

Hydroclimatic Extremes under Climate Change: Mechanisms, Risks and Impacts



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Hydroclimatic extremes, such as floods, droughts, and heatwaves, have caused considerable human casualties and enormous economic losses around the world, especially in China where monsoon climate with significant inter- and intra-annual variations largely dominates. Under climate change mainly driven by global warming, these extreme events are becoming more intense and frequent, which is one of the grand challenges to the sustainable development of human society. Besides extreme events of single hazards, multiple types of hydroclimatic extremes may occur simultaneously or successively, such as compound floods (e.g., heavy rainstorms and storm surges) and co-occurrence of droughts and heatwaves. Such compound hazards may create greater damages, but less studies have been conducted on their causes and impacts. In this talk, I will first discuss the mechanisms of compound hazards and the possible causes of their variations. Our studies showed that synoptic-scale weather patterns and regional land-atmosphere interactions may trigger and enhance compound hazards. Then I will analyze the risks of hydroclimatic extremes under the past and future climate with a focus on the joint behaviors of heavy precipitation and storm surge. Lastly, I will evaluate the combined impacts of simultaneous changes in various types of hydroclimatic extremes under climate change on society.



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