Spatial Distributions and Long-term Variations in Seasonal Peak for Korea

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This study examines the spatial and temporal distributions of the maximum point (summer peak) and minimum point (winter peak) of the seasonal temperature cycle over Korea. These two peaks are defined by using the time series of the day mean temperature that was smoothed by using a 90-day low-pass filter to remove the effects of the intraseasonal fluctuations in temperature. As a result, the earliest summer peak over Korea is found to appear on July 31, in Chuncheon and Hongcheon, in the central inland region, while the latest summer peak is found to appear on August 10, in Busan and Tongyeong, in the southwestern coastal region. The highest summer peak temperature is 27.16°C, in Jeju, located in the southernmost part of Korea, and the lowest is 20.13°C, in Daegownryong, located in the Teabaek Mountains. The earliest winter peak appears on January 13, in Yeongcheon and Jinju, in the southwestern inland region, while the latest winter peak appears on January 25, in Jeju. The highest winter peak temperature is 5.46°C, in Jeju, and the lowest is -7.71°C, in Daegownryong. These climatological features seem to be affected by geographical covariates such as latitude, distance from the coast, and topography.

For 35 years (1974~2008), the interannual variabilities of the temperature and the date for the winter peak are greater than those of the summer peak. The long-term trends in the temperature and the date for the summer peak are slightly positive (0.061day/year, 0.006°C/year), whereas, the winter peak date is slightly negative (-0.123day/year). However, all of these three trends are not statistically significant, which indicates no change. A significant trend is observed only for the winter peak temperature (0.058°C/year), towards warming. With these results, it is supposed that the effect of urbanization is higher than that of global warming.

Keywords: seasonal temperature cycle, summer peak, winter peak, global warming, urbanization effect