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Ensemble forecasting for a hydrological testbed

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Significant precipitation events in California during the winter season are often caused by land-falling "atmospheric rivers" associated with extratropical cyclones from the Pacific Ocean. Atmospheric rivers are narrow, elongated plumes of enhanced water vapor transport over the Pacific and Atlantic oceans that can extend from the tropics and subtropics into the extratropics. Large values of integrated water vapor are advected within the warm sector of extratropical cyclones immediately ahead of polar cold fronts, although the source of these vapor plumes can originate in the tropics beyond the cyclone warm sector. When an atmospheric river makes a landfall on the coast of California, the northwest to southeast orientation of the Sierra Mountain chain exerts orographic forcing on the southwesterly low-level flow in the warm sector of approaching extratropical cyclones. As a result, sustained precipitation is typically enhanced and modified by the complex terrain. This has major hydrological consequences.
The National Oceanic Atmospheric Administration (NOAA) has established the Hydrometeorological Testbed (HMT) to design and support a series of field and numerical modeling experiments to better understand and forecast precipitation in the Central Valley. The main role of the Forecast Application Branch (NOAA/ESRL/GSD) in HMT has been in supporting the real time numerical forecasts as well as research activities targeting better understanding and improvement of Quantitative Precipitation Forecasts (QPF). For this purpose ensemble modeling system has been developed. The ensemble system consists of mixed dynamic cores, mixed physics and mixed lateral boundary conditions. Performance evaluation results for this system will be presented at the conference.