Atmospheric Rivers: Shapers of Global Surface Hydrology*

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Past research on atmospheric rivers (ARs) highlights their significant contribution to total precipitation, with most focus on western North America and West Europe. However, the influence of ARs on global surface hydrology and water resources remains to be characterized and quantified. This is of particular relevance as a global AR detection and climatology study by Guan and Waliser (2015) led to the identification of considerable AR landfalls (and inland penetration) and fractional annual precipitation in areas with traditionally less scientific attention on ARs, such as South-East Asia, central America, western Africa, Australia and New Zealand. In this study we look at the way overland ARs alter the surface hydrology across the globe. In particular, we identify the major global catchments where ARs play a significant role in the (de)construction of the snowpack, generation of runoff, river discharge and flooded area. We perform a sensitivity experiment with a standard offline version of JULES Land Surface Model in order to obtain surface hydrological conditions: snow water equivalent, total runoff and total soil moisture. First, we run a control simulation with *standard* meteorological conditions (obtained from the latest WFDEI global gridded reanalyses product). Second, we run a no-AR simulation by removing the precipitation corresponding from ARs as detected by Guan and Waliser (2015) from the total precipitation. Daily output runoff values from the control and no-AR simulations were provided to the CaMa-Flood model in order to obtain river discharge and flooded area values and quantify AR impacts on river dynamics. Our results identify the regions of the globe that have been less studied with respect to AR impacts on water supply and flood risk, and help to provide water managers and flood forecasters/relief planners a scientific framework that may aid in their decision process.

*I would also be very thankful if the committee considers me for one of the student scholarships.