



Change of precipitation intensity spectra at different spatial scales under warming conditions

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The long-term change of the whole spectra of precipitation intensity in China is examined using observed daily data recorded at 477 surface stations for the period from 1961 to 2008. The results show a spatially coherent decrease of trace precipitation despite different reduction magnitudes among the regions. For measurable precipitation, significant regional and seasonal characteristics are observed. In autumn, the whole measurable precipitation decreased over Eastern China (east of 98°E). In summer and winter, a significant increase of heavy precipitation and decrease of light precipitation are detected south of Eastern China. In Western China, measurable precipitation is found to have increased in all four seasons. Composite analysis reveals a quasi-linear relationship between increasing surface temperature and precipitation on a global scale. The responses of precipitation at different intensities to the increased temperature are distinct, with a significant spectra-shifting from light to heavy precipitation. Compared with precipitation over the ocean, the amplification of heavy precipitation over land is relatively less, most likely constrained by the limited water supply. The response of regional precipitation to global warming shows greater uncertainties compared with those on the global scale, perhaps due to interference by more complex topography and land cover, as well as human activities, among other factors.