

Sedimentary and Environmental Changes of Terminal Lake in the Arid Region of Mongolia During the Last Two Millennia

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Understanding past environmental and climate changes is essential for understanding their influence on human history and for predicting future trends. The Valley of Gobi Lake in Mongolia is highly sensitive to climate change. We analyzed two sediment cores (111 cm and 141 cm in length) from Boontsagaan Lake, the largest in the Valley of Gobi Lakes, and the only permanent lake. We used the main components of sediment (organic matter, carbonate, amorphous silica, and Ca and Mg) and grain size, along with chronological ages determined by optical stimulated luminescence and radiocarbon dating. This terminal lake system is a great indicator of increased water supply during the wet and interglacial cycle or shrinkage due to increased aridity. In this study, we only reconstructed the last two millennia. The largest and only permanent Boontsagaan Lake in southern Mongolia was once dried up or very shallow lake between ~300 CE and 1200 CE. Peaks of OM and amorphous silica suggest a subsequent recovery of the lake condition after ~1200 CE. We hypothesize that this hydrological condition is linked to the regional climate wetting phase and increased river inflow by topographic shifts. In this lake system, the recent sediment sequence also shows intensified aeolian input due to continued lake shrinkage. This lacustrine sediment record from this permanent lake captures important environmental transitions over the last two millennia.

Keywords: lacustrine sediment, aeolian, arid region, lake shrinkage