

An assessment of monsoon precipitation changes during 1901-2001

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Changes of global land monsoon precipitation are examined by using three sets of rain-gauge precipitation data for the period of 1901-2002 compiled by GPCC, CRU and GHCN, respectively. Analysis demonstrates that the three datasets are highly consistent in measuring the long-term changes of seasonal precipitation over the monsoon region except with slightly different amplitudes. Over the past 100 years, the change of global land monsoon precipitation (GMI) exhibits multi-decadal variations, with an overall increasing trend from 1901-1950, followed by a decreasing trend up to the present time. During the first half of the 20th century, both the global and northern hemispheric land monsoon precipitation exhibit a significant increasing trend, which is mainly resulted from the increased precipitation over the North American and East Asian monsoon domains. A decreasing trend over the whole 20th century is seen over the northern and southern hemisphere, but it is only significant for the northern hemisphere. The robust decreasing trend of northern hemispheric land monsoon precipitations during the 20th century mainly comes from the downward trend of North African and South Asian monsoon precipitation. Though the global land monsoon precipitation shows a long-term decreasing trend over the past 100 years, it is mainly caused by the significant decreasing trend since the 1950s. Based on empirical orthogonal function (EOF) analyses of precipitation annual range, the first leading mode features a coherent change of South Asian, Northeast China, southern South African, Australian and western American monsoon, and a coherent change over the equatorial South African monsoon and eastern American monsoon. The corresponding principal component time series indicates that most land monsoon precipitation has experienced an increasing tendency from 1901 to 1950 and a decreasing trend since 1950s.