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Abstract Title:

Impacts of climate change on lake-level fluctuations across the Tibetan Plateau from 1972 to 2010

is part of the Paper Session:

Environmental Change and Human Adaptation on the Tibetan Plateau: II. Earth surface processes

scheduled on Monday, 2/27/2012 at 12:40 PM.

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Abstract:

The Tibetan Plateau plays a critical role in global climate dynamics and provides headwaters for major rivers in eastern and southern Asia. A detailed assessment of the impact of climate change on water resource is critical to the ecosystems within and around the plateau and to the livelihoods of >two billion people. Inland lake level, a sensitive index of regional water balance, can be used to reveal the climate impact on water resources in this critical region. Based on Landsat images and ICESat/GLAS altimeter data, we identified patterns of lake-level fluctuations across the plateau in 1972-2010 and examined the relationship between lake-level fluctuations and climate variations observed from >100 weather stations in this region. Results suggested that the majority of lakes were relatively stable before and are rapidly expanding after 2000. For permafrost dominated lake basins, although precipitation contributes to some changes, lake expansion is more consistent with temperature increase indicating that the recent rapid lake expansion is mainly caused by accelerated permafrost degradation. For some basins, glacier retreat also contributes to lake changes. However, not all basins with rapid lake expansion are covered by modern glaciers. Shrinking or relatively stable lakes are mainly distributed in the southern part of plateau where permafrost contribution is minimal or relatively stable. The dynamics of these lakes are mainly driven by the balance between precipitation and evaporation. These findings would provide a useful guidance for future water resource prediction under continuously changing climate in this critical region.

Keywords:

Lake-level fluctuation, Tibetan Plateau, Climate change, Permafrost degradation

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