

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

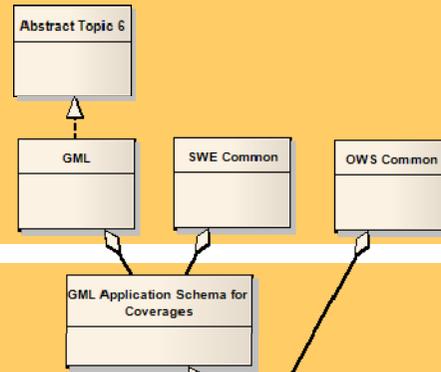
- **OGC 09-110r3** Interface Standard (Implementation Specification)
- Unterstützt alle **coverages von GML 3.2.1**, d.h., curvilinear grids, irregular grids, point clouds, surface coverages, general meshes;
- **Harmonisierung** mit OGC OWS-Common, GML, SWE, WMS, WCPS, and WPS
- Klare und formal **spezifizierte 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



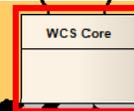
Legend:

Mandatory for EO-WCS

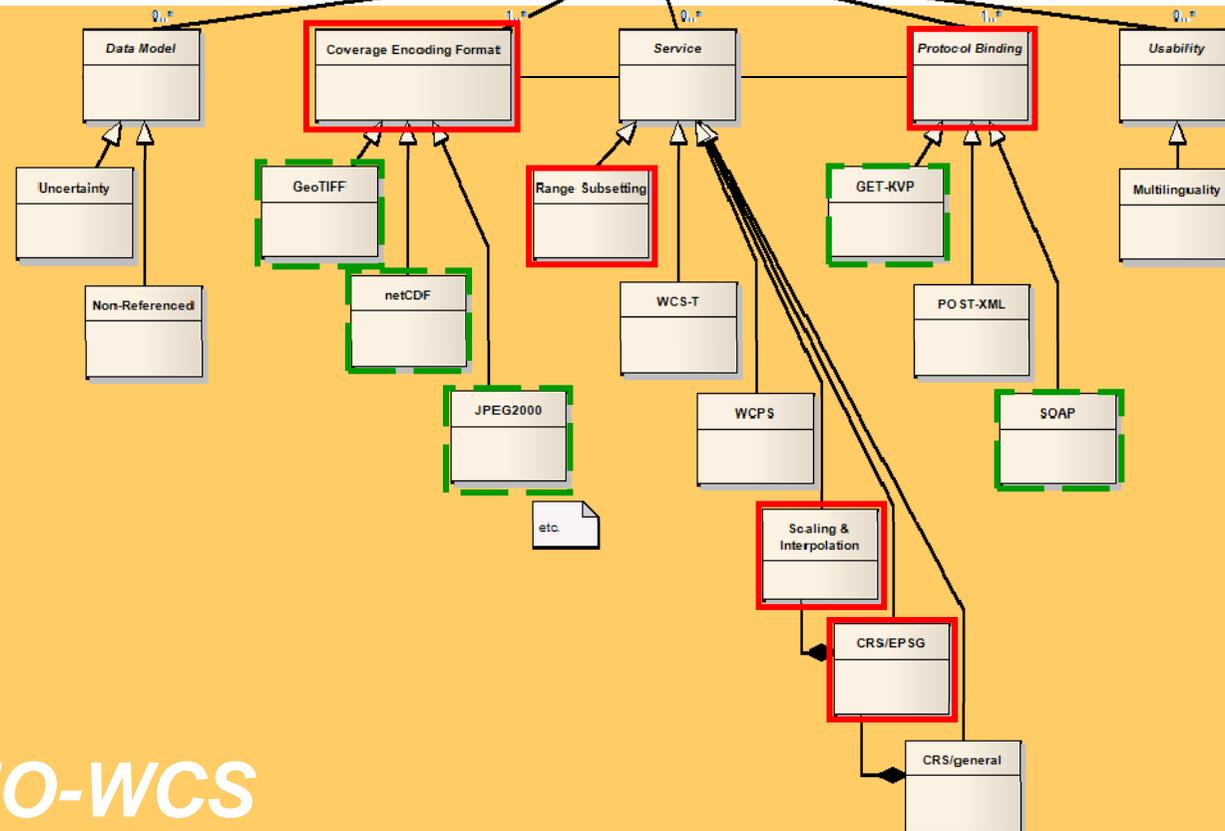
Choice for EO-WCS

GML Application Schema for Coverages

WCS core

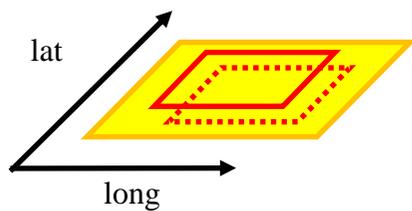


WCS extensions

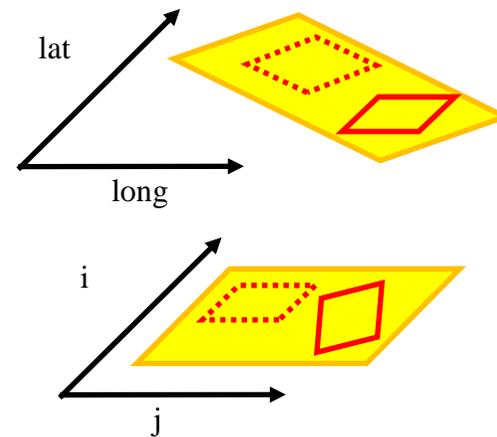


WCS 2.0 / EO-WCS

