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The Spatiotemporal Variability and the Causes in Atmospheric Circulation of the Latest Frost Occurrences in Republic of Korea

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Frosts in late spring cause great damages to crops, but there have been few studies on them. In this study, the last frost in a year between March and August was defined as last frost and the date of the last frost as the last frost date (LFD). Then the spatiotemporal distribution of LFDs 1905 and 2011 and the atmospheric circulation that caused them were investigated.

During the modern observation period, the average LFD was the earliest at Changwon (35.17 degree north latitude, 128.57 degree east longitude, 37.15 meter height) and the latest at Daegwallyeong(37.67 degree north latitude, 128.72 degree east longitude, 772.57 meter height). Among them, the latest LFD was June 2, 2010. LFD showed a trend of getting earlier in 37 stations, and the change in the average of stations by year between 1971 and 2011 also showed a trend of getting earlier.

It has been found through synthetograph investigation and case studies that there were cool temperatures in the Korean Peninsula and China in years when the LFD was late. These low temperatures occurred when the cold air current of high latitudes flowed into the Korean Peninsula in the form of northeasterly wind passing through the East Sea. In 500 hPa, a strong ridge appears over the high latitudes in Asia, creating a 'S'-shaped pressure pattern. Furthermore, the last frost not only became later in particularly cold years, but also in average years when a peculiar pressure pattern was formed for just a few days.