AMS 14C dating for the sediment from Lake Khubsugul, Mongolia

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We analyzed AMS 14C dating of the core samples (core name X103, X104, X106 and X107: core length 1.2-1.4m) recovered from Lake Khubsugul in Mongolia, which records Quaternary environmental history in Eurasian. Analytical materials were a piece of wood fragment and total organic carbon (TOC) in the sediment of 16 horizons.

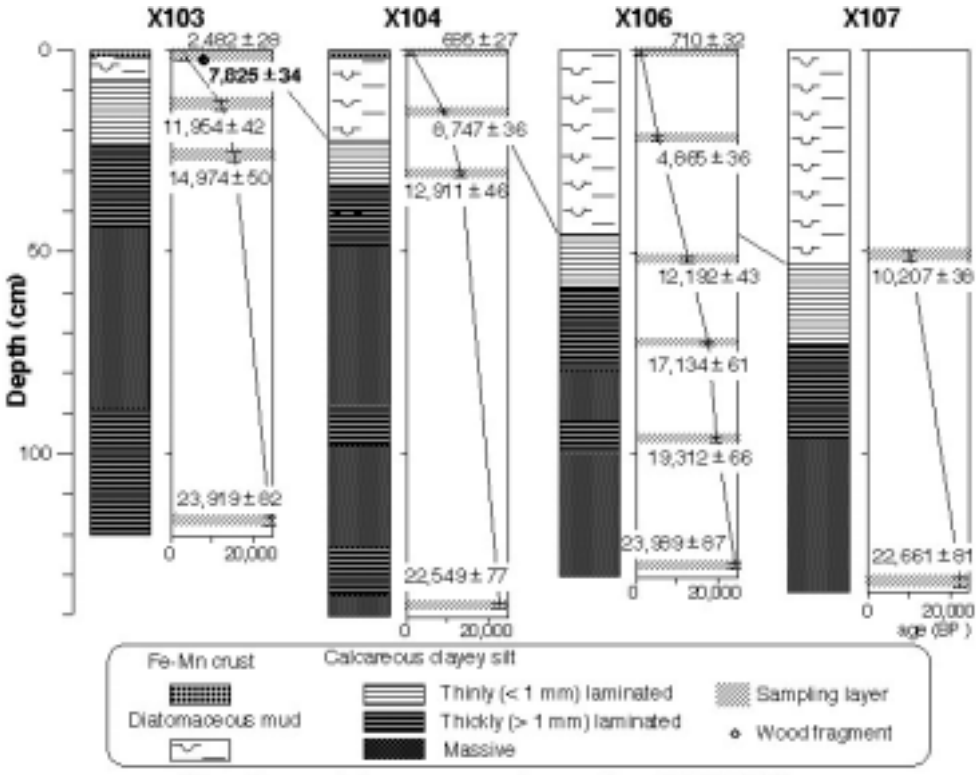
Chemical pre-treatments for AMS 14C dating samples were followings. Wood fragment sample was washed with HCl (1.2N), NaOH (1.2N) and HCl (1.2N), this is a general method to remove contamination. Other sediment samples to analyze TOC were washed with only HCl to remove containing carbonate, because these samples have extremely low TOC content (0.17-7.3%), and if we remove containing humin from sediment with alkaline method, we can not obtaine enough carbon for AMS analysis. After chemical method, we graphaitized the carbon from samples, and analyzed AMS 14C dating with Accelerator Mass Spectrometer (AMS) in Nagoya University. AMS 14C ages in this study were corrected for carbon isotopic fractionation.

The core tops have range 685-2,482 BP in AMS 14C age of TOC, and the bottoms have about 23,000 BP. We could not discover any chronological inversion in whole section of each core. From these results, we estimated that mean sedimentation ratio of Lake Khubsugul was 5.5cm/kyr.

However it is impossible to distinguish the origin of TOC in sediment, and chronological reliability with such method is not sufficient to determine sedimentation age. Therefore, this study compared them with the wood fragment age which carbon well known. The wood fragment was yielded from the core X103 depth 3cm, and that AMS 14C age was 7,825 BP. If this chronological result is true and the age of the core depth 0cm is 0 BP, we are able to estimate that the age of the core depth 1.25cm was 3,260 BP. This age is 820 BP younger than AMS analytical age 2,482 BP with TOC of sediment from the core depth 0-2.5cm, mean depth 1.25cm. This difference is not large to analyze environmental changes of late Quaternary, and this comparison give the chronological reliability to 14C dating with TOC of sediment.

In this study, we also tried litho-stratigraphical analysis of the cores with AMS 14C dating to reconstruct of paleoenvironmental history. The recovered cores consist of Diatomaceaous mud upper section and calcareous cleyey silt lower section in lithology, and we recognized clear boundaries in every core. These lithofacies changes show the history of aquatic productivity in Lake Khubsugul since the last 23,000 BP, and these boundaries was estimated 11,000 BP by the sedimentation ratio. This age is same time of beginning of global climate worming, and this fact indicates that aquatic productivity in Lake Khubsugul sensitively responded to the global climatic changes.

Core sites



Stratigraphic comparison for AMS ^{14}C dating of Lake Khubsugul cores