Geophysical Research Abstracts
Vol. 13, EGU2011-12391, 2011
EGU General Assembly 2011


# Neogene topography and precipitation patterns of the Central Anatolian Plateau

Tamás Mikes (1,2), Andreas Mulch (1,2), Bora Rojay (3), Tina Lüdecke (1), and Fabian Schemmel (1)

(1) Biodiversity and Climate Research Centre, Senckenberganlage 25, D-60325 Frankfurt am Main, Germany (tamas.mikes@senckenberg.de, andreas.mulch@senckenberg.de), (2) Goethe University, Institute of Geosciences, Altenhöferallee 1, D-60438 Frankfurt am Main, Germany, (3) Middle East Technical University, Institute of Geological Engineering, TR-06531, Ankara, Turkey (brojay@metu.edu.tr)

Long-term stable isotope records of terrestrial depositional environments represent increasingly important tools for paleoclimatic and paleoaltimetric reconstructions within continental interiors. A rapidly growing number of studies within the Earth's major mountain ranges demonstrates that the growth of topography and orogenic plateaus profoundly influences local, regional, and hemispheric climate and hence precipitation patterns. In contrast, such records are almost absent for the Near East and the Turkish-Iranian plateau, an important topographic element in the Alpine-Himalayan chain and an area most likely to be strongly affected by future climate change and water scarcity.

Our objective is to assess the role of climatic and orographic factors that have governed the distribution and isotopic composition of precipitation across the central Anatolian plateau (CAP, Turkey) from the Neogene to recent. Such data are fundamental for our understanding of the geodynamic and sedimentary history of orogenic plateaus in general and for the role of surface uplift along the plateau margins in the Pontide and Tauride mountains. We present oxygen, carbon, and hydrogen isotope data from Neogene-to-recent fluvio-lacustrine and pedogenic environments, and recent surface waters from small catchments of the CAP with the ultimate aim of reconstructing past precipitation changes, plateau aridification and, ideally, Neogene surface uplift histories. Our approach is to cross-calibrate modern patterns of isotopes (oxygen and hydrogen) in precipitation with pedogenic carbonate oxygen and carbon isotope data across topographic barriers that today strongly control the distribution of rainfall along the plateau margins and within the plateau interior. We then compare these patterns with Miocene-to-Pleistocene lacustrine and pedogenic records to assess the role of late Neogene (ca. 8-0 Ma) surface uplift in the Taurus mountains and the importance of rain shadow development in the lee of the plateau margins.

Based on ca. 350 hydrogen and oxygen isotope data from modern streams and rivers we document the orographic effect of the southern plateau margin on the hydrogen and oxygen isotopes in precipitation with apparent oxygen isotope lapse rates that fall within the global average (0.2-0.4 ‰ /100 m) and a leeward decrease in the oxygen isotope ratios of ca. 3-4 ‰ compared to sea level.

Miocene-to-recent lacustrine and pedogenic carbon and oxygen isotope profiles from the southern plateau margin into the plateau interior (Ermenek, Ecemis Fault Zone, Kazan, Çankırı, Kastamonu basins) document that to first-order similar-to-modern lake isotope records characterize the late Neogene with strongly evaporative lake systems dominant in the Pliocene. Based on our current long-term stable isotope data we preliminarily conclude that surface uplift of the Central Anatolian Plateau occurred at different rates and magnitudes along the Pontide Mountains which places indirect constraints on plate boundary and mantle dynamics in the Eastern Mediterranean region.