

WCS 2.0 / EO-WCS

**New OGC Standards and Open Source
implementations
(MapServer, rasdaman and EOxServer)**

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- *The Web Coverage Service (WCS) supports electronic retrieval of geospatial data as "**coverages**" – that is, digital geospatial information representing space-varying phenomena."*
- A **coverage** is defined as a "space-time varying phenomenon", such as:
 - 1D sensor time series (t)
 - 2D remote sensing imagery (x/y)
 - 3D x/y/t satellite image time series
 - 3D x/y/z geophysical data
 - 4D x/y/z/t atmospheric and ocean data

Source: <http://www.ogcnetwork.net/wcs>

➤ WCS 2.0 – Web Coverage Service

- **OGC 09-110r3** Interface Standard (Implementation Specification)
- Unterstützt alle **coverages von GML 3.2.1**, d.h., curvilinear grids, irregular grids, point clouds, surface coverages, general meshes;
- **Harmonisierung** mit OGC OWS-Common, GML, SWE, WMS, WCPS, and WPS
- Klare und formal **spezifizierte Syntax** (XML Schema) **und Semantik** (Schematron); dient dem Verständnis und einer leichteren Implementierung
- Basierend auf OGC's "**Core / Extension**" Modell

- EO-WCS – Earth Observation Application Profile for WCS 2.0
 - **OGC 10-140** OGC Web Coverage Service 2.0 Interface Standard - Earth Observation Application Profile (submitted to OGC, **awaiting public RFC**)
 - Definiert ein Standard Interface und Operationen die den interoperablen, online Zugriff auf geospatial "EO-coverages" ermöglichen
 - Definiert **zusätzlich zu WCS 2.0**:
 - Request: **DescribeEOCoverageSet**
 - Data type: **Dataset Series**
 - Data type: **Stitched Mosaic**
 - **EO metadata delivery**
 - **Lineage information** (= processing history)

- WMS: Web Mapping Service ist mittlerweile sehr bekannt und weit verbreitet
 - WMS liefert Abbilder !
 - Serverseitiges Rendering
- WCS: Web Coverage Service ist kaum bekannt und wird nur selten angeboten
 - WCS liefert Daten !
 - Daten mit Original-Semantik
 - Kein serverseitiges Rendering
 - Daten zur weiteren Analyse verwendbar

Foundation



Legend:

