

Global warming and climate variability in Korean Peninsula

In-Sik Kang, Seoul National Univ., Korea

According to observation data, it is clear that global mean surface temperature has been risen by 0.3~0.6°C since 19C. Moreover, it is suggested by proxy data, atmospheric- ocean coupled model, and energy balance model that this temperature rising is beyond the standard variability. Global mean temperature is rising abruptly in 1940s and 1980s. The rising at early 20C is limited in middle and high latitude, but lately it extends over global scale. Any other trend obtained from proxy data (for example, annual ring) for 1,000 years is not more than a half of global mean temperature rising for 20C. Judging from the results obtained through many other possible methods, we can know that temperature rising in 20C is not just one of the natural variations.

Precipitation and temperature variability in Seoul were studied using a long historical data from 1908 to 1996 with a main focus on the long-term change of the variability associated with warming trend. Wavelet analysis and singular spectrum analysis shows that predominant periods of the temperature variation are 2-3 and 5-6 years, and those of the precipitation are 3-4 and 5-6 years. The amplitude of the precipitation variability, particularly of 3-4 year time scales, is gradually reduced in recent years. On the other hand, the inter-annual variability of the temperature shows no clear signal on the amplitude. The temporal changes of climate extremes are examined. Abnormally high temperature has appeared more frequently since 1980 when the warming trend is more distinctive. The appearance of the extremely low daily minimum temperature for summer and winter decreased for the last quarter of a century. It is also noted that the appearance of cold surge in winter shows a negative trend after 1970 in Seoul, which is calculated from time series by moving summation for 9 years.

The number of rainy day for a light precipitation less than 10 mm day⁻¹ appears to be reduced in recent years. However, the frequency of heavy rainfall greater than 40 mm day⁻¹ has been increased for the data period. Interestingly, the event of the extremely heavy rainfall greater than 150 mm day⁻¹ has been decreased, although its mean value has been increased.