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Oral
This study investigates the impact of assimilating spaceborne Global Navigation Satellite System (GNSS) radio occultation (RO) observations on the frontal structure of a landfalling atmospheric river and the forecasts of the resulting precipitation. A useful case study to evaluate the impact of these observations occurred during the CALWATER2015 campaign, which took place off the west coast of California and observed a particularly strong atmospheric river before it made landfall on 6 February 2015. An exceptional aircraft dataset is available for validation for this event, including dropsondes and airborne radio occultation (ARO) data. This event was associated with copious precipitation in northern and central California, both along the coast and in the Sierra-Nevada Mountains.

The impact of assimilating these GNSSRO observations in the high resolution Weather Research and Forecasting model is first assessed through the resulting mesoscale analyses, the quality of which are evaluated using the available microwave satellite data and other offshore observations. Next the impact of the data assimilation on key features of the offshore atmospheric river, including the integrated vapor transport, is identified. Finally the impact of the assimilation of the various observations on the forecasts of the low-level winds, moisture, and precipitation over California is quantified. Results are shown from multiple experiments assimilating different combinations of datasets including GNSSRO, offshore Atmospheric Motion Vector Winds (AMV), dropsondes, ground-based GPS PW, and conventional Global Telecommunication System (GTS) observations. High

time resolution GPS PW observations from an extensive network of sites in California proved to be helpful in assessing the timing of the onshore moisture transport and diagnosing errors in the distribution of precipitation in the coastal and Sierran mountain ranges.

The case study is also used to investigate the effects of choices in microphysical parameterizations on orographic precipitation and the vertical distribution of hydrometeors. Two double moment microphysical parameterizations are tested, the WRF Double-Moment 6-Class (WDM6) class microphysics scheme and the Morrison 2-moment scheme. We simulate the anticipated effects of the two schemes on polarimetric excess phase observations in order to assess the potential contribution of GNSS polarimetric remote sensing to diagnosing vertical features of precipitation in this type of event.

OSTS session

Regional and Global CAL/VAL for Assembling a Climate Data Record

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