

## Long-term changes in precipitation characteristics over northern Eurasia

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Changes in precipitation characteristics over northern Eurasia are analyzed using a gridded daily precipitation dataset for the period 1961–2004 (41 years). The precipitation dataset is newly-developed through the APHRODITE project conducted by the Research Institute for Humanity and Nature (RIHN) in Japan. This study examines the observed variability and trends of various extreme precipitation indices estimated based on the data on 0.5 degree grid resolution in northern Eurasia. The indices employed as measures of precipitation extremes are annual total wet-day precipitation (PRCPTOT), annual frequency of occurrence of wet days, simple daily precipitation intensity index (SDII), annual frequency occurrence of heavy and very heavy precipitation days (R10 and R20), and contribution of precipitation due to very wet days (R95tot). These indices have been widely used to analyze global and regional climate extremes by numerous studies in the last decade. This study mainly focuses on the precipitation characteristics and their changes represented by these indices in the Siberian domain (60–135E, 50–70N). All the indices are estimated as annual values (annual total values, annual averaged values, and annual frequency occurrences). The timeseries of area averaged PRCPTOT over the Siberian domain reveals an interdecadal change around 1982. This change appears to be associated with the interdecadal variability with timescales of about 20–40 years. The broad Siberian region experienced the relatively wet period that persisted from the mid-1960s through the early 1980s, while the relatively dry period that persisted from the mid-1980s through the mid-1990s. The former and the latter are defined for 1966–1981 and 1983–1996, respectively. A significant decrease of the average annual total precipitation is observed from the wet period to the dry period. Other precipitation indices also show a similar temporal change. Spatial distributions of the precipitation indices are examined to capture the extent of the interdecadal change. Changes in the average precipitation, the frequency of heavy precipitation days and the very wet day precipitation show a widespread decrease from the wet period to the dry period over the broad Siberian domain. After the late 1990s, the precipitation indices show a tendency toward relatively wetter conditions again. These results imply the occurrence of regime shifts in the hydro-climate of Siberia. Linear trends for the precipitation indices over the 41 years are also assessed. Decreasing trends are found in all the indices, however, there is no significant trend in any of them.

Keywords: precipitaion extremes, Interdecadal variavility, Northern Eurasia, Siberia, Long-term change, gridded daily precipitaion data