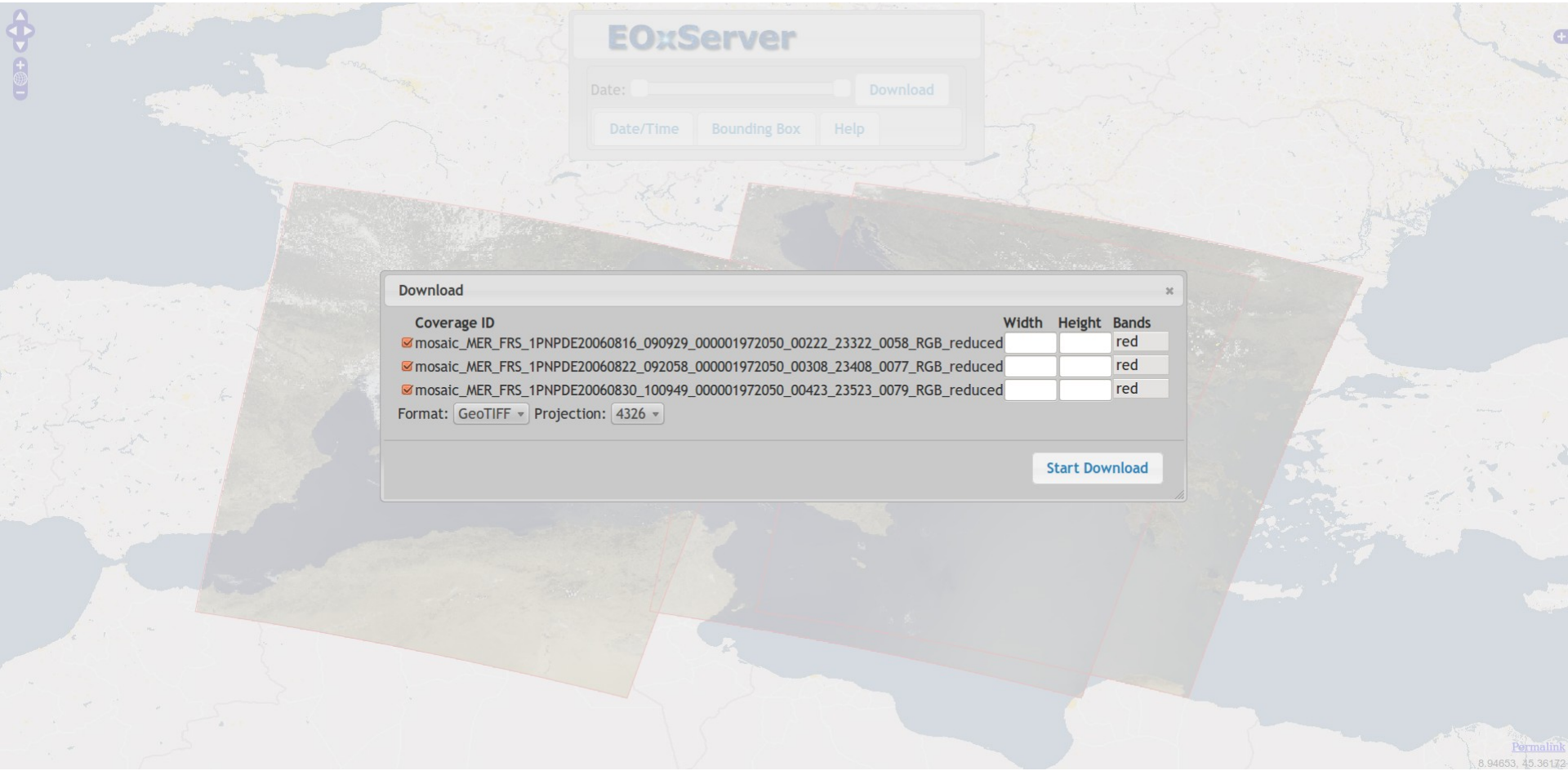
# EO-W*S Client – Bounding Box





© EOX IT Services GmbH, 2012

