METEOSIX – BUILDING A METEOROLOGICAL SDI FOR THE REGION OF GALICIA (SPAIN)[1]

X. Méndez[1], J. Touriño[1], J. Parapar[1], M. Hermida[2], V. García[2], M.A. Regueiro[3], J.R. Viqueira[3], F. Landeira[4]

[1]Computer Architecture Group – University of A Coruña, Spain
[2]MeteoGalicia – Environment, Territory and Infrastructure Regional Ministry – Galician Government, Santiago de Compostela, Spain
[3]Systems Laboratory – University of Santiago de Compostela, Spain
[4]CESGA (Supercomputing Centre of Galicia), Santiago de Compostela, Spain

Meteorological information is of great importance in a very wide range of scopes, from the daily management of wind and solar power stations to the control of pollution emissions, including agricultural and fishing resources administration, and even personal trip planning. This, together with the improvements in the technical means and the increase of the amount of collected and generated information, makes it key to build an infrastructure for organizing and spreading such information. Annex III of the INSPIRE directive mentions meteorological information as one of the spatial data themes for which countries are encouraged to develop SDIs. The need to manage and share large amounts of spatial data meant that the meteorological and oceanographic communities had been using their own means of spatial data representation and publication for a long time, much before the directive suggested it.

MeteoGalicia is the organization responsible for obtaining and spreading meteorological information in Galicia, an autonomous region located at the Northwest of Spain. It has a complex observation system (with networks for 100+ weather stations, marine data, lightning detection, radar data, satellite data and imagery...) and it has implemented several numeric forecasting models (WRF, WW3, SWAN, MOHID...) that run on different grids. In this context, the MeteoSIX project (http://meteosix.cesga.es/, currently under development) arises with the aim of creating a meteorological SDI in Galicia. Among its goals are the structuring and spreading of available forecasting and observation geoinformation through OGC (WMS, WFS, WCS, SOS...) and non-OGC (NetCDF Subset, OPeNDAP...) services, and the elaboration of a GeoPortal that lets the public, as well as MeteoGalicia's forecasting staff, to discover, query, view and download those data in a personalized way from anywhere.

Global architecture of the MeteoSIX project is shown in Figure 1. It involves a significant work on integrating diverse existing and new tools and services. Observation data is stored in a SQL Server database. A 52North SOS server is being customized to offer it via the SOS 1.0.0 standard. Numerical forecasting models run on the Finisterrae supercomputer and the results are stored in NetCDF, GRIB, HDF and other file formats, and served through WMS, WCS and NetCDF Subset services using a THREDDS server. The GeoPortal consists of a JavaEE web application developed using open source frameworks (Spring, Hibernate, Apache Wicket...). The geographic viewer is based on OpenLayers and GeoExt and the database server is PostgreSQL, which stores

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users data and other GeoPortal-related information. Likewise, an instance of GeoServer stores and serves complementary non-meteorological layers to the geographical viewer (province limits, points of interest, geographical features, etc.).

One of the challenges of the project lies in the fact that WMS and WFS protocols were not designed to deal with meteorological data (there are some issues when managing vertical and temporal dimensions, styles, scales...). Therefore, there is still a gap between these standards and the needs of meteorological and oceanographic communities. Another challenge is that such a system has to work with rapidly varying data. Numerical forecasting models generate new data twice a day, and sensors are continuously producing new observations. To address this and provide users always with the last available data, a polling system is in charge of reading and interpreting the metadata offered by the different services and updating the references to the last data served through the GeoPortal accordingly.

As well, some code contributions to open source communities have already been made. In OpenLayers, some patches improving SOS support have been developed; also, code contributions were submitted to ncWMS (current THREDDS WMS implementation) enabling the server to read and display data in different projections, and some synchronization issues have been fixed. The development of the SOS tackles two major problems. First, the available data sources include observations of four different types of sensors, namely in-situ and remote static and mobile sensors. Current available solutions do not support all those types of data. Secondly, data integration technologies have to be developed to provide a uniform SOS data access interface to a heterogeneous collection of meteorological and oceanographic legacy data sources.

An initial version of the GeoPortal will be published in the next months. The objectives for the final release include the development of a mobile version of the site, and providing the international meteorological and oceanographic working groups with feedback about the results of the study of the suitability of the current data formats, protocols and standards for the meteorological data and forecasting processes.

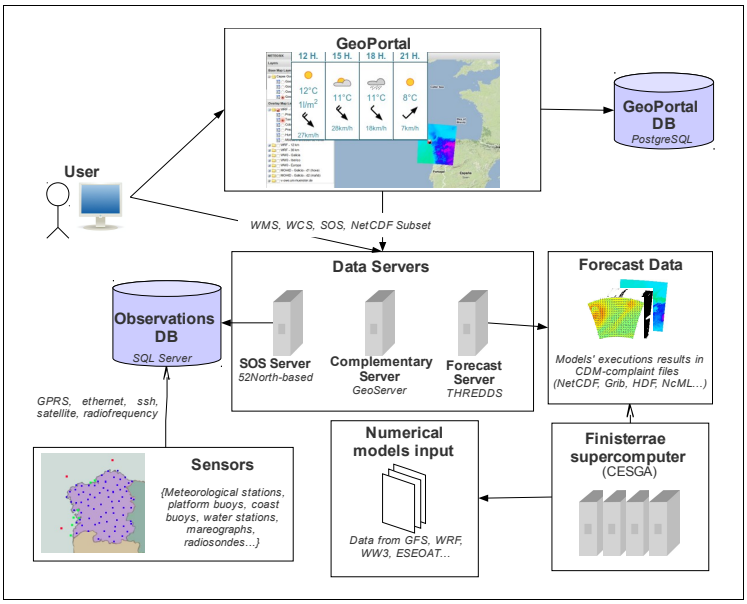

***Figure 1**: Global architecture of MeteoSIX*