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Reconstructing the moisture transport from the Equatorial Pacific toward Central America since the 19th Century

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It has been estimated that up to 30% of the total precipitation recorded in areas of the westward coast of Central America and Southern South America has its origin on the moisture evaporated from the Equatorial Pacific and transported by a low level jet to the continent. Unfortunately, the Equatorial Pacific has large drops in meteorological data coverage prior to the mid-20th century and a virtual absence of observations during the 19th century. In consequence, our understanding of the long-term variability of the jet responsible of this transport is rather limited.

During the last years, it has been possible to assess the interannual variability of the moisture advected to landmasses by designing indices based solely on wind direction over some key areas. The main advantage of these indices ("directional indices") is that by design, they only require the knowledge of the wind direction, a variable that has been routinely measured aboard ships since the end of the 17th century. In this research we make use of wind direction observations taken by sailing ships to build an index for this transport starting in the late 19th century, adding almost a century of data to previous comparable indices.

Our results indicate that the seasonal distribution of the precipitation in Central America has changed along the 20th century as a response to the changes in the moisture advection from the Pacific. Additionally, we have found that the influence of El Niño / Southern Oscillation on this transport has been remarkably stable along the entire 20th century, a finding particularly significant because the stability of this relation is usually the basis of the hydrologic reconstructions in northern South America.