Developing a Web Service Infrastructure for Providing Atmospheric Data

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This project is sponsored by
Space for Geo-Information
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Introduction

- Adaguc
- OGC WebServices WMS, WFS, WCS
- UMN Mapserver
- GDAL Driver
- Adaguc HDF5 file standard
- Webclient
- Demonstration

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ADAGUC

Atmospheric Data Access for the Geospatial User Community

- Bridging different sciences
- Atmospheric Datasets in GIS systems
- Open Standards → OGC
  - Web Mapping Service – For visualization
  - Web Feature Service – To retrieve vector data
  - Web Coverage Service – To retrieve raster data
- Connect with GIS clients

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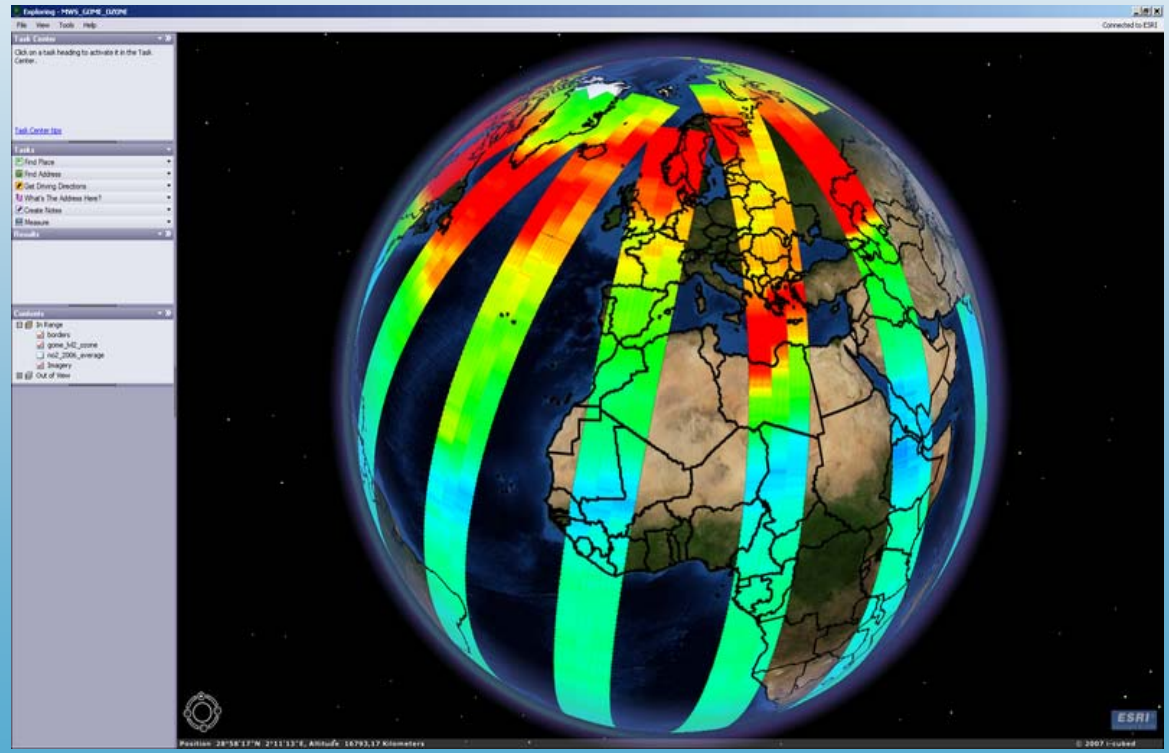
Datasets

- Instruments
  - Sciamachy
  - GOME
  - OMI
  - AMSR
- Datasets
  - Soil Moisture
  - FRESCO
  - NO_2
  - CH_4
  - CO
  - O_3
- Vector data
- Raster data

- Special because:
  - Temporal data
  - Large
- Goal: Provide data through OGC Services



GOME O_3 in ArcGIS Explorer - using WMS

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Open Geospatial Consortium

- International industry consortium of more than 350 companies
- Publicly available interface specifications
- OpenGIS Specifications "geo-enable" the Web
  - Plug & Play
    - Connect with ArcGIS 9.x, uDig, gvSIG, etc…
  - Interoperability
  - Public data availability
  - Open source (free implementations)
- For this project:
  - Web Map Service — WMS for images
  - Web Feature Service — WFS for vector data
  - Web Coverage Service — WCS for raster data