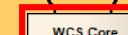
Mandatory for EO-WCS

Choice for EO-WCS

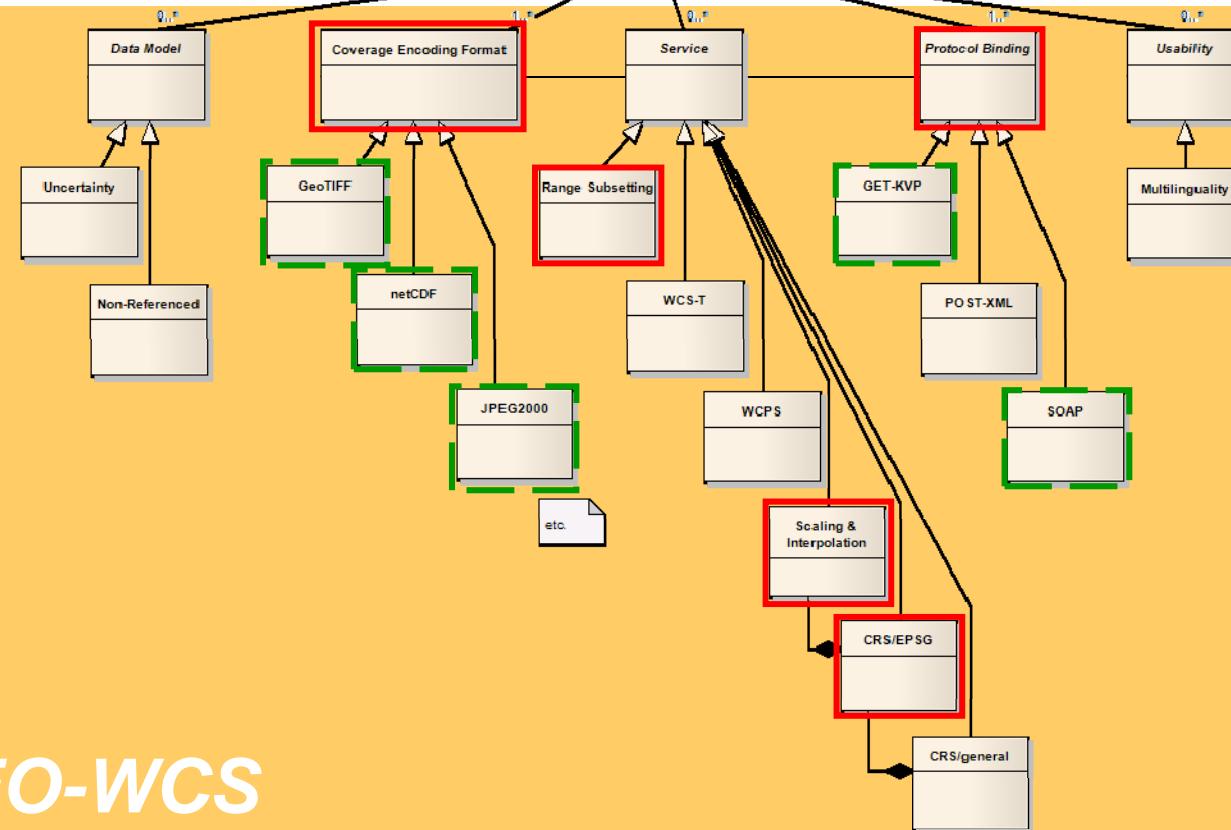
GML Application Schema for Coverages



WCS core

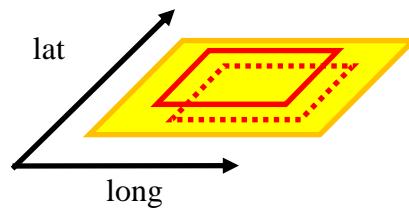


WCS extensions

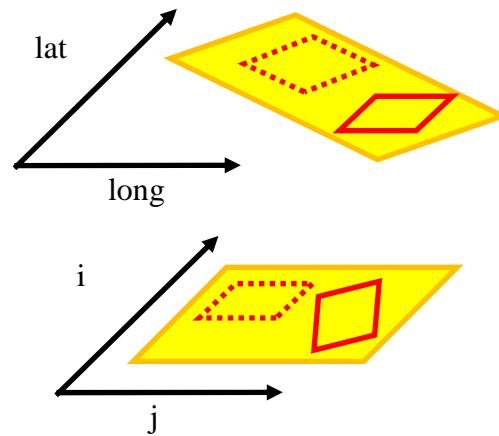


WCS 2.0 / EO-WCS

EO vocabulary	EO-WCS
scene / image / product / raster data (image) / raw data (image) / orthoimage	dataset
mosaic / seamless mosaic	dataset

