Moisture transport during the inland-penetrating atmospheric river of early November 2006 in the Pacific Northwest: A high-resolution model-based study

Michael J. Mueller, Cooperative Institute for Research in Environmental Sciences (CIRES) University of Colorado, 325 Broadway, Boulder, CO USA; michael.mueller@noaa.gov; (303) 497-4858

Kelly Mahoney, Physical Sciences Division (PSD) Earth System Research Lab (ESRL), Boulder, CO USA

In early November 2006, a series of storms caused extreme precipitation across the Pacific Northwest. Within the active storm track was an unusually intense atmospheric river that penetrated through the Coastal and Cascade Mountains of Oregon and Washington into the continental interior. Record-breaking precipitation fell as far as 900 km inland at Montana's Glacier National Park. The objective of the present study is to investigate pathways of moisture transport through complex terrain using a high resolution modeling approach. In question is the extent to which the Columbia River Gorge facilitated the inland moisture transport or whether much moisture transport was possible over the Cascade Range.

The Weather Research and Forecasting (WRF) model was configured at 4-km grid spacing over western North America and the northeastern Pacific Ocean. A simulation was driven by the Climate Forecast System Reanalysis (CFSR) from 00 UTC 3 November – 00 UTC 9 November 2006. Model output is used to examine the depth of moisture and associated transport during its approach to the northern Rocky Mountains, including Glacier National Park. Integrated water vapor transport (IVT) and integrated water transport (IWT) are used to quantify the movement of water vapor and various types of hydrometeors through the region. Water vapor mixing ratio cross-sections and drying ratio calculations across the Cascades enables examination of the impact of orographic precipitation on interior moisture transport.