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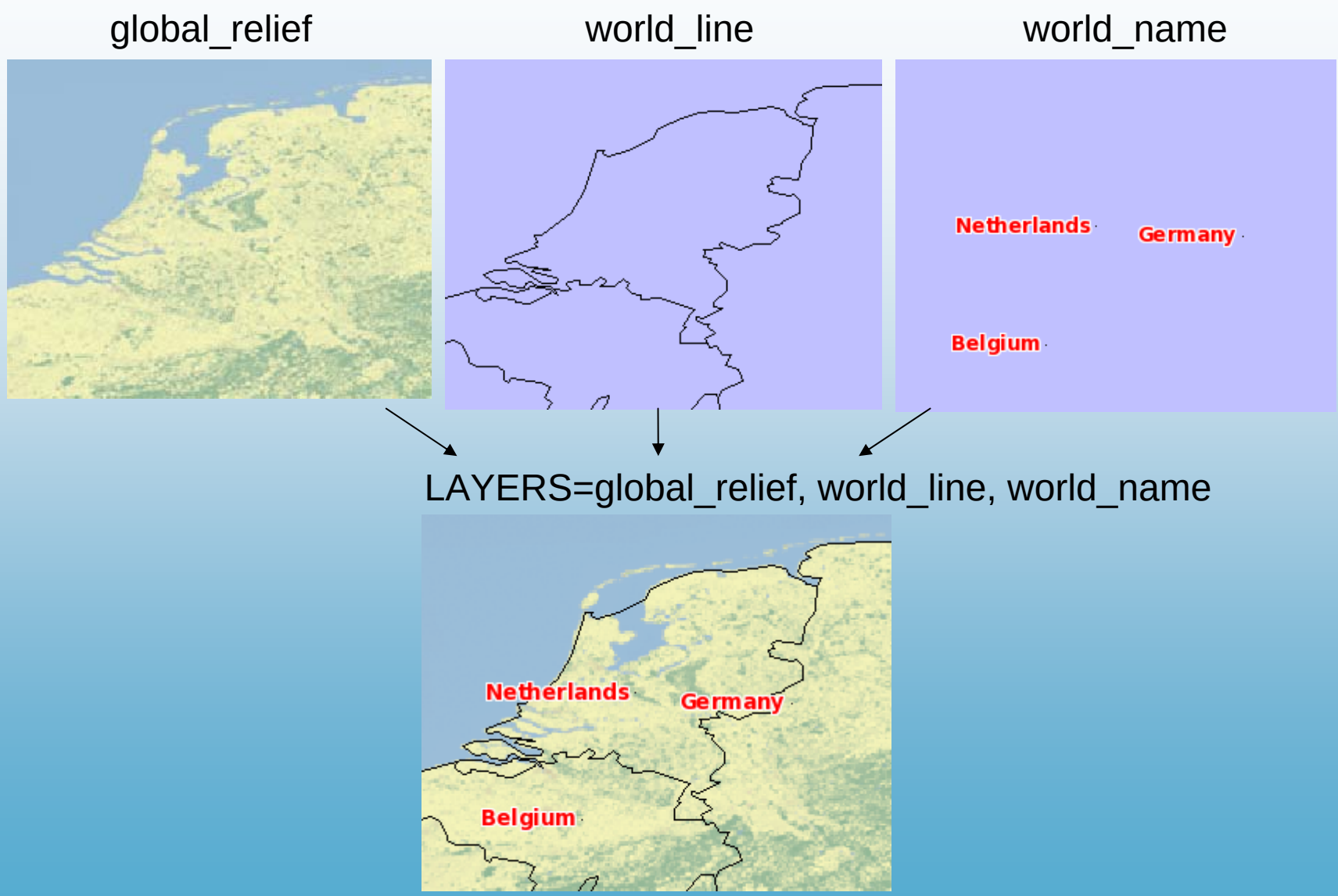
WMS - Visualization



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WFS - Features

- Web Feature Service
- Returns data – Geography Markup Language (GML)
- Features – Vectors