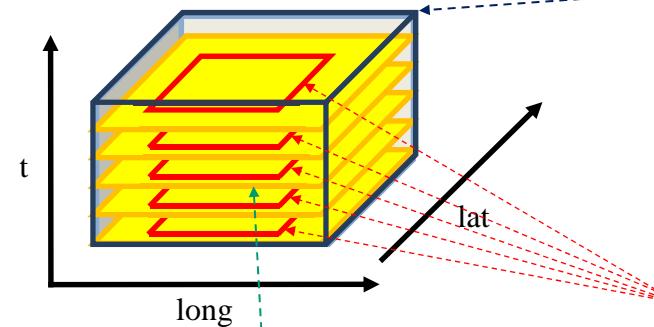


rectified grid coverage



referenceable grid coverage

EO vocabulary	EO-WCS
series / time series	dataset series

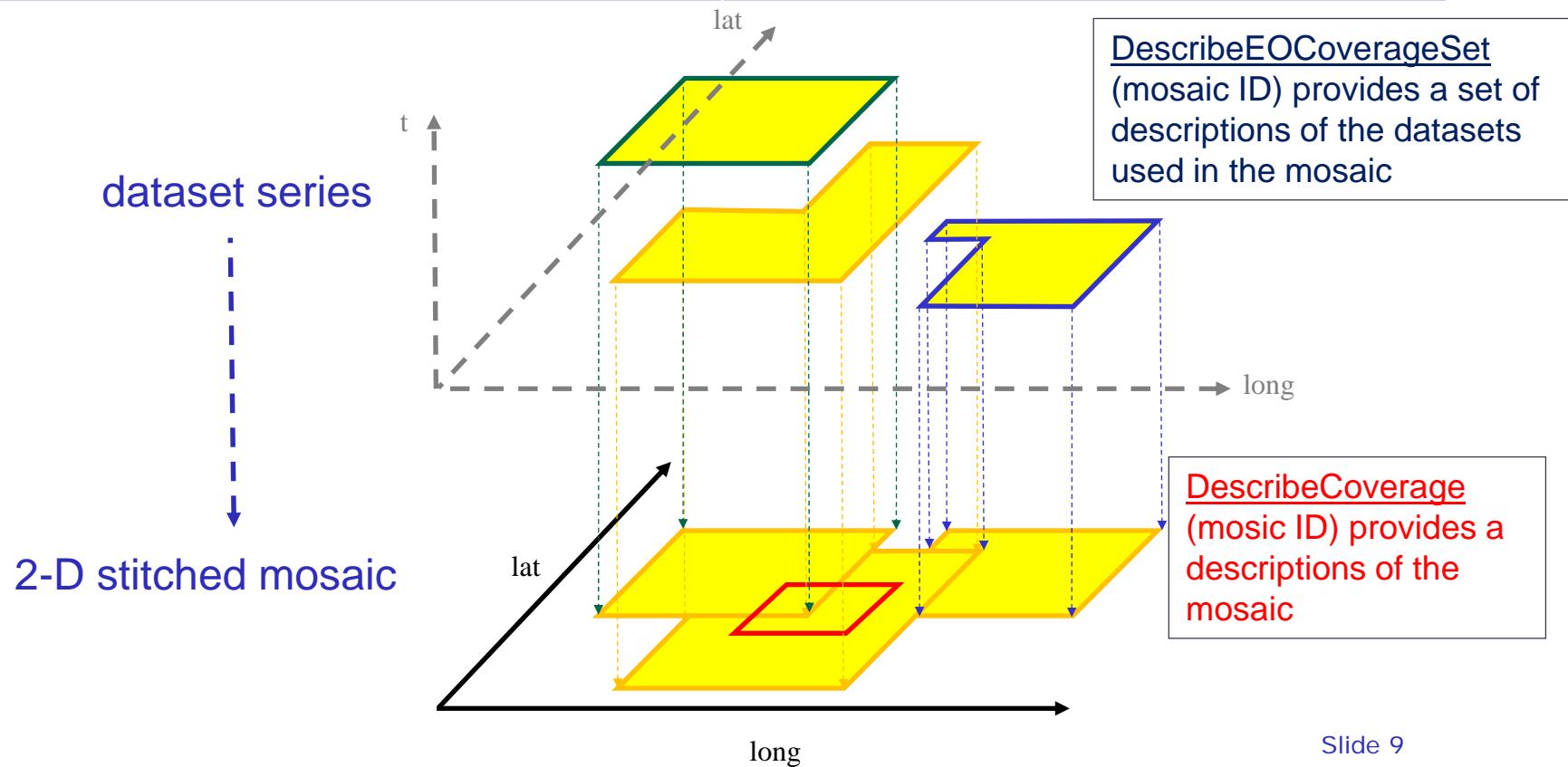


DescribeEOCoverageSet
provides a set of dataset
descriptions

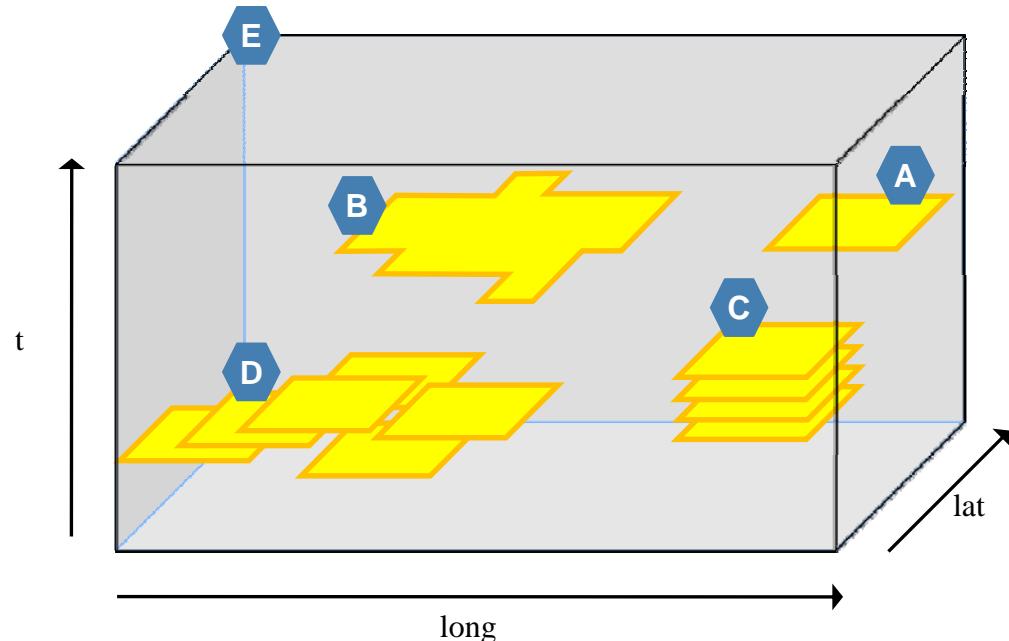
extraction from a 2-D dataset
series by repeated GetCoverage
Requests

DescribeCoverage
provides description on
