A High-resolution Record of Late Neogene Environmental Changes in Southern Tibet

Y. Wang (Geological Sciences FSU and NHMFL); T. Deng (Chinese Academy of Sciences); L. Flynn (Peabody Museum, Harvard U); X. Wang, Y. Xu (NHMFL); E. Lochner (MARTECH, FSU); W. Parker (Geological Sciences FSU)

Introduction

Long-term paleoclimate records within the Tibetan Plateau are lacking, but are needed to allow comparison with the marine record of global climatic changes and to elucidate the role of Tibetan uplift in controlling regional and global climate. Here we report the initial results of an isotopic study of a long sedimentary sequence in the Gyirong Basin in southern Tibet.

Results and Discussion

We determined the carbon and oxygen isotopic ratios of carbonates in lacustrine and fluvial sediments at ~11 thousand years resolution to reconstruct climatic and hydrological changes during the late Neogene in the Gyirong Basin in southern Tibet. The data reveal three major catchment-scale events in the late Miocene and Pliocene that fundamentally altered the regional hydrological regime and environment. The 1st major event is marked by the formation of a paleo-lake system at ~ 7.2 Ma. The filling of the paleo-lake basin beginning at ~7.2 Ma suggests a major change in environment, drainage, or topography in the area then. This local event is synchronous (within dating uncertainty) with the onset of normal faulting in southern Tibet as well as major environmental changes in areas surrounding the plateau, suggesting a possible link between tectonic change and climate change. The 2nd event at ~5.4 Ma, is indicated by an abrupt decrease in $\delta^{18}O$ values of lacustrine carbonates and a change in sediment mineralogy. This $\delta^{18}O$ shift also slightly precedes or roughly coincides with a major change in Himalayan drainage systems inferred from neodymium isotope data from the Arabian Sea, implying a regional rather than local tectonic event. The 3rd major event, signified by the disappearance of the paleo-lake and an influx of conglomerate in the basin at ~3.2 Ma, indicates yet another major environmental change in the basin caused by a more recent phase of tectonic upheaval in the area.

Conclusions

Our initial data from the Gyirong Basin in southern Tibet reveal three major hydrological events at about 7.2 Ma, 5.5 Ma and 3.2 Ma, respectively. We suggest that these environmental changes were driven by regional scale tectonic events in the Himalayas. Although it is presently impossible to tie these environmental events to specific tectonic events, our data provide the first high-resolution long-term record of late Neogene environmental changes that appear to link with the tectonic evolution of southern Tibet.