



## **Global Analysis of Climate Change Projection Effects 1 on Atmospheric Rivers**

Duane Waliser (1), Vicky Espinoza (2), Bin Guan (1), David Lavers (3), and Marty Ralph (4)

(1) Jet Propulsion Laboratory / Caltech / NASA, (2) Sonny Astani Civil and Environmental Engineering Department, University of Southern California, (3) European Centre for Medium-Range Weather Forecasts, (4) Center for Western Weather and Water Extremes, University of California at San Diego

This study uses a uniform, global approach to quantify how atmospheric rivers (ARs) are projected to change in association with climate change as represented in 21 Coupled Model Intercomparison Project Phase 5 (CMIP5) models. AR frequency and integrated water vapor transport (IVT) are analyzed and compared between historical simulations (1979–2002) and future projections (2073–2096) under the RCP4.5 and RCP8.5 warming scenarios. Multi-model means show pronounced increases in AR frequency (IVT) under RCP8.5: ~50% (25%) globally, ~50% (20%) in the northern midlatitudes, and ~60% (20%) in the southern midlatitudes. The models exhibit systematic low biases across the midlatitudes in replicating historical AR frequency (~10%) and zonal/meridional IVT (~15%/~25%) relative to the ERA-Interim reanalysis, with sizable inter-model differences. More detailed examination of six regions strongly impacted by ARs suggests the western U.S., northwestern Europe and southwestern S. America exhibit considerable inter-model differences in projected changes in AR characteristics.