

High-frequency daily temperature variability in China and its relationship to large-scale circulation

Futing Wu

Institute of Hydrology and Water resources, Hohai University, Nanjing, China (wuft@hhu.edu.cn)

Two measures of intra-seasonal variability, indicated respectively by standard deviations (SD) and day-to-day (DTD) fluctuations denoted by absolute differences between adjacent 2-day periods, as well as their relationships with large-scale circulation patterns were investigated in China during 1962–2008 on the basis of homogenized daily temperature records from 549 local stations and reanalysis data. Our results show that both the SD and DTD of daily minimum temperatures (T_{min}) in summer as well as the minimum and maximum temperatures in winter have been decreasing, while the daily maximum temperature (T_{max}) variability in summer is fluctuating more, especially over southern China. In summer, an attribution analysis indicates that the intensity of the Western Pacific Subtropical High (WPSH) and high-level East Asian Subtropical Jet stream (EASJ) are positively correlated with both SD and DTD, but the correlation coefficients are generally greater with the SD than with the DTD of the daily maximum temperature, T_{max} . In contrast, the location of the EASJ shows the opposite correlation pattern, with intensity regarding the correlation with both SD and DTD. In winter, the Arctic Oscillation (AO) is negatively correlated with both the SD and DTD of the daily minimum temperature, but its intra-seasonal variability exhibits good agreement with the SD of the T_{min} . The Siberian High acts differently with respect to the SD and DTD of the T_{min} , demonstrating a regionally consistent positive correlation with the SD. Overall, the large-scale circulation can well explain the intra-seasonal SD, but DTD fluctuations may be more local and impacted by local conditions, such as changes in the temperature itself, the land surface, and so on.