

DRIHMS: ENHANCED FORECASTING FOR A TURBULENT FUTURE

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In the Lisbon strategy, the 2005 European Council identified knowledge and innovation as the engines of sustainable growth and stated that it is essential to build a fully inclusive information society. In parallel, the World Conference on Disaster Reduction (Hyogo, 2005), defined among its thematic priorities the improvement of international cooperation in hydrometeorology research activities.

This was confirmed at the Joint Press Conference of the Center for Research on Epidemiology of Disasters (CRED) with the United Nations International Strategy for Disaster Reduction (UNISDR) Secretariat (2009), where it was noted that that flood and storm events are among the natural disasters that most impact human life.

Hydrometeorological science has made strong progress over the last decade at the European and world-wide level: new modeling tools, post processing methodologies and observational data are available.

Recent European efforts in developing a platform for e-science provide an ideal basis for the sharing of complex hydrometeorological data sets and tools. Despite these early initiatives, however, the awareness of the potential of the Grid technology as a catalyst for future hydrometeorological research (HMR) is still



low and both the adoption and the exploitation have astonishingly been slow, not only within individual EC member states, but also on a European scale.

The project Distributed Research Infrastructure for Hydro-Meteorology Study (DRIHMS, www.drihms.eu) bridge this gap between the HMR and e-Infrastructure communities. DRIHMS will identify requirements of HMR users and match them to capabilities of the newly developed ICT infrastructure.

HMR RESEARCH AREA

Prediction of floods and other hydrometeorological events relies on hydrological and meteorological forecast models that solve the basic equations that describe the hydrological cycle in the atmosphere. These predictions are based on observational measurements, for example of rainfall and river flow. In recent years, the quantity and complexity of the tools and data sets has increased dramatically for three reasons. Firstly, remote sensing observations from satellites and from ground-based radars provide complete three-dimensional coverage of the atmospheric and land surface state, vastly increasing the quantity of data. Secondly, forecasting methods combine multiple numerical weather prediction and hydrological models through stochastic downscaling techniques to quantify the uncertainty in the forecast. This multiplies the computational costs. Thirdly, there is increased recognition of the need to understand the entire forecasting chain, from observations through to civil defense response, resulting in complex workflows able to combine different data sets, models and expertise in a flexible manner.

Hydro-Meteorological Research is closely linked to operational forecasting. Researchers rely on data archives maintained by operational agencies and increasingly make use of operational modeling tools. The scattering of hydrometeorological data tools among national operational agencies and ad hoc collections from fields campaign is a substantial barrier to progress in research. On the one hand, weather systems freely cross national boundaries, and thus the national archives are of limited use.

This has long been recognised in meteorology, and indeed the World Meteorological Organisation (WMO) effectively coordinates international exchange of much meteorological data. Unfortunately this does not include much of the high resolution data required for hydrometeorological research. On the other hand, the chaotic nature of the atmosphere requires large numbers of events to be considered when developing robust forecasting methods, especially when the most damaging extreme events are targeted.

The objective of DRIHMS is to leverage investments in e-science for effective support of hydrometeorological research.

LINKING HMA TO e-SCIENCE

DRIHMS will therefore convene two small meetings of expert groups, involving the proposers and invited experts, in the first case from the Hydro-Meteorological Research community, and secondly from the ICT sector. The work of these groups will be supplemented by surveys and questionnaires, where input from the broader communities is sought, leading to a draft version of a White Paper delineating a new strategy for Grid and other e-science technologies in hydrometeorology. An open conference will be organised, supplemented by web-based communication, to discuss the results of the consultation phases and the draft version of the White Paper with the stakeholders.

Finally a public open conference will present the DRIHMS White Paper to the scientific community, so that specific projects can be initiated to implement the strategy.

INTERACTION AND IDEAS

The DRIHMS Hydro-Meteorology Research (HMR) questionnaire is now published (www.drihms.eu/survey/survey) and the consortium would very much appreciate your feedback on it.

The purpose of this questionnaire is to define important topics in Hydro-Meteorology Research that can benefit from advances in Information and Communication Technologies (ICT), and thus set a joint HMR-ICT research and applications agenda.

The DRIMHS consortium is coordinated by CIMA Research Foundation - International Centre on Environmental Monitoring - <http://www.cimafoundation.org/>