

Atmosphere Rivers observed during the Olympic Mountains Experiment (OLYMPEX) Field Campaign

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The Olympic Mountains Experiment (OLYMPEX) was a multi-agency field experiment to evaluate the performance of the US/Japan Global Precipitation Measurement (GPM) Satellite. The project was conducted over the Olympic Peninsula in the Pacific Northwest of North America to measure precipitation associated with wintertime mid-latitude cyclones as they traverse from the ocean to the coast to high terrain to the leeward side. The overall goals of OLYMPEX were to validate passive and active satellite measurements of precipitation and their algorithm assumptions and to determine the orographic effects on precipitation processes in land-falling wintertime mid-latitude cyclones. The field campaign took place from November 2015 through March 2016 with intensive observational periods during 12 November – 19 December 2015 and 4 – 15 January 2016. The dizzying array of instruments and platforms included radars sampling at different wavelengths on the windward and leeward sides of the Olympic Mountains, a ground network of rain gauges and disdrometers placed at varying elevations on both the windward and leeward sides of the Olympic Mountains and high elevation sites. Both snow particles and raindrop characteristics were measured, and the accumulating snow pack was monitored. Rawinsonde soundings were launched on both the windward and lee sides of the Olympic Mountains. Three aircraft participated during the intensive field phase with two of the aircraft providing radar and passive microwave measurement akin to those sampled by GPM instruments and one aircraft providing in situ microphysical measurements. An additional aircraft used lidar to document snow depth at two key times during the snowfall season.

During the intensive operations period, three atmospheric river events occurred and high-quality data were collected by the radars, ground network and aircraft. The first two events, 12-13 November, 2015 and 17 November, 2015, were characterized by moist westerly flow impinging on the Olympic Mountains, and the third, 8-9 December, 2015 was characterized by moist southerly and southwesterly flow. The 24-h precipitation totals ranged from 50 mm on the coast to well over 300 mm in the interior on the forward flanks of the Olympic Mountains. The degree of orographic enhancement and the locations of the maximum rainfall varied during the evolution of each case and from case to case and depended on factors including the speed, height and direction of the moist low-level flow relative to the melting level height. In this

presentation, an overview of the OLYMPEX field campaign will be presented along with the synoptic situations of the three atmospheric river events. Preliminary results obtained during these three events from the ground network, surface radars and aircraft will be shown for these three cases.