An ENSEMBLES Web Portal for Seasonal Statistical Downscaling

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The demand for high-resolution seasonal predictions is continuously increasing due to the multiple end-user applications in a variety of sectors (hydrology, agronomy, energy, etc.) which require regional meteorological inputs. To fill the gap between the coarse-resolution lattices used by global weather models and the regional needs of applications, a number of statistical downscaling techniques have been proposed. Statistical downscaling is a complex multi-disciplinary problem which requires a cascade of different scientific tools to access and process different sources of data, from GCM outputs to local observations.

One of the ENSEMBLES project's aims is maximizing the exploitation of the results by linking the outputs of the ensemble prediction system to a range of applications. In order to accomplish this task in an interactive and user-friendly form, we have developed a Web portal which integrates the necessary tools with Grid middleware providing the appropriate technology for geographically distributed data access and computing. In this form, users can obtain their downscaled data testing and validating different statistical methods (from the categories "weather typing", "regression" or "weather generators") in a transparent form, not worrying about the details of the downscaling techniques and the data formats and access.

Grid computing is a new paradigm for Internet-based distributed computing. It enables the development of interactive problem-solving environments integrating the sharing, selection, and aggregation of geographically distributed autonomous resources, such as computers and databases (Foster 2003). The developers of Grids applications need to address numerous challenges: security, heterogeneity, resource management, application decomposition, etc. A number of projects around the world are developing technologies (middleware) to run complex applications addressing and testing those

challenges. The ENSEMBLES statistical downscaling portal has been developed using this technology which allows an efficient design of the computational flow in order to develop an interactive portal where users can run several grid jobs simultaneously.

The portal can also operate using local resources. In this case, in addition to the local data, the portal can use distributed data resources from the web using OpenDAP protocol to access remote datasets. OpenDAP protocol exposes in the Web (mainly global model outputs) and subsetting this datasets using URL queries. When the required information is ready to run a downscaling job requested by a user, the portal send the data and the downscaling is launched to the local job queue. The scripts to run downscaling jobs are based on the open-source toolbox MeteoLab developed by our group (see www.meteo.unican.es/MeteoLab for details).

References:

Foster, I. and Kesselman, C. (2003). The Grid 2: Blueprint for a New Computing Infrastructure. Morgan Kaufmann Publishers.