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          20.966810,40.791180 20.961941,40.77
          20.555830,40.066380 20.513611,40.08
          20.260559,39.667759 20.012300,39.69
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<ms:REGION>Europe</ms:REGION>
</ms:world_line>
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WCS - Coverages

- Web Coverage Service
- Returns data observations in a regular spaced grid
- Coverages – Rasters

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34	26	46	52	59	67	45	41	36	48	66	54	53	55	42	38	38
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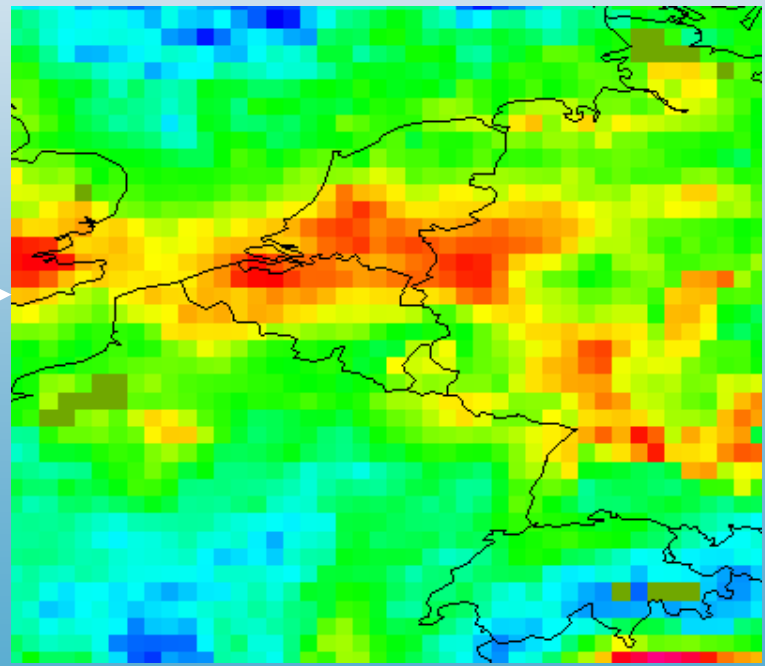

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Server: UMN MapServer

- Developed by the University of Minnesota (UMN)
- OGC Services support:
  - WMS, WFS, WCS, WMC, Filter Encoding, SLD, GML, SOS
- Data Formats
  - GDAL: Raster datasets; over 70 formats supported
  - OGR: Vector datasets; over 20 formats supported
- Why UMN MapServer ?
  - Open source
  - Widely used
  - Large user community
  - Flexible and well documented

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GDAL / OGR

- Geospatial Data Abstraction Library
  - Open source translator library for raster geospatial data formats
  - Vector access with OGR, the Simple Feature Library
- Why GDAL?
  - Used by many software products:
    - ESRI ArcGIS 9.2, GRASS, OpenEV, Quantum GIS
  - Used in UMN Mapserver for raster/vector access
- Developing ADAGUC HDF5 driver for GDAL
  - Read ADAGUC HDF5 file structure
  - Write ADAGUC HDF5 file structure
    - HDF files become available for the Web Coverage Service
  - Provide the driver to the GDAL community