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

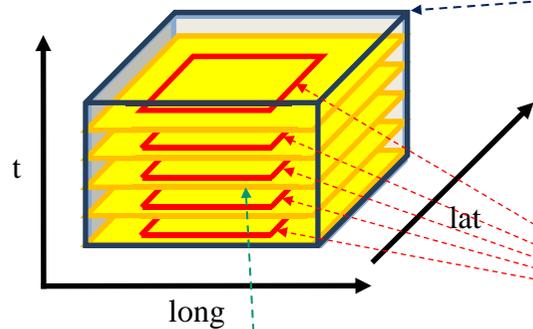


rectified grid coverage



referable grid coverage

EO vocabulary	EO-WCS
series / time series	dataset series

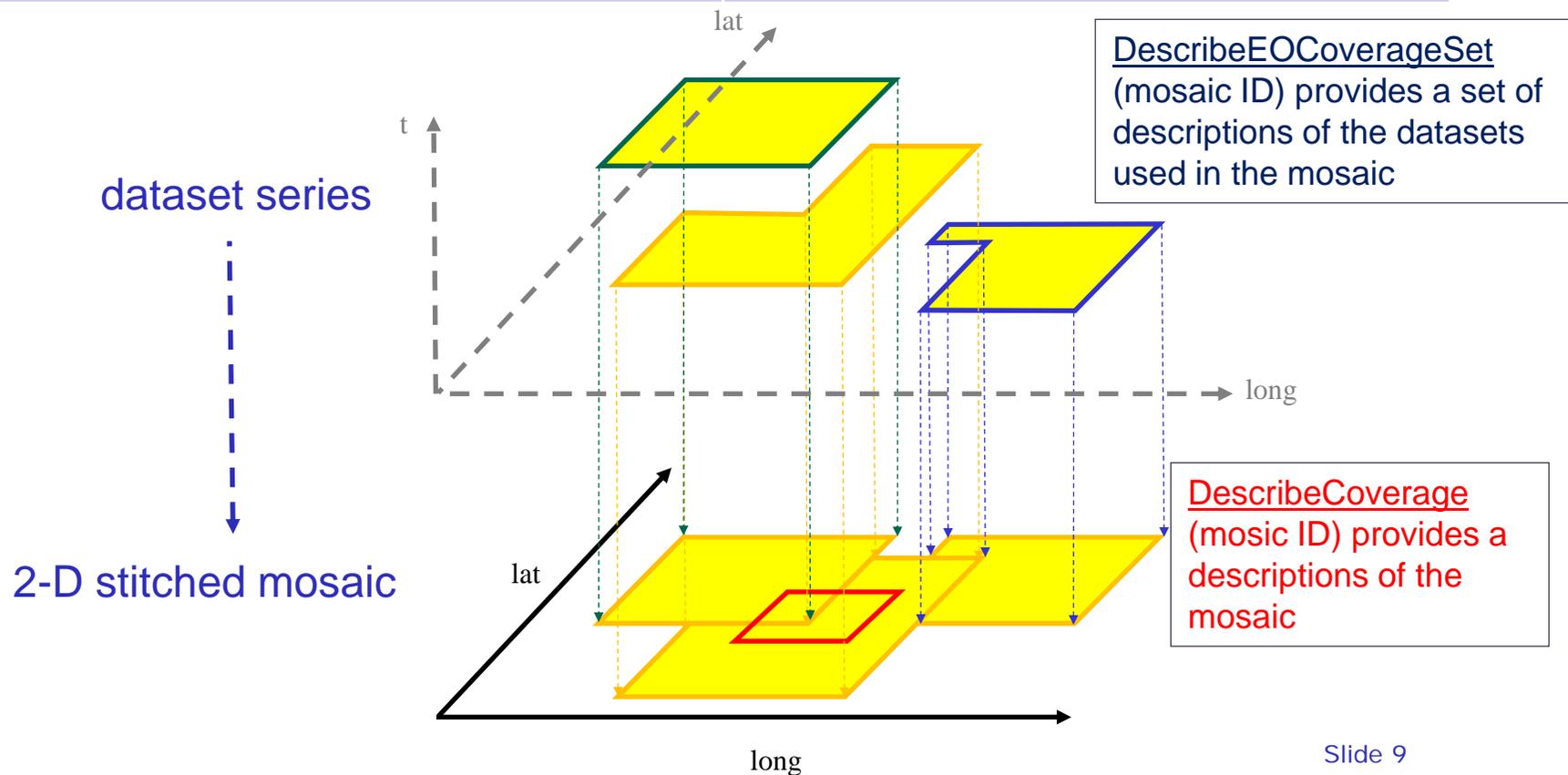


DescribeCoverage
provides description on
single coverage

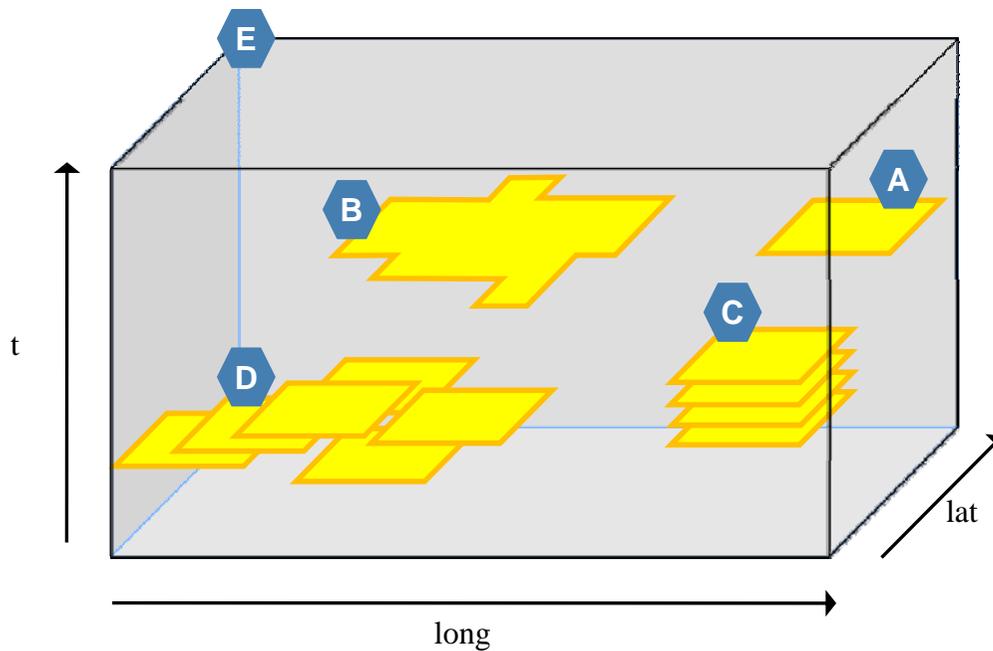
DescribeEOCoverageSet
provides a set of dataset
descriptions