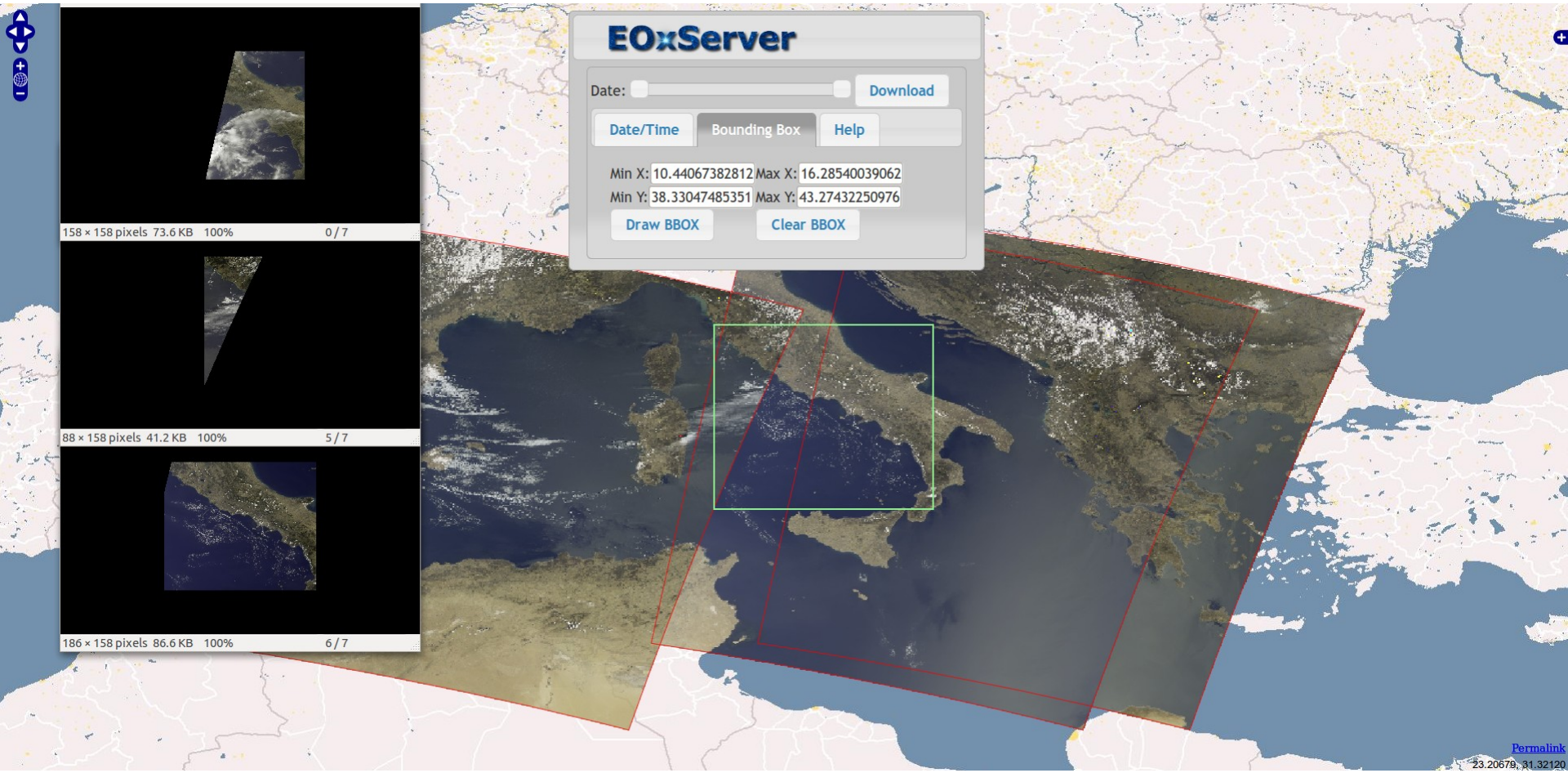
# EO-W*S Client – Download





© EOX IT