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Hydrometeorology testbed in the American River Basin of Northern California

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In California, most precipitation occurs in the winter, as a mixture of rain at lower elevations and snow in the higher mountains. Storms from the Pacific carry large amounts of moisture, and put people and property at risk from flooding because of the vast urban development and infrastructure in low-lying areas of the central valley of California. Improved flood prediction at finer spatial and temporal resolutions can help minimize these risks. The first step is to accurately measure and predict spatially-distributed precipitation. This is particularly true for river basins with complex orography where the processes that lead to the development of precipitation and determine its distribution and fate on the ground are not well understood. To make progress in this important area, the U.S. National Oceanic and Atmospheric Administration (NOAA) is leading a Hydrometeorology Testbed (HMT) effort designed to accelerate the testing and infusion of new technologies, models, and scientific results from the research community into daily forecasting operations. HMT is a national effort (http://hmt.noaa.gov) that will be implemented in different regions of the U.S. over the next decade. In each region, the focus will be on individual experimental test basins. The first full-scale implementation of HMT, called HMT-West, targets northern California's flood-vulnerable American River Basin (4740 km2) on the west slopes of the Sierra Nevada between Sacramento and Lake Tahoe. The deployment strategy is focused on the North Fork of the basin (875 km2), which is the least-controlled portion of the entire catchment. This basin was selected as a test basin because it has reliable streamflow records dating back to 1941 and has been well characterized by prior field

studies (e.g. the Sierra Cooperative Pilot Project) and modeling efforts, focusing on both short-term operations and long-term climate scenarios.

Intensive field activities in the North Fork of the American River will occur over the next 3-4 winter seasons, with less intensive long-term monitoring continuing thereafter. This paper focuses on activities occurring during the current winter season (http://www.etl.noaa.gov/programs/2006/hmt/). Several research observing systems from NOAA have been deployed to the region to focus on spatially-distributed precipitation. Transportable and mobile scanning precipitation radars (polarimetric and Doppler) have been deployed to complement and fill gaps in the operational radar network. Additional remote sensors that have been deployed include wind-profiling radars, precipitation-profiling radars, and GPS sensors for measuring precipitable water vapor. Also, radiosondes are being released serially upwind of the area during storm episodes. Precipitation gauges, raindrop disdrometers, surface meteorological stations, soil moisture/temperature probes and stream level loggers are operating within the coverage areas of the scanning radars. These will help determine the fate of the precipitation on the ground and through the river network.

Several experimental high-resolution weather prediction models are being run by NOAA to supplement the operational model guidance already available to operational forecasters. In addition, the second phase of the Distributed Hydrologic Model Intercomparison Project (DMIP-2) has a major component of its effort focused on hydrologic modeling of the American River Basin, particularly the North Fork. HMT-West datasets will be critical tools in evaluating the hydrologic models evaluated in DMIP-2 as well as the physical processes that the models attempt to represent.