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

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

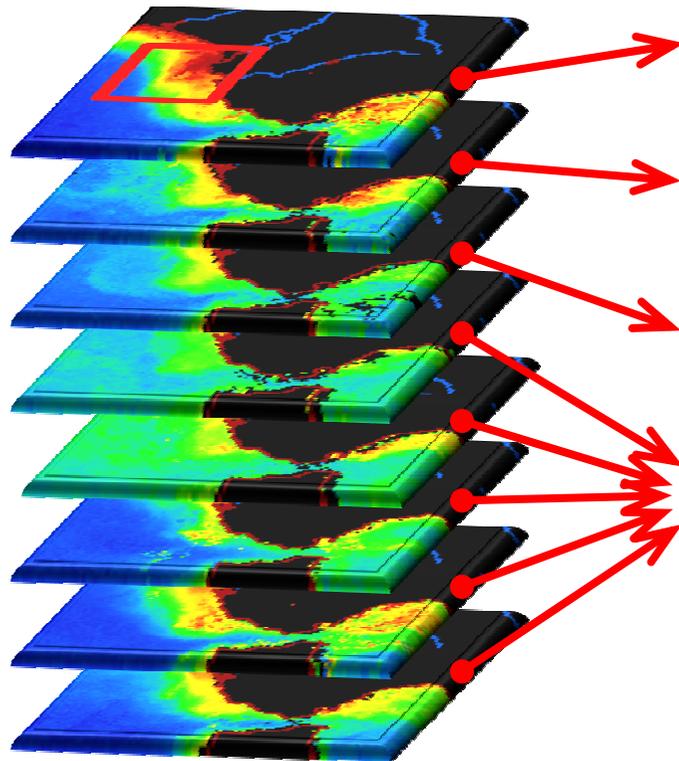
➤ Data structures:

- **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:

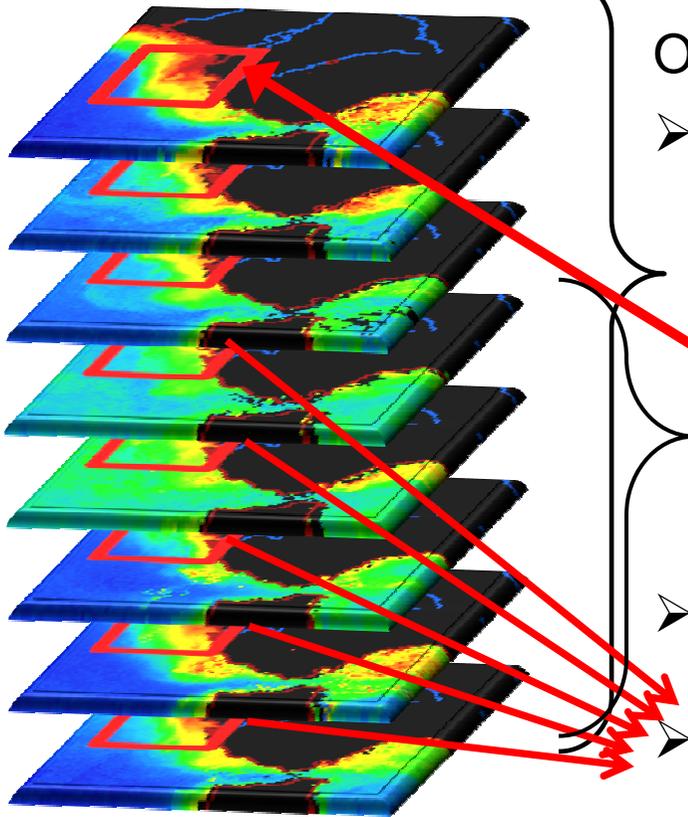
- GetCapabilities: document is more flexible
- DescribeCoverage, GetCoverage: as known
- **DescribeEOCoverageSet**: spatio-temporal search possibility

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 ?

