



Progress on the observation and modeling of air-land Interactions over heterogeneous landscapes: from Tibetan Plateau to Third Pole and Pan-Third Pole regions

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The Tibetan Plateau is an important water source in Asia. As the “Third Pole” of the Earth, the Tibetan Plateau has significant dynamic and thermal effects on East Asian climate patterns, the Asian monsoon process and atmospheric circulation in the Northern Hemisphere. However, little systematic knowledge is available regarding the changing climate system of the Tibetan Plateau and the mechanisms underlying its impact on third pole region (Tibetan Plateau and the nearby surrounding region). This study was based on “water-cryosphere-atmosphere-biology” multi-sphere interactions, primarily considering global climate change in relation to the Tibetan Plateau–third pole climate system and its mechanisms. This study also analyzed the Tibetan Plateau to clarify global climate change by considering multi-sphere energy and water processes. Additionally, the impacts of climate change in the third pole and the associated impact mechanisms were revealed, and changes in water cycle processes and water conversion mechanisms were studied. The changes in surface thermal anomalies, vegetation, local circulation and the atmospheric heat source on the Tibetan Plateau were studied, specifically, their effects on the East Asian monsoon and energy balance mechanisms. Additionally, the relationships between heating mechanisms and monsoon changes were explored. The research plan and initial progress for the land-atmospheric interaction over the Pan-Third Pole region is shown in the last.