Services GmbH, 2012

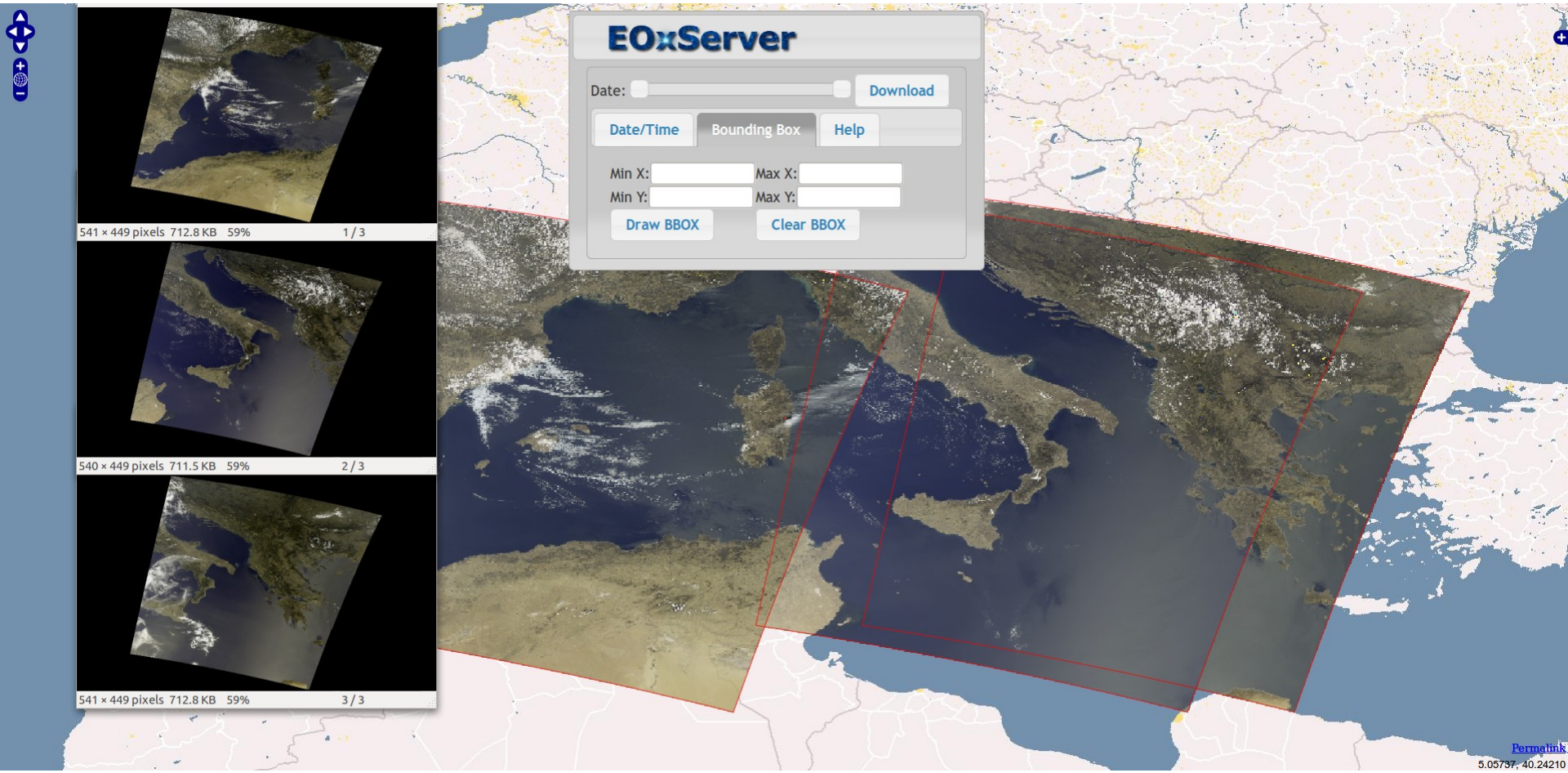
# EO-W*S Client – Download sub.