single coverage

EO vocabulary	EO-WCS
google-like mosaic / composite mosaic	stitched mosaic



EO vocabulary	EO-WCS
collection	dataset series



A dataset (e.g. scene)
B dataset (e.g. seamless mosaic)
C datasets of dataset series
(e.g. time series)
D datasets of dataset series
E dataset series (e.g. collection)

A dataset may be a member
in different dataset series

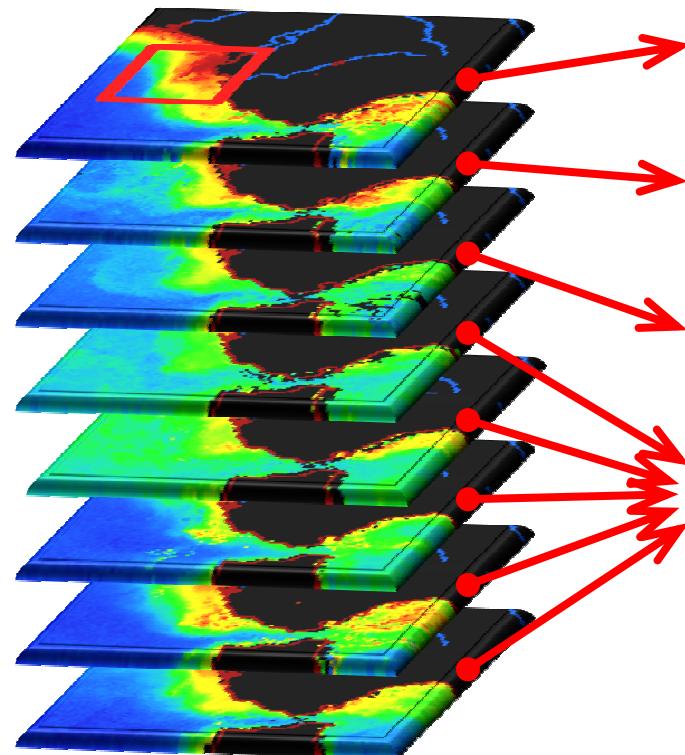
➤ Data structures:

