Geophysical Research Abstracts
Vol. 15, EGU2013-13991, 2013
EGU General Assembly 2013

Robust grain size end-members inferred from Quaternary lacustrine sediments across the Tibetan Plateau

Elisabeth Dietze (1), Bernhard Diekmann (2), Karoline Henkel (3), Christian Herb (4), Thomas Kasper (3), Stephan Opitz (5), Weilin Zhang (6), and Torsten Haberzettl (3)

(1) GFZ German Research Centre for Geosciences, Section 5.2 Climate Dynamics and Landscape Evolution, Potsdam, Germany, (2) Alfred Wegener Institute for Polar and Marine Research, Research Unit Potsdam, Germany, (3) Institute of Geography, Friedrich-Schiller-University Jena, Germany, (4) Department of Geosciences, University of Tübingen, Germany, (5) Institute for Earth and Environmental Sciences, Potsdam University, Germany, (6) Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing, China

The detrital grain size composition of sediments can be explained by different transport processes, each of them sorting sediments in a characteristic way. Transport processes are typically linked to distinct environmental, mainly hydrological variations. However, also tectonic and anthropogenic influence can significantly alter them. Lake basins act as final sediment sinks, where sediments that were sorted by different processes get mixed. This results in multi-modal grain-size distributions of lake sediments. To interpret these distributions descriptive grain size analysis (e.g., the method of moments) may lead to misinterpretations. End-member modelling analysis (EMMA) allows a mathematical unmixing of grain size compositions to geoscientifically-interpretable end-members and quantifying these end-members in space and time.
Lakes of different sizes and catchment configurations from the northern, north-eastern, and southern Tibetan Plateau are studied here, including Late Quaternary sediments from Lakes Donggi Cona, Nam Co, Tangra Yum Co and up to 2.7 Ma old lake sediments from the Qaidam basin. Grain size distributions from lake sediments are analysed using EMMA. The most robust grain-size end-members are determined by a variety of similarly-likely model runs. Their relation provides valuable and quantitative information on the most prominent past sediment transport processes and, hence, on past hydrological variations for different times throughout the Quaternary independent of time scale and resolution of the respective lake sediment archive.