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Trend and seasonality of land precipitation in observations and CMIP5 model simulations

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In this study, we examined the annual precipitation amounts, the seasonality over global land and their linear trends, and the uncertainties in observations and then compared them with historical runs by multiple models. Overall, the large-scale patterns of both the climatology of the annual precipitation amount and the seasonality are consistent between the observations. Nevertheless, some noticeable differences existed, particularly in the regions with fewer gauge observations, such as northern Africa and the Tibetan Plateau. For long-term changes, significant drying trends during 1948–2005 were observed in the tropical areas of northern Africa, accompanied by significant wetting trends in the polar region of Canada. The seasonality change during the period was dominated by a decreasing trend in precipitation, especially in the western portion of Russia. The model simulations of the Coupled Model Intercomparison Project, Phase 5 (CMIP5) reproduced the climatological mean state of annual precipitation and its seasonality in the observations, and to some extent the zonal mean trends of precipitation amounts, but did not reproduce the zonal mean trends of seasonality. The two-dimensional distribution of linear trends of annual precipitation and seasonality simulated by CMIP5 models showed little consistency with their observational counterparts. One possibility for the inconsistencies was that they were largely determined by internal variations of the climate system. In contrast, it might also suggest a challenge for state-of-the-art climate models to correctly simulate the spatial distribution of responses of annual precipitation amounts and seasonality to the evolution of external forcings.

Biography

Xiaofan Li has completed his PhD from University of Hawaii, USA. He is working as a Professor at School of Earth Sciences, Zhejiang University, China. He has published over 100 papers in reputed journals.

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