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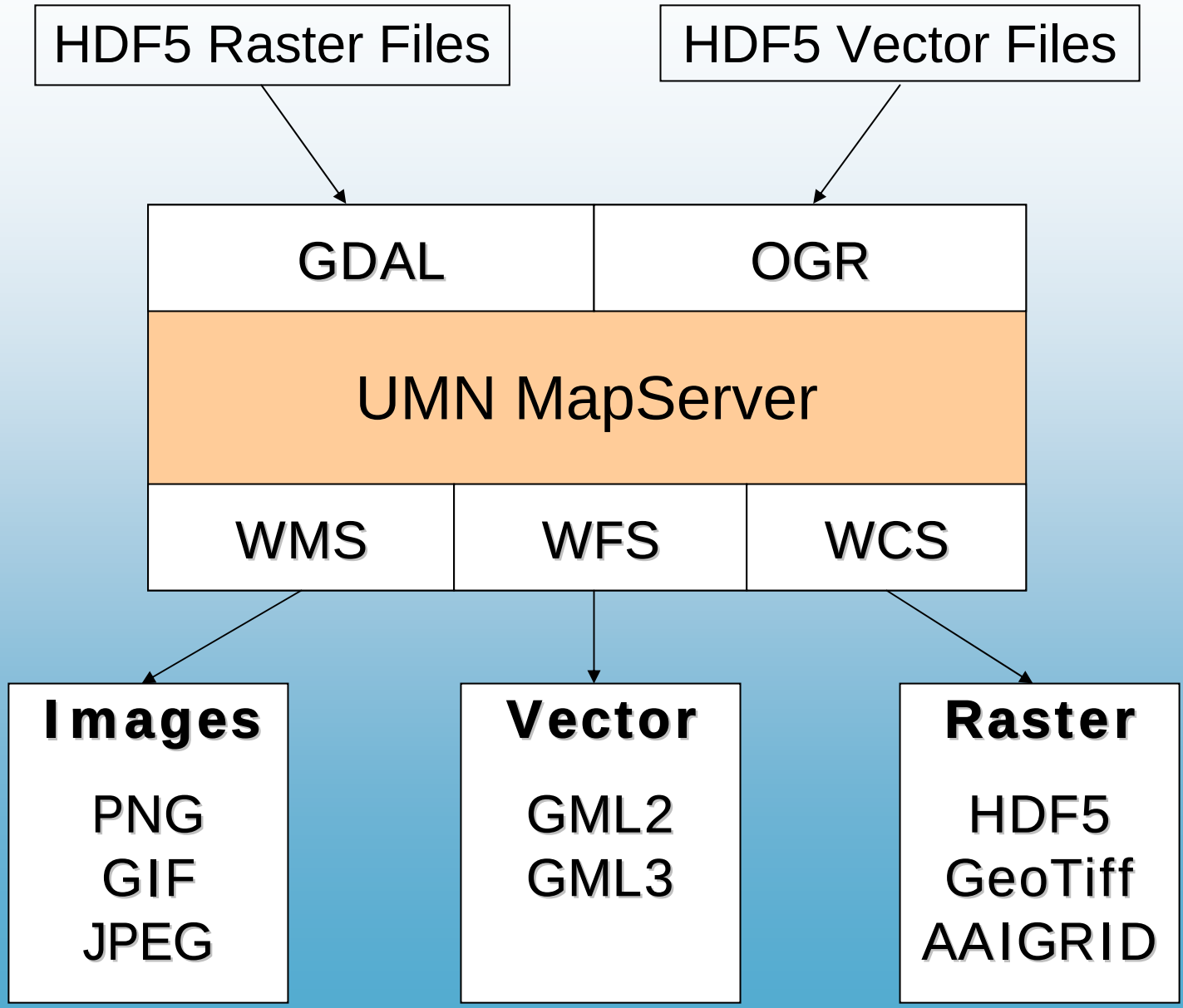
Services with UMN MapServer



