

3.环境变化与人地关系历史

Northward shift of Indian summer monsoon and intensifying winter westerlies cause stronger precipitation seasonality over Pamirs and its downstream basins in the 21st century

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摘要: Hydroclimate will change over Pamirs and its downstream basins (PDB), including Indus River, Tarim River, Amu Darya and Syr Darya Basins, in response to the variation of Indian summer monsoon (ISM) and mid-latitude westerlies. However, the precipitation variation and its mechanism over PDB in the 21st century are yet not fully understood. Here, the best models ensemble selected from 25 CMIP6 models under SSP2–4.5 and SSP5 –8.5 scenarios is applied to detect the precipitation variations over PDB in the 21st century. A remarkable dipolar pattern is found in both summer and winter precipitation over PDB, particularly in the central Indus River Basin and upper Amu and Syr Darya Basins. The central Indus River Basin (upper Amu and Syr Darya Basins) will experience an increasingly wet (dry) summer in response to northward ISM and a dry (wet) winter driven by mid-latitude westerlies. The amplifying dipolar pattern of seasonal precipitation thus increases the water resource vulnerability over PDB and emphasizes the role of Pamirs in modulating the water resources over surrounding basins, especially the Amu Darya and Syr Darya Basins in the future. The findings underscore the need for prioritizing policies by considering the impacts of precipitation seasonality on social planning.

关键词: Precipitation seasonality; Climate change; Water resource; Indian summer monsoon; Winter westerlies