Impacts of seasonal transitions of ENSO on frequency of atmospheric rivers over East Asia

*Youichi Kamae[1], Moeka Naoi[2], Hiroaki Ueda[1]

1. Faculty of Life and Environmental Sciences, University of Tsukuba, 2. Graduate School of Life and Environmental Sciences, University of Tsukuba

Narrow corridors of moisture transport bands over the middle latitudes called atmospheric rivers (ARs) are important phenomena for hydrological cycle and natural disasters. Landfalling ARs associated with extratropical cyclones bring huge amount of rainfall over western coasts of North America and Europe. Previous studies pointed out that large-scale anomalies in atmospheric circulation associated with El Niño-Southern Oscillation (ENSO) are important factors for interannual variability in frequency of wintertime ARs over western North America. Recently, Kamae et al. (2017) revealed that ARs were also frequently observed over East Asia, especially during boreal summer. They also pointed out that preceding winter's El Niño results in anomalously-enhanced AR activity over summertime East Asia with a half-year lag. After the wintertime El Niño development, delayed warming over the Indian Ocean produces an anomalous anticyclone over the western North Pacific and associated increase in summertime AR frequency over East Asia. However, possible impacts of ENSO transition from preceding winter to concurrent summer on summertime AR activity over East Asia are still unclear. Here we extend our understanding on seasonal ENSO-AR relationship by compositing individual ENSO transition cases from winter to summer including rapid transitions from El Niño to La Niña. The rapid transition results in an anomalous AR activity over East Asia associated with the anomalous anticyclone over the western North Pacific. The anomalous anticyclone shifts northward compared to those found in years with sustained El Niño or decayed El Niño. We also found that the impacts of ENSO transition on ARs can be understood as a result of summertime teleconnection from the tropics favored by anomalous convective heating over the tropics associated with anomalous Walker circulation over the equatorial Pacific.

Keywords: ENSO, Atmospheric river, North Pacific High, Indian Ocean capacitor effect

©2019. Japan Geoscience Union. All Right Reserved.