Takahashi, K., T. Sakazaki, 2025: The Climatological Features of Atmospheric Rivers and their Role in Water Vapor Transport in the South Polar Region. *J. Meteor. Soc. Japan*, **103,** http://doi.org/10.2151/jmsj. 2025-020.

Plain Language Summary: Atmospheric River (AR) is characterized by a very narrow structure in water vapor flux, playing a key role in moisture transport from mid to high-latitude regions. This study comprehensively examined the climatological features of AR in the south polar region, using an AR detection method that extracts localized, narrow areas of water vapor flux at each time step. This method contracts with conventional methods, which use some fixed percentile value defined at each grid point for AR detection and is more appropriate for revealing the geographical distribution of AR frequency. We discovered that AR detection frequency shows a zonally asymmetric, spiral-like structure extending from mid-latitudes in the Atlantic to high latitudes in the Pacific Ocean. This structure then contributes to the zonal distribution of moisture transport toward Antarctica. Such geographical dependence is likely caused by different meteorological systems: extra-tropical cyclones in the Atlantic and blocking events in the Pacific Oceans.

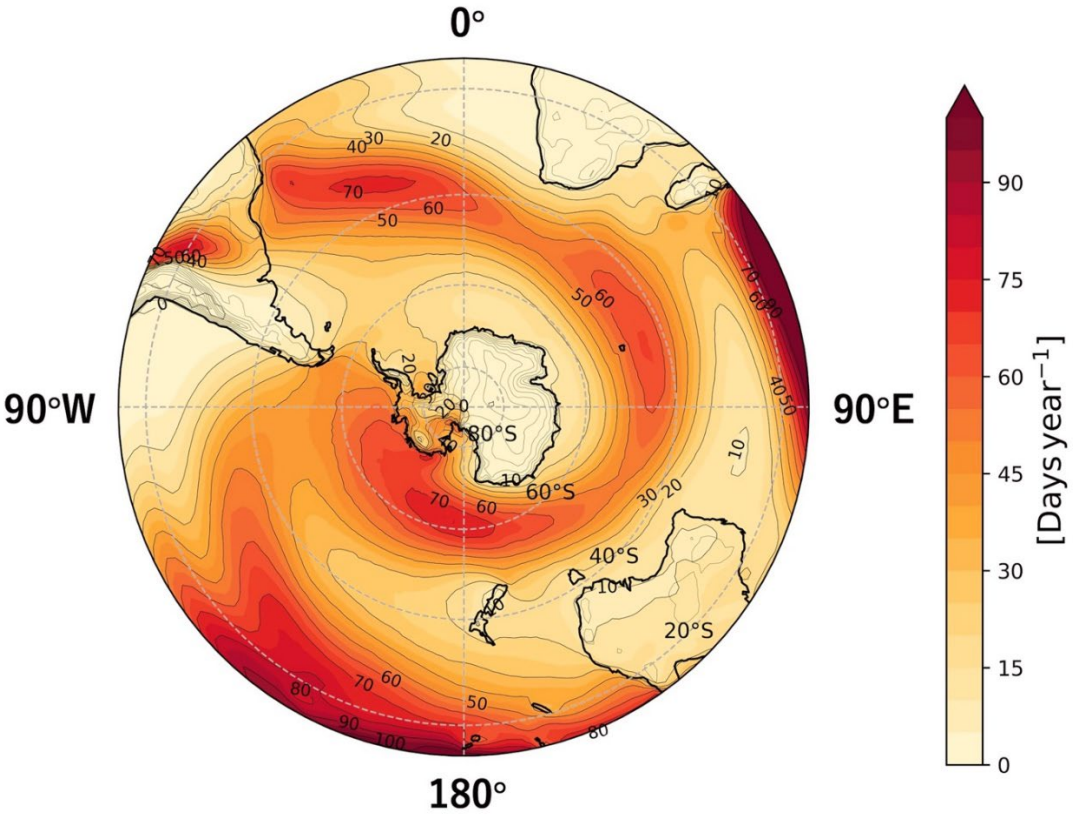

Fig. 1 The annual-mean frequency of AR detection (color and black contours; unit: days year^(-1)). Thin black curves over the continent indicate the topography with the contour interval of 500 m.

- We applied an AR detection algorithm that extracts localized, narrow area of the vertically integrated water vapor transport at each time step to reveal the geographical distribution in AR activity over the south polar region.
- AR detection frequency displays a zonally asymmetric, spiral-like structure extending from mid-latitudes in the Atlantic to high-latitudes in the Pacific Ocean, largely contributing to the geographical dependence in moisture transport toward Antarctica.
- ARs over the Indian Ocean and the Atlantic are likely associated with extratropical cyclones, while ARs over the Southern Pacific are primarily attributed to blocking highs.