

# Observations, reanalysis, and modeling of the regional climate and water cycle at the earth's Third Pole

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## Abstract

Water cycle is central to nearly every aspect of the global environment and crucial to human welfare. Planet Earth is witnessing a period of tremendous and unprecedented global changes characterized by complexity and uncertainty. The Tibetan Plateau (TP), being the world's highest and most extensive plateau, is the core region of the so called Third Pole Region which encompasses a large portion of Eurasia. The TP holds the largest glacially stored fresh water outside of the Arctic and the Antarctica. It is the source of major Asian rivers and hosts thousands of lakes, and thus imperative to nearly one third of the world's population in terms of fresh water supplies. Past studies have established that fluctuations in the water cycle over the TP are particularly 'wicked' and difficult to predict given the huge uncertainties in regional climate which determines water cycling involving water vapor transport by the atmospheric circulations, evapotranspiration, cloud formation and their relationships to precipitation.

This talk will provide an overview of what we have learned about the regional climate change and its impact on water cycle over the TP from the existing observations, how they are simulated by models for the past and predicted for the future, what more observations do we need, and how to constrain and improve the models with data for better future prediction and uncertainty quantification.