

EGU22-8096

<https://doi.org/10.5194/egusphere-egu22-8096>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Relationship between atmospheric rivers and landslides in western North America

Sara M. Vallejo-Bernal<sup>1,2</sup>, Frederik Wolf<sup>1</sup>, Lisa Luna<sup>1,2,3</sup>, Niklas Boers<sup>1,4,5</sup>, Norbert Marwan<sup>1,2</sup>, and Jürgen Kurths<sup>1,2,6</sup>

<sup>1</sup>Research Domain IV - Complexity Science, Potsdam Institute for Climate Impact Research, Germany

<sup>2</sup>Institute of Geoscience, University of Potsdam, Germany

<sup>3</sup>Institute of Environmental Science and Geography, University of Potsdam, Germany

<sup>4</sup>Earth System Modelling, School of Engineering & Design, Technical University of Munich, Germany

<sup>5</sup>Global Systems Institute and Department of Mathematics, University of Exeter, UK

<sup>6</sup>Lobachevsky University of Nizhny Novgorod, Russia

In this study, we investigate the relationship between land-falling atmospheric rivers (ARs) and landslides in western North America. ARs are channels of enhanced water vapor flux in the atmosphere and play an essential role in the water supply for precipitation in the midlatitudes. However, they can also trigger natural hazards such as floods and landslides. Our objective is to determine if the occurrence of landslides in western North America can be attributed to ARs hitting the western coastline and causing rainfall at the locations of the landslides and to characterize the strength and persistence of the ARs that lead to landslides. To that aim, we use landslide records with daily temporal resolution along with daily rainfall estimates from the ERA5 reanalysis, for the period between 1996 and 2018. We propose and run two attribution models to relate landslides to rainfall and rainfall to ARs and subsequently verify statistically if there is a unique and significant association between the landslides and the ARs. Our results show that the majority of the landslides reported along the western coast of North America are preceded by an AR. In the coastal regions, ARs and landslides are significantly correlated. Further inland, landslides are less likely, but those that do occur are significantly correlated with very intense ARs. Understanding and revealing the impacts of ARs on landslides in western North America will lead to better forecasts and risk assessments of these natural hazards.