Geophysical Research Abstracts
Vol. 18, EGU2016-16502, 2016
EGU General Assembly 2016

Linking hydrological modeling and paleolimnological records for a better understanding of climate-hydrosphere interactions on the Tibetan Plateau

Sophie Biskop (1), Manfred Fink (1), Sascha Fürstenberg (3), Torsten Haberzettl (2), Thomas Kasper (2), and Peter Frenzel (3)

(1) Friedrich-Sciller-University Jena, Institute of Geography, Geoinformatics, Jena, Germany , (2) Friedrich-Sciller-University Jena, Institute of Geography, Physical Geography, Jena, Germany , (3) Friedrich-Sciller-University Jena, Institute Geosciences, Jena, Germany

On the Tibetan Plateau (TP), where lake monitoring data are sparse, lacustrine systems, especially terminal lakes, act as sensitive indicators of climate variability, storing climatic and environmental information within their sediments. Thus, lake sediments are important archives for the reconstruction of hydrological changes and related climate conditions on decadal to millennial time scales. From a large number of lacustrine records on the TP, high lake levels were reconstructed for the Early Holocene, which are assumed to be related to a period climatically wetter than today. This study is the first attempt to integrate such paleoclimatic evidences from Tibetan lakes into hydrological modeling attempts to establish a quantitative reconstruction of climate variations. For the large lake Tangra Yumco (southern-central Tibetan Plateau) a high lake level indicated by an erosional terrace of 181 to 183 m above the recent lake level was dated to 8.5 ka. To maintain this high stand allowing forming a distinct lake level terrace, certain climatic conditions are needed. Considering the paleo-lake extension of Tangra Yumco and nearby lake Xuru Co, the hydrological model developed and evaluated for present-day conditions was run through several scenarios of precipitation and temperature changes. The High Asia Reanalysis (HAR) atmospheric data set for the period 2001-2010 (10 km, daily resolution) served as meteorological driver for the process-oriented conceptual hydrological model built within the Jena Adaptable Modeling System. Based on inverse modeling, this study estimates the amount of precipitation and temperature to maintain a state close to equilibrium during the lake level high-stand at 8.5 ka. This study highlights the benefits of water balance simulations by combining paleolake records and synthetic climates derived from atmospheric model data, in order to deepen the understanding of the response of hydrological systems to climate variability.