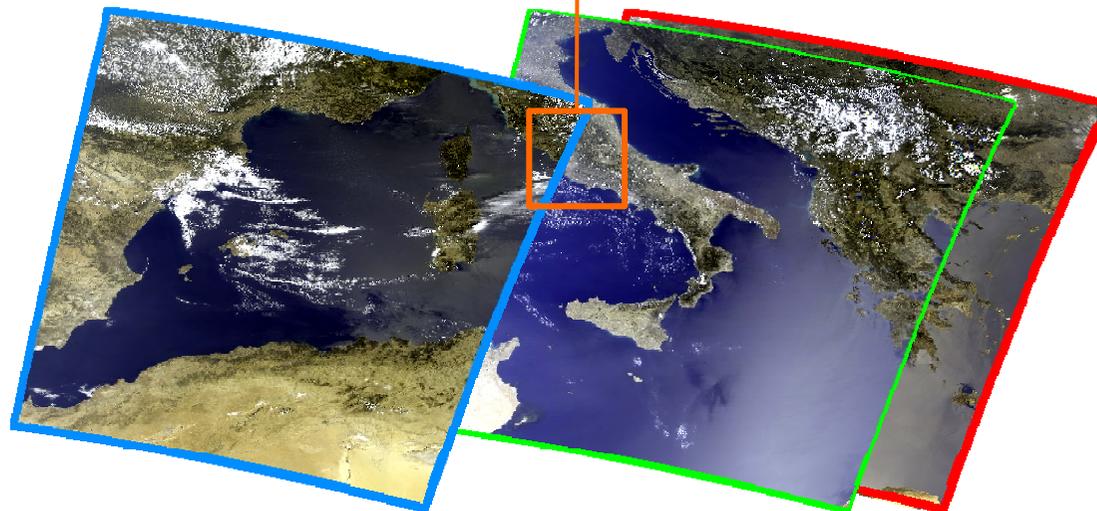


- You may discover the required data using a Catalog
- You may Order using direct links from the Catalog for each item

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

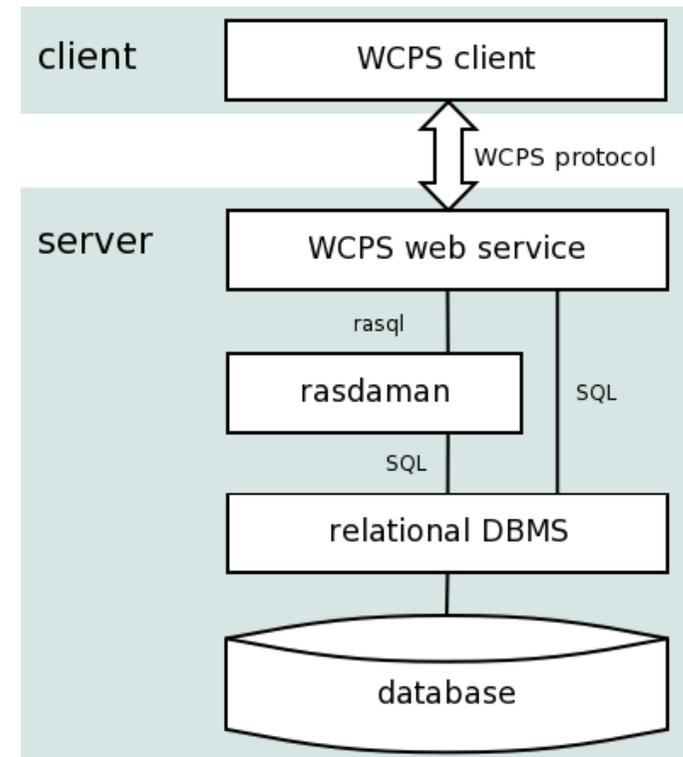
- Keine endlosen, nichtssagenden (Inhalt) Dateilisten auf FTP-Servern
- Geringerer Daten-download → man erhält nur was man wirklich benötigt (AOIs / TOIs)
- Zugriff auf Originaldaten

➤ 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

- [+ BeginTime: 2006-08-16 11:58:11](#)
EO Metadata Entry
- [+ BeginTime: 2006-08-16 00:00:00](#)
EO Metadata Entry
- [+ spot5_set_mosaic_sicily_HMA_demo](#)
DatasetSeries
- [+ BeginTime: 2011-02-05 09:44:07](#)
EO Metadata Entry
- [+ 215 RectifiedGrid](#)
RectifiedGrid
- [+ EOxSLineageRecord object](#)
Lineage Entry
- [+ BeginTime: 2011-02-05 09:44:07](#)
EO Metadata Entry
- [✎ spot5_set_mosaic_sicily_HMA_demo](#)
DatasetSeries
- [+ spot5_set_mosaic_sicily_HMA_demo](#)
DatasetSeries
- [+ 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
- Unterstützt GML AP – Coverages for RectifiedGridCoverages
- Unterstützt die WCS 2.0 Spezifikation
- Vorweggenommene Unterstützung 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:

