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The distributed hydrologic model intercomparison project (DMIP): Phase 1 results and phase 2 plans

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The National Weather Service of the U.S. National Oceanic and Atmospheric Administration (NOAA/NWS) recognizes the need for a continued series of science experiments to guide its research into advanced hydrologic models for river and water resources forecasting. This need is accentuated by NOAA/NWS' recent advance into a broader spectrum of water resources forecasting to complement its more traditional river and flash flood forecasting mission. To this end, the NOAA/NWS welcomes input and contributions from the international hydrologic research community in order to better fulfill its mandate to provide the U.S. with valuable products and services.

In 2002**, t**he Hydrology Laboratory (HL) of the NOAA /NWS Office of Hydrologic Development completed the first phase of the Distributed Model Intercomparison Project (DMIP 1). DMIP 1 provided a venue for researchers to test their hydrologic models with those used in U.S. operational river forecasting. DMIP 1 attracted participants from 12 institutions based in Denmark, China, Canada, New Zealand, and the U.S. The experiments in DMIP 1 focused on the comparison of lumped and distributed models in hydrologically simple regions. Models were forced with data used for NWS operational river forecasting. DMIP 1 results were mixed. In some basins, distributed models performed better than the NWS lumped model, in other cases the opposite was true. The DMIP 1 results were formally presented in a special issue of the Journal of Hydrology (Vol. 298, 2004). The DMIP 1 participants identified many significant scientific successes of the intercomparison, and also noted a number of additional areas worthy of further investigation.

DMIP 2 capitalizes on the success of DMIP 1 and is designed around two themes: 1) continued investigation of science questions pertinent to the DMIP 1 test sites, and 2) distributed and lumped model tests in hydrologically complex basins in the Sierra-Nevada mountains in the Western U.S. DMIP 2 will benefit from data available from the Oklahoma Mesonet and an intense instrumentation effort in one of the Sierra-Nevada basins. Key science questions to be addressed in DMIP 2 include the following: What is the value of soil moisture observations in the validation of distributed models? How do distributed and lumped models perform given forecast estimates of precipitation? Can distributed models provide improved simulations in mountainous areas given current model forcings? Can appropriate observational network densities be defined in mountainous areas that will lead to improved simulations and forecasts? Can new observations of the rain/snow division provide improved streamflow simulations? Can existing remote-sensor observing platforms be better utilized in providing precipitation estimates in mountainous areas?

We expect DMIP 2 to provide multiple opportunities to develop data requirements for modeling and forecasting in hydrologically complex areas. These requirements fall into the two general categories of appropriate spatial and temporal resolution, and of quality. From these, new sensor platforms could be designed or appropriate densities of existing gauges could be specified to meet specific project goals. From the river forecasting viewpoint, these data needs are particularly acute in the mountainous west.

In this presentation we will briefly review the results from DMIP 1 and discuss the plans of the ongoing DMIP 2 effort.