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Synoptic Climatological Analyses Using PCA on the Korea Easterlies over the Eastern Coast of South Korea.

Seung Yeon Lee (1,4), Sojung Park (1,4), Ebony Lee (1,4), SungMin Won (3), Seon-Ki Park (1,2,4)

(1) Department of Climate and Energy System Engineering, Ewha Womans University, Seoul, Republic of Korea (sy02021004@gmail.com), (2) Department of Environmental Science and Engineering, Ewha Womans University, Seoul, Republic of Korea, (3) Department of Statistics, Ewha Womans University, Seoul, Republic of Korea, (4) Severe Storm Research Center, Seoul, Republic Of Korea

The Korea easterlies are defined as the winds from the East Sea/Sea of Japan (ESJ) that cause precipitation or lowers temperature on the eastern coastal areas in South Korea. The eastern side of the Korean Peninsula has a northwest-southeast oriented mountain range with high altitude and slope, called Taebaek Mountains (TM). Especially, in winter, the easterly winds, known as the Korea easterlies, blowing to TM and its adjacent coastal region frequently cause heavy snowfalls on both the mountain and coastal areas, mainly due to the orographic effect and increasing instability over the sea. Understanding the synoptic conditions is important for analyzing and forecasting to the easterly-related weather systems. This study aims to determine synoptic patterns that are associated with the easterly-related weather systems over the Korean Peninsula. Using principal component analysis in T-mode and k-means clustering, we try to find the major atmospheric circulation patterns associated with the Korea easterlies cases with the fifth generation of ECMWF atmospheric reanalyses data (ERA5) set from recent 10-year (2008∼2017). Besides, we performed synoptic climatological analyses on the Korea easterlies, especially for precipitation systems in the categories of heavy rainfall and snowfall and ordinary rainfall and snowfall. Various synoptic climatological analyses are performed, including vertical sounding and horizontal distributions of wind, temperature, and moisture flux to identify the characteristics of the Korea easterlies. Through this study, we can not only make a better understanding of the development mechanisms of the easterly-induced weather phenomena in Korea but also identify major factors crucial to forecasting those phenomena.