Satellite gravity observations from the Gravity Recovery and Climate Experiment (GRACE) provide a unique means for monitoring large-scale water mass redistribution associated climate change on a global basis, which include terrestrial water storage (TWS) change, ice mass change of polar ice sheets and mountain glaciers, and non-steric sea level variation. The over 10 years GRACE data have revealed a coherent picture of global water mass redistribution from seasonal to long-term time scales, and captured some large-scale transient hydrologic signals, and major climate and environmental change features, including excessive groundwater depletions, and severe droughts and floods. This presentation will provide a comprehensive analysis of TWS changes over the Tibetan Plateau during the past decade using GRACE satellite gravity measurements and advanced land surface models, and discuss main limitations and challenges of using GRACE data, and expected advancements of future satellite gravity missions.

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