- **EO Coverage** = Coverage + EO Metadata + Lineage
 - *RectifiedGridCoverage* or
 - *ReferenceableGridCoverage*
- **Dataset** = 2D “horizontal” EO Coverage
- **Stitched Mosaic** = homogeneous grouping
 - *Can be seen as a coverage itself*
- **Dataset Series** = heterogeneous grouping

➤ Operations:

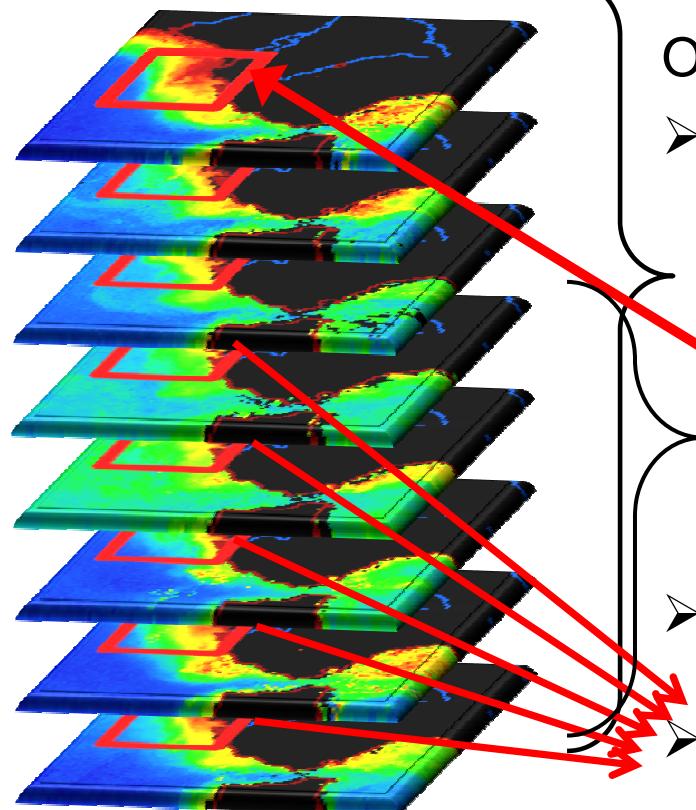
- GetCapabilities: document is more flexible
- DescribeCoverage, GetCoverage: as known
- **DescribeEOCoverageSet**: spatio-temporal search possibility

***What needs
to be done if
you just need a
small AOI ?***



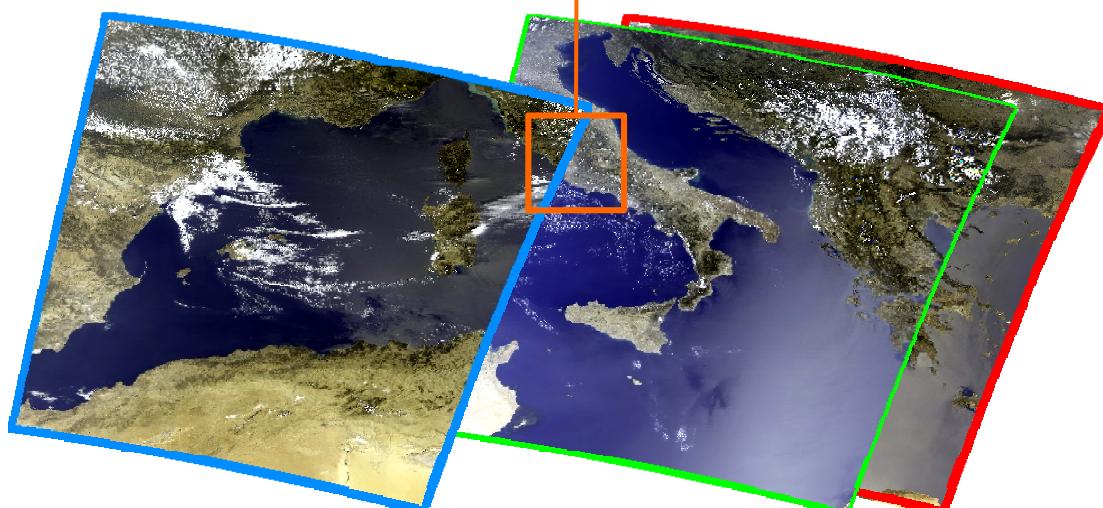
- Discover the required data using a Catalog
- Go to FTP-site
- Discover respective files
- Download 1st big file
- Wait until download is finished
- Download 2nd big file
- Wait ...
- Download 3rd big file
- Wait ...
- Download other big files
- Wait ...
- Extract the AOI from each file and throw away the rest