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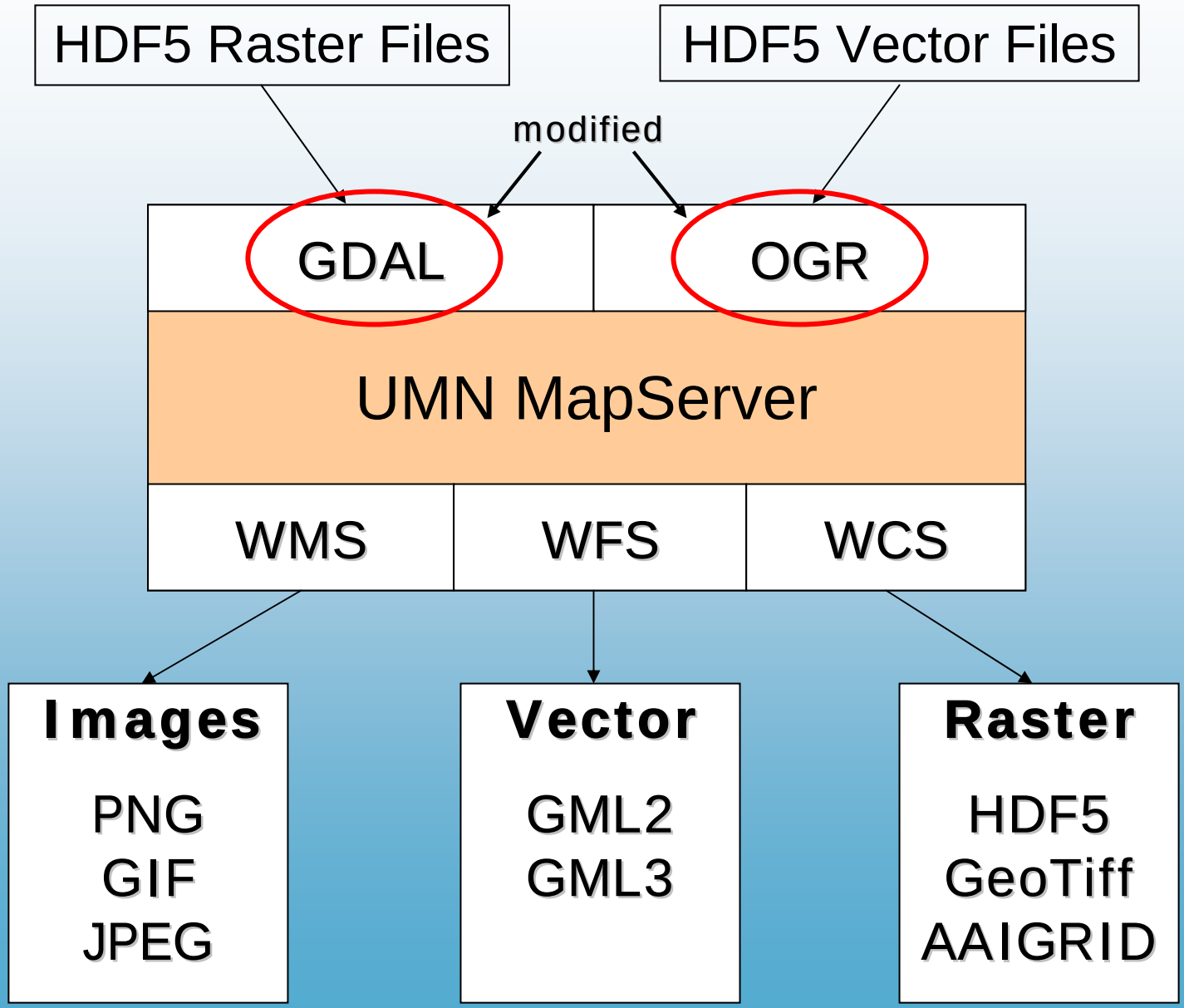
Services with UMN MapServer



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ADAGUC HDF5 file

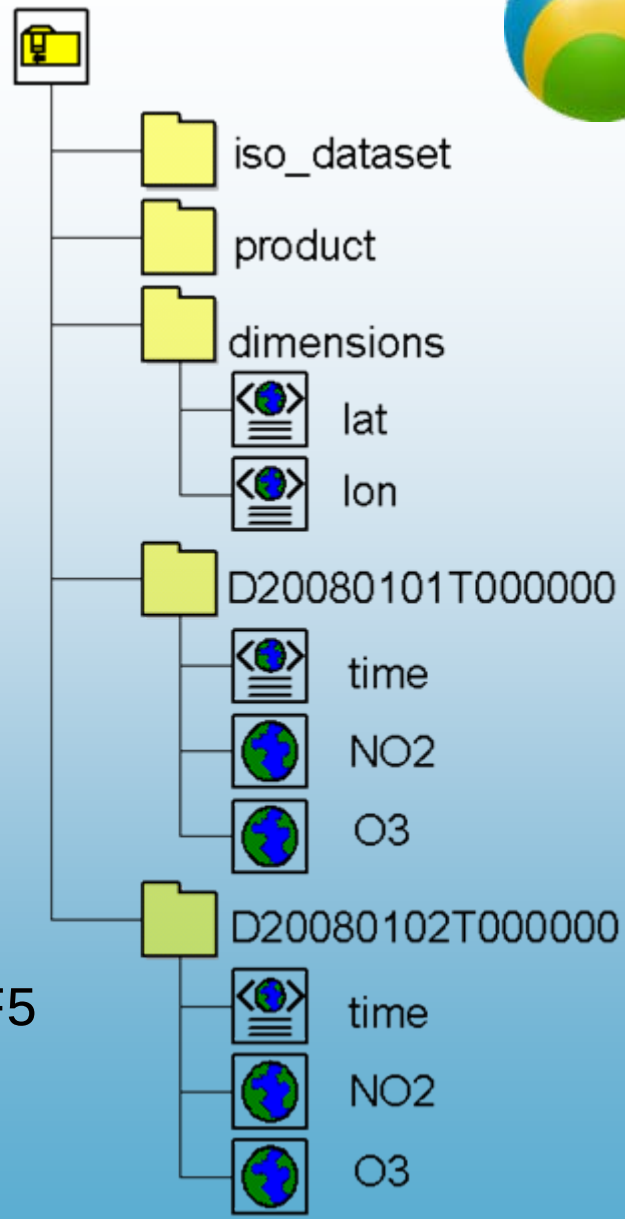
- Adaguc HDF5 file structure
  - HDF5 library 1.8
  - CF metadata conventions
  - Dimension scales
  - Can contain multiple datasets
  - All data will be stored using this standard

