



Nonlinear trends in winter precipitation in south China

1. Zhang (1), X.H. Zhu (2), X.F. Zhi (3), and K. Fraedrich (4)

(1) Nanjing University of Information Science & Technology, Nanjing, China (zlnuist@163.com), (2) Meteorology Institute, KlimaCampus, Hamburg University, Hamburg, Germany (xiuhua.zhu@zmaw.de), (3) Nanjing University of Information Science & Technology, Nanjing, China (xiefei_zhi@yahoo.com.cn), (4) Meteorology Institute, KlimaCampus, Hamburg University, Hamburg, Germany (klaus.fraedrich@zmaw.de)

Based on daily precipitation observations in South China during the period from 1961 to 2010, nonlinear trends of winter precipitation are analyzed in terms of Standardized Precipitation Index determined from winter (DJF) precipitation (SPI3). The associated large-scale circulation features are investigated by using NCEP/NCAR and ERA-40 reanalysis data. The SPI-3 index has experienced an increase in 1980s. Before the late 1970s the SPI-3 index has a low level, and during 1980s SPI-3 has an increase trend. But the increase trend isn't linear, after the late 1980s the SPI-3 index stabilizes at a high level. The composite circulation patterns between 1988-2002 and 1962-1976 show that the increased rainfall in South China is attributed to the weakened East Asian Winter Monsoon (EAWM), and the associated weakened northerlies along the east coast of China mainland favor the northward transport of warm and humid air originated from tropical oceans to South China. The weakened EAWM is related to low-level warming over the high-latitude Eurasian continent due to strengthening of the Arctic Oscillation (AO) after 1980s. Therefore, AO plays a major role in determining the nonlinear trend observed in winter precipitation over South China.

Keywords: winter precipitation; nonlinear trends; EAWM; AO