© EOX IT Services GmbH, 2012

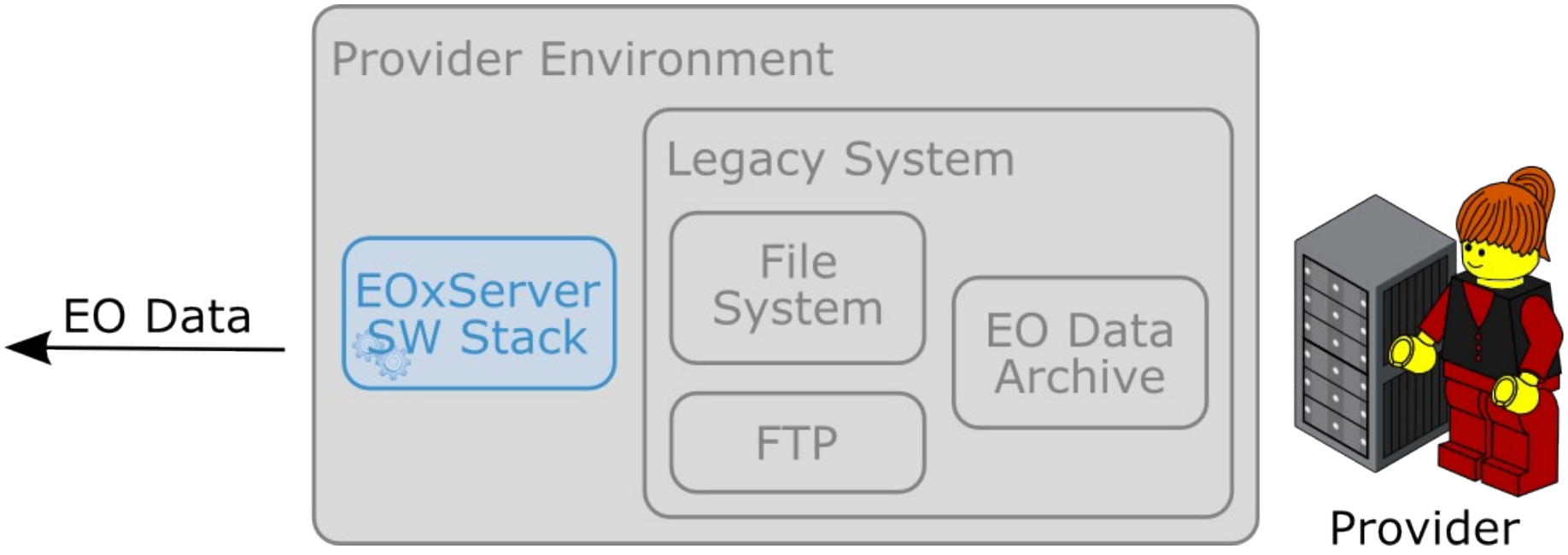
# EO-W*S Client – Download full





© EOX IT Services GmbH, 2012

# Reference Implementation





© EOX IT Services GmbH, 2012

# Reference Implementation

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


© EOX IT Services GmbH, 2012

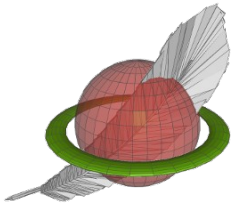
# Reference Implementation

EOxServer Highlights

- MIT-style license and based on Open Source SW
- Rectified- and ReferenceableGridCoverages
- DatasetSeries and StitchedMosaics
- WCS Transactional (WCS-T)
- Integration with security system
- Data registration via admin gui or command line
- Simple client demonstrating integrated usage of EO-WMS & EO-WCS


© EOX IT Services GmbH, 2012

# EOxServer Open Source SW



...


© EOX IT Services GmbH, 2012

# Welcome to the EOxServer Open Source Project

## EOxServer is a server for Earth Observation (EO) data

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

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

EOxServer is released under the EOxServer Open License a MIT-style license and written in Python and entirely based on Open Source software including MapServer, Django, GDAL, SpatiaLite, or PostGIS, and PROJ.4. Versions 0.1.x are released under the GNU General Public License.

**Download EOxServer**

**EOxServer Demonstration**

The currently available functionality includes:

- Support of GML AP – Coverages for RectifiedGridCoverages
- Support of adopted WCS 2.0 specification (Core including GetCapabilities, DescribeCoverage, and GetCoverage requests, KVP-, and XML/POST protocol binding)
- Anticipated support of envis
  "anticipating" we mean to r
- Support of 2-D EO Coverag
- Support of Dataset Series a
- Support of new DescribeEO
- Support of Stitched Mosaic
- Support of EO Metadata (re
- Protocoll bindings supporte
  - KVP
  - XML/POST (used toge
- Coverage formats supporte
  - GeoTIFF
  - Formats supported by
- Support of EO-WMS for EO

**EOxServer Mailing Lists**

**EOxServer Documentation**

**EOxServer API Documentation**

Work on EOxServer has been par

HMA

## EOxServer Wiki

This wiki is a major source of inf

Development discussions take pla



EOxServer

Table Of Contents

Global Use Case
- The General *Provider* View
  - Environment & Software Configuration
  - Data Registration
- The General *User* View
  - Web Browser
  - GIS Tool

