Mineralogy and Provenance of Quaternary Sediments in the Gaxun Nur Basin, Northwestern Inner Mongolia, China

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The intermontane basins of the Badain Jaran and Tengger Shamo are prominent sources for dust transport over Central Asia and northern China. They are situated within the sediment cascade between the large mountainous catchment areas and the loess plateau. The endorheic character of the basins predestines them as a terrestrial longtime-archive of climate and environmental change. The sediments in the Gaxun Nur basin (western part of Inner Mongolia) were deposited during the last 250 kyr. To understand the sedimentary processes of this huge sediment cascade the provenance of the terrestrial sediments is one important aspect. Sediment provenance can be deduced from mineralogical fingerprints of modern sediments deposited along the recent pathways from the sources (Qilian Shan) to the sink (basin). The resulting spatial variation serves as a reference for the mineralogical data from a drilling core of the Gaxun Nur Basin. Inferring spatial and temporal variation of sediment provenance provides important information for reconstructing sediment input by fluvial, eolian, lacustrine and glacial processes. The methodical approach focusses on the analysis of clay and heavy minerals, using XRD and petrographic techniques. Other methods involve geochemistry of heavy mineral grains, using computer-controlled scanning electron microscope (CCSEM), as well as bulk geochemistry, XRF element scanning and a statistical data processing.

In this poster, we present results from about 200 surface sediments from different archives distributed over the whole catchment of the Hei He (Black River). Our data suggest that chlorite in the clay fraction can be regarded as a signal carrier for the discrimination of distinctive geological units and the source recognition of basin and foreland sediments. Most of the chlorite can be traced to the widespread greenshists of the eastern part of the Qilian Shan. The petrographic analysis of the heavy minerals points to amphiboles and pyroxenes as the main signal carriers.

Furthermore, we present first mineralogical data of a 20 m sediment core (GN100) from the western part of the Gaxun Nur Basin. Lithological changes in drilling core GN100 reveal temporal changes in the depositional environment, related to the alternation of fluvial, eolian, and lacustrine conditions. Changes in the depositional environment were accompanied temporarily by changes in sediment provenance, determined by sediment transportation routes and the influence of far-distance and local sediment sources. At a later stage, these findings may help to reconstruct climate conditions and their connections to geomorphological processes in the foreland of the Gaxun-Nur-Basin.

Key words: Provenance, Heavy Minerals, Clay Minerals, Gaxun Nur