- Raster GDAL HDF5 driver
- Vector OGR HDF5 driver

- Current status:

  GDAL reads and writes ADAGUC HDF5 raster data

  HDF5 output through WCS!



See EGU2008-A-03570 (S. de Witte, et al) for the ADAGUC data products standard

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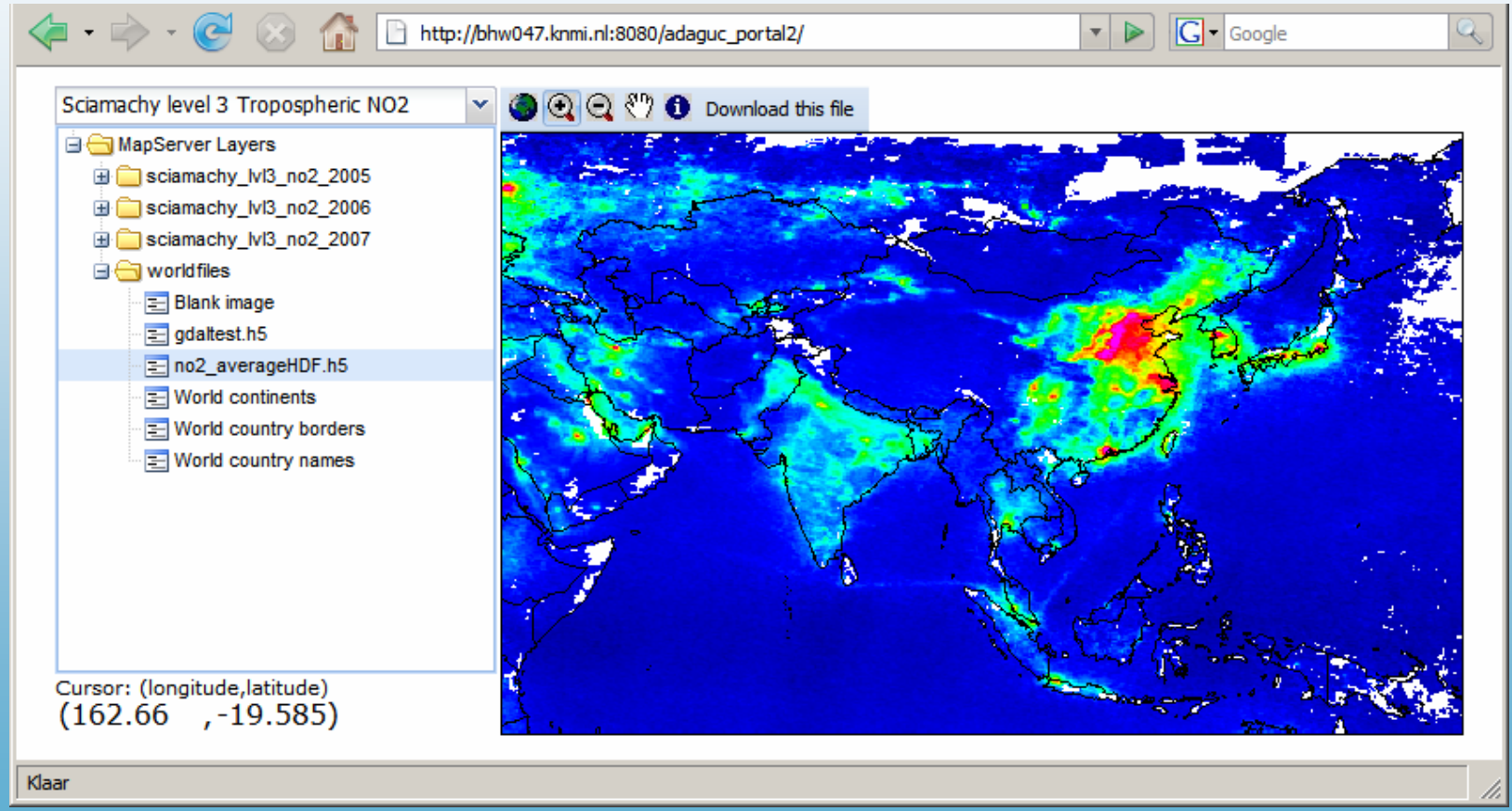
WebGIS Client