Previous topic
Getting Started

Next topic
Mailing Lists

This Page
Show Source

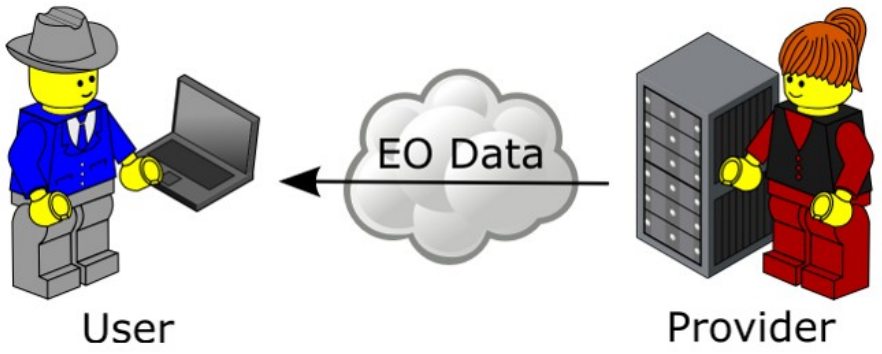
Quick search

Go

# Global Use Case

This section describes the global Use Case of EOxServer including concrete usage scenarios as examples.

Figure: "*Parties involved in the EOxServer Global Use Case*" introduces the involved parties in this global U




*Parties involved in the EOxServer Global Use Case*

On the one side there is a provider of Earth Observation (EO) data. The provider has a possibly huge, in size, archive of EO data and wants to provide this data to users. Of course the data provision has constraints and requirements like technical, managerial, or security frame conditions but in general the reach as many users as possible with minimal efforts.

# EOxServer

GENERAL
**Summary**
Highlights
News
Links
Similar Projects
Widgets

DEVELOPMENT
Code Analysis
Commits
Estimated Cost
Enlistments

COMMUNITY
Contributors
Users
Managers
World Map
Ratings & Reviews
Journal Entries

EDIT
Report Duplicate
Permissions
History

EOxServer is a server for Earth Observation (EO) data

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

EOxServer is released under the EOxServer Open License a MIT-style license and written in Python and entirely based on Open Source software including MapServer, Django, GDAL, SpatiaLite, or PostGIS, and PROJ.4.

This project is managed by Stephan Meissl.

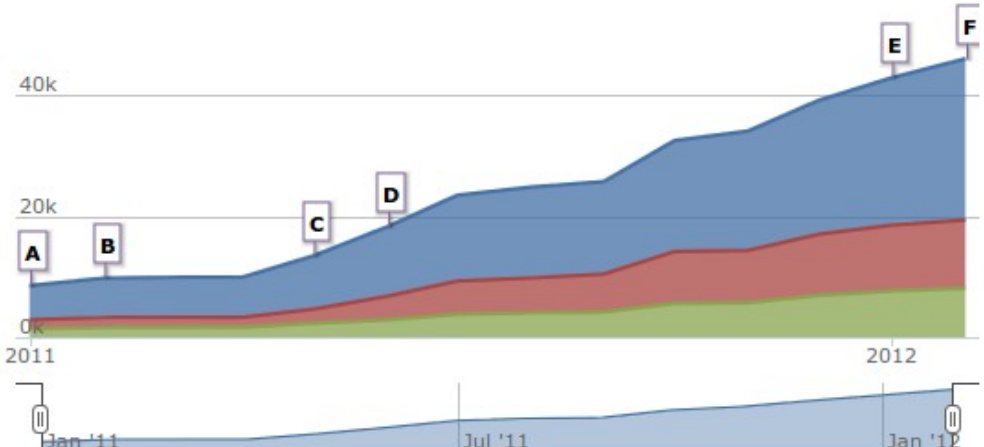
2 USERS I USE THIS

Tagged as proxy webmapservice coverage opensource gis earthobservation python26 wms ogc_web_services gdal django mapserver ogc wcs python ows eoxserver mapping osgeo webcoverageservice soap

## Code Analysis

Lines of Code

Zoom 1yr All




## Ohloh Analysis Summary

**Updated about 9 hours ago**

- Mostly written in Python
- Well-commented source code
- Estimated project cost: $338,936

View All Possible Factoids

## 30-Day Commit Activity

**Jan 15 — Feb 14**

- Repository has come back to life!
  - First commit after 2 months – Jan 24
- Recent large commits
  - Added rudimental webclient interface....
  - WCS-T: New Coverage Managers' API int...
  - split up services.ows.wms1x into part...
  - Adjusting svn properties.
- 6 committers made 115 commits
  - 97 files modified
  - 8848 lines added
  - 3928 lines removed

## World Activity Map

Stephan Meißl
+43 664 968 8701
stephan.meissl@eox.at

EOX IT Services GmbH
Thurngasse 8/4
1090 Wien
Austria

eox.at

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

This work is licensed under a
Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.