

Climatology of atmospheric rivers in East Asian summer monsoon region

Chanil Park¹, Seok-Woo Son¹, and Hye-Mi Kim²

¹*School of Earth and Environmental Sciences, Seoul National University, Seoul, South Korea*

²*School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, New York,
United States*

Atmospheric river (AR), which is a narrow corridor along which a large amount of water vapor is transported, is known to play a crucial role in extreme rainfall events in midlatitudes. In this study, by using the newly-released ERA5 reanalysis, subseasonal variation of ARs and their impacts on moisture transport and monsoon rainfall within East Asian summer monsoon (EASM) are explored. In May-July, East Asian ARs are concentrated along the northern boundary of the North Pacific high where southwesterly monsoon flow is prevalent. As the North Pacific high expands, they gradually shift northeastward and decrease in August when the North Pacific high dominates Korea and Japan. However, in September-October when EASM is disorganized, ARs are confined to the Pacific storm track in the open ocean. This subseasonal variation of ARs determines 50-90 % of transient moisture transport in EASM with the largest fraction in May-July. It is also found that ARs contribute to 40-70 % of monsoon rainfalls in EASM, especially those associated with heavy rainfall events. This result indicates that the transient water vapor transport and the associated rainfall in EASM are largely controlled by ARs rather than a quasi-stationary monsoon circulation.