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Developing a Web service Infrastructure for Providing Atmospheric Data

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Many tools and data formats exist for atmospherical data. To disseminate this wealth of information to the geospatial communities is very cumbersome: in general the geospatial communities use other data formats and they use GIS for their analyses. Therefore, time-consuming and inefficient conversions are needed to use atmospherical data. Within the ADAGUC project (Atmospheric Data Access for the Geospatial User Community) we provide selected space borne atmospheric and land datasets using web services that can be used for data comparison, resampling, selection, manipulation and visualization in GIS. In this paper we focus on the development of the web service infrastructure.

In the project use cases are defined based on an extensive consultation of the user communities consisting of policy makers, atmospheric scientists, GIS users and the risk assessment community. Several atmospheric data products (NO2, CH4, cloud fraction) and weather model products (precipitation, wind, boundary layer height) are identified in these use cases. The data products should be delivered on a high processing level: gridded and reanalyzed data (level 3/4) as HDF-5, GeoTIFF, ESRI Grid, ESRI Shapefile and GML. The user communities also indicated that they need an easy to use online viewing tool including access by Google Earth (KML).

To provide access to the atmospheric datasets, a spatial data infrastructure based on OGC compliant web services is developed: Web Mapping Services (WMS) for online visualization, Web Feature Services (WFS) for downloading vector data and Web Coverage Services (WCS) for downloading raster data. As most users demanded at least

the HDF-5 format, it was decided to use this format as the format to store all datasets. From the HDF-5 format data can be converted to data formats like Geo-TIFF.

At present many different open source solutions are available for building the spatial data structure of which UMN MapServer, GeoServer, Deegree and THREDSS are well-known. All these web services are constantly further developed and every release incorporates more functionality and better compliance to the OGC standards which are also under ongoing development. The dynamical nature of the software and the standards imply that there is no single web server solution for the provision of all the different datasets within the project. Therefore UMN MapServer is used as basis, when UMN MapServer is not satisfactory for a specific job, another server like THREDDS will be used for the provision of a certain dataset.

The development of this infrastructure is a dynamical process. During this process we encountered several problems that have to be solved during the project. Atmospheric datasets are special in the way that they are temporal and that the file size may be huge. Most server solutions are optimized for static datasets by using caching, which does not work well for temporal datasets. Also the OGC standards are not fully adapted yet to temporal data. For example the TIME property that optimizes the retrieval of temporal data is available in the OGC-WMS specification and OGC-WCS specification but is not yet available in the OGC-WFS specification. Solutions to these problems and a working prototype of the system will be presented on the conference.