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Continuous Holocene increase of the radiocarbon reservoir age at Lake Kanas, southern Altai Mountains, related to peat/soil erosion and climatic wetting

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Radiocarbon (14C) dating of the total organic carbon (TOC) content of lacustrine sediments is usually affected by a 14C reservoir effect and the 14C dates are often systematically older than the true ages, due to the input of carbon from different sources. Therefore, when using TOC's radiocarbon data to build the age-depth relation, it is necessary to accurately deduct the radiocarbon reservoir age. However, due to the possible diachronic variation of the reservoir effect in sediments, it is difficult to deduct the this effect. We collected TOC samples from the Holocene sediments of Lake Kanas, in the southern Altai Mountains, for AMS 14C dating and compared the results with AMS 14C ages based on terrestrial plant macrofossils from the same depths. The results show that the reservoir ages progressively increased from ~0 to ~2800 yr between ~9700 cal BP and ~530 cal BP. As the lake catchment was glaciated prior to the Holocene, and Holocene soils and peats are the main sources of the TOC in the lake sediments, we argue that soil erosion is the major factor contributing to the progressive increase in the reservoir age. Based on previously reported evidence for increasing moisture in central Asia and glacier advances in the mid-to-late Holocene, we suggest that the intensified soil erosion on the hillslopes was caused by increased precipitation during the mid-to-late Holocene and by anthropogenic forest clearance after 1500 cal BP.

Student Submission

No

Primary author: 曹, 辉辉 (兰州大学)

Co-authors: Dr 向, 丽雄; Prof. 黄, 小忠 (兰州大学)

Presenter: 曹, 辉辉 (兰州大学)

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