# Predictability and Prediction Skill of Atmospheric Rivers

**Michael J. DeFlorio**, *NASA Jet Propulsion Laboratory/California Institute of Technology, Jet Propulsion Laboratory M/S 300-330, 4800 Oak Grove Drive Pasadena, CA 91109 USA; michael.deflorio@jpl.nasa.gov; (818) 354-4119*

**Bin Guan**, *Joint Institute for Regional Earth System Science and Engineering, University of California, Los Angeles, and NASA Jet Propulsion Laboratory, Pasadena, CA 91109 USA*

**Duane E. Waliser**, *NASA Jet Propulsion Laboratory/Joint Institute for Regional Earth System Science and Engineering, University of California, Los Angeles, Pasadena, CA 91109 USA*

Atmospheric rivers (ARs) are responsible for the majority of horizontal water vapor transport in the midlatitudes and can intensify downstream precipitation and influence flooding, snowpack and water availability. Consequently, there is significant incentive to estimate the predictability and quantify our prediction skill of AR events in operational forecast models, especially weeks to months in advance. Understanding and exploiting the full extent of AR predictability is vital for watershed and hazard preparation and water resource management in areas that are sensitive to heavy precipitation events often associated with ARs. Though the predictability limits and prediction skill of AR-related quantities such as precipitation and integrated vapor transport have recently been quantified for very limited regional areas, a systematic assessment of AR events themselves (with explicit consideration of AR geometries/intensities) using contemporary operational forecast models on a global scale has not yet been made. In this study, we create new objective skill metrics for AR events and quantify predictability limits and prediction skill of ARs in two decades of AR hindcasts from several operational models at lead times ranging from 1 day to 1 month. These efforts contribute to the overarching goals of the international WMO Subseasonal to Seasonal Project by leveraging operational forecast and hindcast experiments with an emphasis on subseasonal forecasting applications.