- View geographical information
- Make Spatial - Temporal Selections
- Download Data



Demo: http://145.23.240.221/adaguc_portal/

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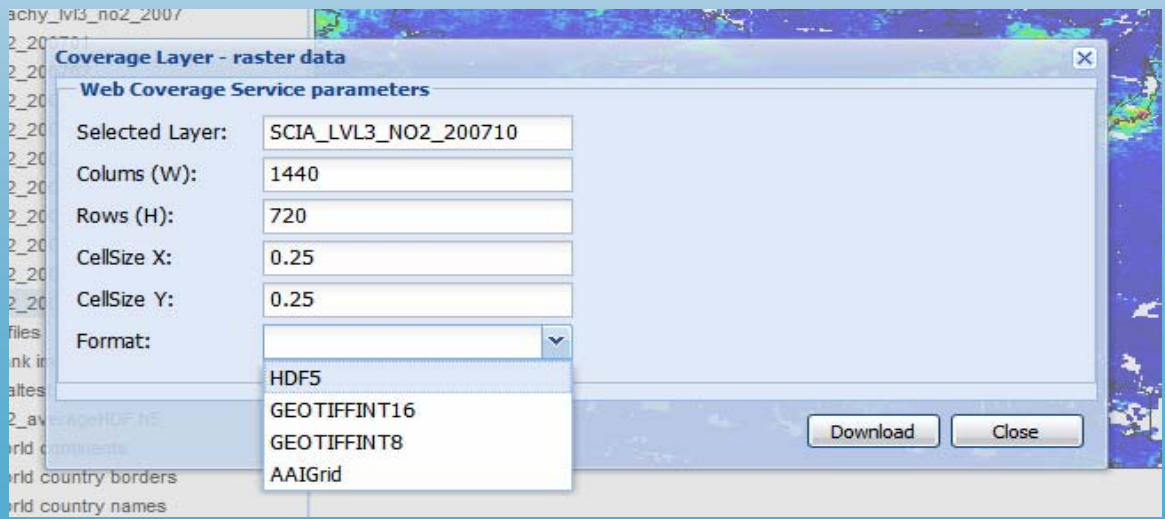
Download from WebGIS Client

- Obtaining the real data (instead of pictures)
- WFS or WCS ?
  - WebGIS Client selects the appropriate service depending on the datatype (raster/vector)
- WCS – obtain optimal parameters:
  - Predefined Bounding Box, Columns, Rows and Cell size
  - No resampling/interpolation

  User is always free to adjust the parameters
- User must select his favorite GIS format:



Summary

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- Summary
  - Data will be stored using the ADAGUC HDF5 file standard
  - GDAL is adjusted to support this standard

- Current developments:
  - WebClient:
    - Combine information from multiple sources
    - Query on date/time
    - Loop over images, animation of a time series
  - Web services
    - Support TIME requests
      - WMS and WCS only
      - WFS has no TIME support
    - Include CF support and dimension scales

Questions?

Final ADAGUC Workshop
4-5 Dec 2008
Amsterdam

Hosted by VU University

Faculty of Earth and Life Sciences

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