



Geochemical and sedimentological analyses of dune fields on the NE Tibetan Plateau and their environmental implications

Janneke Ijmker (1), Georg Stauch (), Kai Hartmann (), Bernhard Diekmann (), Elisabeth Dietze (), Alexandra Hilgers (), Stephan Opitz (), Bernd Wünnemann (), and Frank Lehmkuhl ()

(1) RWTH Aachen University, Geographical Institute, Physical Geography and Geo-ecology, Aachen, Germany (j.ijmker@geo.rwth-aachen.de, +49 241 80 92460), (2) Free University of Berlin, Institute of Geographical Sciences, Interdisciplinary Center of Ecosystem Dynamics of Central Asia (EDCA), Berlin, Germany, (3) Alfred Wegener Institute for Polar and Marine Research, Potsdam, Germany, (4) University of Cologne, Geographical Institute, Geochronology, Cologne, Germany, (5) Nanjing University, School of Geography and Oceanography, Nanjing, China

Sand cover sediments on the Tibetan Plateau are often interpreted as indicative of cold and/or dry conditions. This study focuses on two areas of sand deposition north and south of the Donggi Cona lake on the north-eastern Tibetan Plateau. Dune sections and surface samples from both dune fields are compared based on their grain-size characteristics and geochemistry. Sections are interpreted in terms of past climate conditions.

Sedimentological analysis of the two dune fields shows no significant difference between both. Geochemical analysis shows that the sediment compositions of the dune fields differ significantly in their Ca and Sr content. This suggests that the dune fields have a different source. The southern dune field seems to be related to a large former floodplain, whereas the northern dune field is related to a large alluvial fan-former lake complex. The high Ca and Sr concentrations in the northern dune field might originate from autogenic carbonate production within the former lake system.

The northern dune field shows sediment sorting from the former lake in the direction of transport. Coarse sands are found at low elevations, whereas finer sediments are found at higher elevations. Sorting is most pronounced in the north, due to high elevation differences and orientation of the mountains perpendicular to the main wind direction.

In the south, valleys are in line with the main wind direction and reach lower elevations. Therefore, sorting processes play only a minor role. The oldest dune sediments from both dune fields point to an onset of sand deposition at the end of the last glacial. Geochemical characteristics of the sediment combined with the start of sand deposition might indicate dry conditions during this period. Comparable climatic conditions were found in several profiles, indicating a second climatic deterioration at the end of the Holocene.

This study shows that transport distance and direction of sandy sediments are related to very local morphological conditions. The sand deposits within the Donggi Cona catchment are firstly formed during the same epoch but have different source areas as has been shown by geochemical data. Geochemical data also indicate varying environmental conditions during the late Pleistocene and early Holocene.