Geophysical Research Abstracts,
Vol. 11, EGU2009-1791, 2009
EGU General Assembly 2009

Tibetan Plateau glaciation during the last glacial cycle: widely diverging (LGM-) reconstructions of glacial extents using numerical ice sheet simulations driven by GCM-ensembles of climate forcings

N. Kirchner (1), R. Greve (2), J. Heyman (1), and A. Stroeven (1)

(1) Department of Physical Geography and Quanternary Geology, Stockholm University, Sweden (nina.kirchner,j.heyman,a.stroeven@natgeo.su.se), (2) Institute of Low Temperature Sciences, Hokkaido University, Japan (greve@lowtem.hokudai.ac.jp)

The Tibetan Plateau is a topographic feature of extraordinary dimension and has an important impact on regional and global climate. Yet, the glacial history of the Tibetan Plateau is less constrained than the history of some other formerly glaciated regions, especially in the Northern Hemisphere (e.g. Laurentide Ice Sheet, Fennoscandian Ice Sheet). Nevertheless, field evidence for extensive valley glaciation indicates that ice sheet glaciation on the Tibetan Plateau did not evolve during the Last Glacial maximum (LGM). This is an important and robust result that has not been widely investigated using numerical ice sheet models, despite potentially important climate ramifications. Perhaps this is because reconstructions of the LGM glacial configurations of the Tibetan Plateau in the framework of numerical simulations covering an entire glacial cycle exhibit a pronounced variability then entire range of which is not supported by field evidence.

Using the 3d thermomechanical ice sheet model SICOPOLIS, we simulated the evolution of Tibetan Plateau ice configurations during the last 125.000 years. Temperature and precipitation data driving the simulations have been applied in the form of a large ensemble of glacial/interglacial climate scenarios. It is observed that variations in ice sheet configuration resulting from the prescription of different present-day precipitation- and temperature data sets, on the one hand, and different paleoclimates as obtained from reconstructions based on different GCM-model outputs, on the other hand, include as extreme end members an entirely ice free Tibetan Plateau during the last glacial cycle as well as a plateau-scale Tibetan Ice sheet during the LGM. Comparison of such numerical results with available field data indicates that further refinements in the numerical simulations are required, and that these must include atmosphere-ice sheet feedback mechanisms.

However, because mapped and simulated glacial extents are represented at different spatial scales, this task is not straightforward.