What can EO-WCS do for you if you just need a small AOI ?



- You may discover the required data using a Catalog
- You may Order using direct links from the Catalog for each item
- OR ...
- You may use a EO-WCS enabled Client
 - Request information about the dataset series
 - Supply the AOI
 - Supply your time-frame (TOI)
 - You may request details for each Dataset
- Request the datasets of your AOI/TOI and
- Wait until download of the AOIs requested is finished

***EO-WCS allows
to keep track of
the metadata
history of
stitched
mosaics?***



- But each pixel will keep its history
- Each coverage has its metadata record
- Overlaying coverages replace existing ones

➤ Nutzer

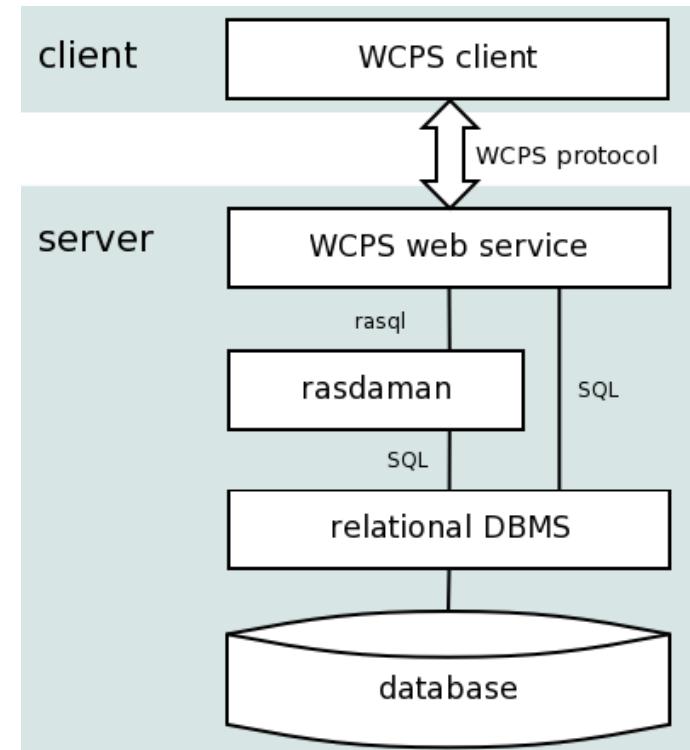
- Keine endlosen, nichtssagenden (Inhalt) Dateilisten auf FTP-Servern
- Geringerer Daten-download → man erhält nur was man wirklich benötigt(AOIs / TOIs)
- Zugriff auf Originaldaten

➤ Anbieter

- Originaldaten oder Rectifizierte Daten
- Keine Daten Duplizierung notwendig
- Mögliche Integration in komplexe "Web Service Chains" (z.B. Anbindung an ein Web Processing Service (WPS))
- Besseres "Quality of Service"

- Früher bekannt als: *UMN MapServer*
- Wahrscheinlich das bekannteste FOSS Web Mapping Projekt
- Seine Stärke ist das effiziente liefern von großen Rasterdaten Sets
- MapServer wurde um WCS 2.0 erweitert:
 - implementiert in C
 - vollständig WCS 2.0 standard konform, aber vorläufig limitiert auf "rectified" und "referencable grid coverages"
 - erweitert um XML-POST (jetzt auch für WCS 1.1 vorhanden)
- MapServer 6.0 – erhältlich seit 2011-05-12

