Offline coupled WRF- distributed hydrological modeling: Preliminary testing for a warm season flood event in the Southwestern US

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By improving skill in short term forecasts of extreme precipitation events, the Advanced Research WRF (ARW) model has the potential to significantly enhance hydrological forecasting of flood events and distributed land surface variables. Compared to earlier generations of meteorological models, WRF can provide an unprecedented level of detail in meteorological forcings to distributed hydrological models, including long-lead time forecasts of meteorological conditions at high spatiotemporal resolution over a large spatial domain. In this study, we couple the WRF model to the TIN-based Real-time Integrated Basin Simulator (tRIBS) hydrological model in an off-line mode. This case study focuses on a warm season mesoscale convective storm event occurring in the Four Corners region of the southwest U.S. during the late monsoon season (September 2003). We are primarily interested in assessing the potential for WRF to issue improved meteorological forecasts of precipitation during a large, semiarid flood event in Upper Rio Puerco, New Mexico. A three tier interactive nesting (grid spacings of 30, 10, and 3.33 km, respectively) configuration of the WRF model is driven by North American Regional Reanalysis (NARR at 32-km resolution) data for 4 days with the finest grid centered on the Upper Rio Puerco. Our results demonstrate that WRF captures the essential spatiotemporal features of the mesoscale storm as compared to NEXRAD quantitative precipitation observations. We then compare the tRIBS hydrological forecasts from the WRF meteorological fields with a set of runs using rain gauge, weather station, NEXRAD data and MM5 model outputs. The comparisons clearly illustrate the value of the WRF simulations for hydrological simulations of streamflow and internal, high-

resolution basin hydrological states (e.g. soil moisture, runoff production, evapotranspiration). Preliminary testing in the offline coupled model will contribute to the development of a fully-coupled hydrometeorological prediction system for warm season flood forecasting in the North American Monsoon region.