

Intraseasonal Variability of Temperature in Late Winter Detected in the Normal Value Averaged over 30 years

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The climatological normal values are usually calculated by applying a low-pass filtering in date, such as 9-day moving average three times, and averaging the obtained value over 30 years. Although these operations are conducted to get a smooth seasonal march, we sometimes find that some signals with an intraseasonal time scale still remain in the normal value. In fact, we find that the time derivative of the surface temperature (dT/dt) has a local minimum value of 0.03 K/day on 18 February and maxima on 8 February and 7 March at Fukuoka, in the western part of Japan. We also find that the daylight hours has a local minimum around the date of the dT/dt minimum. We are now examining the spatial and temporal extension of such non-uniform seasonal march to other regions and past climatology.

First, to examine the spatial extension, we use the re-analysis product by European Centre for Medium-Range Weather Forecast (ERA-Interim) data. The local minimum around 18 February is detected over the 1000-km scale region: 110°E-150°E and 20°N-36°N and up to 300 hPa except for a small phase delay in the upper layer. The preliminary analysis suggests that the intensity of the subtropical high pressure system synchronizes with the dT/dt change. We propose two factors to explain the intraseasonal signal in dT/dt : one is a shielding effect of the solar input by clouds, and the other is a dynamical constraint including sub-high system or their combination.

Second, to examine the temporal extension, a long-year records of Japanese temperature collected by the Japan Meteorological Agency are analyzed. The past normal values averaged in the center of Japan (Fukuoka, Kyoto, and Choshi) also have a local minimum of dT/dt in later February. However, the date of the minimum dT/dt has a significant decadal change. If we define a normal value at a specified year by the average over a period before and after 15 years (i.e. the normal value at 1995 is calculated with 1981-2010 values), the date of the local minimum of dT/dt changes around 1915, 1935, and 1965. This intraseasonal variability in the normal values may be explained by the Interdecadal Pacific Oscillation having similar time-scale.

Key words: intraseasonal variability in the climatology, subtropical high