- Middleware extending RDBMS for multi-dimensional, unlimited size, raster data
- Extensive query raster data language → rasql
- Features:
 - embeds into PostgreSQL
 - GDAL rasdaman driver available
 - MapServer integration (beta)
 - PostGIS query language (under work)
- Provides OGC interfaces:
 - WCS 2.0
 - WCPS (Web Coverage Processing Service)
 - WPS (Web Processing Service)
 - WCS-T WCS Transactional



WCPS Reference Implementation architecture with *rasdaman*;

EoxServer veröffentlicht unter:

<http://eoxserver.org>

- Neueste Version: 0.1.2, vom: 2011-05-04
- derzeit GNU GPL 3 (→ Änderung auf MapServer Lizenz)
- Entwickelt in Python
- Nur auf Open Source Software basierend (MapServer, Django, GDAL, SpatialLite or PostGIS, PROJ.4, etc.)
- Implementiert das Model – View – Controller Konzept
- Administrations-Interface zum einbinden und verwalten von Datasets, Dataset Series und Stitched Mosaics
- Umfangreiche Dokumentation
- Online Demo Implementierung
- Mailing list, Trac, SVN, etc.

EoxServer Admin Client

Welcome, **admin**. Change password / Log out

Site administration

Auth		
Groups	 Add	 Change
Users	 Add	 Change
Server		
Channels	 Add	 Change
DatasetSeries	 Add	 Change
Datasets	 Add	 Change
EO Metadata Entries	 Add	 Change
Files	 Add	 Change
Layer Metadata	 Add	 Change
Lineage Entries	 Add	 Change
NilValues	 Add	 Change
RangeTypes	 Add	 Change
RectifiedGrids	 Add	 Change
Single File Coverages	 Add	 Change
StitchedMosaics	 Add	 Change

Recent Actions

My Actions

- [!\[\]\(6532ca221fd29bf01740af58b30ab1b6_img.jpg\) BeginTime: 2006-08-16
11:58:11
EO Metadata Entry](#)
- [!\[\]\(001b054131c7dda60bb9e7ad14474d58_img.jpg\) BeginTime: 2006-08-16
00:00:00
EO Metadata Entry](#)
- [!\[\]\(768b1f0ff0f049993895f8a2d4fad1aa_img.jpg\) spot5_set_mosaic_sicily_HMA_demo
DatasetSeries](#)
- [!\[\]\(c42e2647bdb85954516c28b8c6ba50f6_img.jpg\) BeginTime: 2011-02-05
09:44:07
EO Metadata Entry](#)
- [!\[\]\(1cd7e8a67ff028ef22c549e891b53962_img.jpg\) 215 RectifiedGrid
RectifiedGrid](#)
- [!\[\]\(97dbc6c77a854dffbde05f46574bbf9d_img.jpg\) EOxSLineageRecord object
Lineage Entry](#)
- [!\[\]\(65395a6db1e61a1f8ce7f522aeee2279_img.jpg\) BeginTime: 2011-02-05
09:44:07
EO Metadata Entry](#)
- [!\[\]\(d34a52b376f7cea01bf5f716be525be0_img.jpg\) spot5_set_mosaic_sicily_HMA_demo
DatasetSeries](#)
- [!\[\]\(7ea6517a979147a2ad4a8ec74217b0eb_img.jpg\) spot5_set_mosaic_sicily_HMA_demo
DatasetSeries](#)
- [!\[\]\(972255309e1ba0db5d54fc915807ce25_img.jpg\) BeginTime: 2011-02-05
09:44:07
EO Metadata Entry](#)

Funktionalität

- Implementiert EO-WCS and EO-WMS "on top of" MapServer's 6.0 WCS and WMS Implementierung
- Unersttzt of GML AP – Coverages for RectifiedGridCoverages
- Unersttzt die WCS 2.0 Spezifikation
- Vorweggenommene Untersttzung der zu erwartenden WCS-Extensions: Coverage formate, GeoTIFF encoding, predefined (or EPSG) CRSs, scaling & interpolation, and non-referenced access
- Protocol bindings
 - KVP
 - XML/POST

Kontakt:

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Consortium:



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