



Contribution ID: 115 Contribution code: PSA-15

Type: Poster

## Multi-proxy palaeoenvironmental record of the past 4600 years from Beloe Lake, northwestern Altai, Russia

*Monday, 21 October 2024 17:55 (20 minutes)*

Beloe Lake (51°17' 40"N, 82°38' 50"E, 530 m a.s.l.) is a foothill lake in the northwestern Altai of Russia. Twenty-five AMS 14C dates on sedimentary TOC and plant remaining samples were obtained from a 193-cm long core to construct the chronology of the lake sediment sequence. Additionally, 210Pb and 137Cs dating were applied to the uppermost 20 cm sediments of the core to complement the chronologic framework. The measurements of TOC and TN by EA and 0.5N HCl leaching elemental concentrations measured by ICPOES provide high-resolution climate change and human impact over the past 4600 years. I (2660-2500 BC): high surface runoff and lake productivity due to wet and warm conditions; II (2500-2330 BC): salinity abruptly decrease (Ca and Sr) indicate a dry condition; III (2330-2170 BC): decreasing in terrestrial input, but the lake was well-mixed; IV (2170-1510 BC): terrestrial elements were remained low, and limnological factors changed due to the limited waterbody, such as variations in pH, temperature; V (1510-1050 BC): a small pulse of TOC and Mn indicated a wet condition; VI (1050-640 BC): increasing in surface runoff and waterbody was observed, showing a wet climate; VII (640 BC-40 CE): relatively high TOC, terrestrial elements and metal concentrations resulted from enhanced catchment erosion in wet and warm climates; VIII (40-220 CE): a sudden drop in concentrations due to the dry condition; IX (220-540 CE): TOC increased but Sr decreased indicate wet and high-level water condition; X (540-710 CE): a mild dry condition resulted in a gentle decrease in element concentration; XI (710-1070 CE): a significant increase in terrestrial elements showed a wet condition; XII (1070-1210 CE): Si and TOC concentrations indicated terrestrial input decreased associated with dry condition; XIII (1210-1950 CE): the lake had very low sedimentation, perhaps due to enhanced surface frozen period during the Little Ice Age; XIV (1950-2022 CE): TOC and heavy metal elements increase showed lake became fresh and activity. The lake was fresh and low productivity resulted from wet and warm climates and human impact. This study is supported by the Russian Science Foundation (RSF) (grant No.22-47-08001) to Kazan Federal University (KFU).

### Student Submission

No

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**Session Classification:** Poster Session A

**Track Classification:** Applications in Climate Studies