

Dinocyst lamination, a freshwater “red tide” recorded in lacustrine sediments

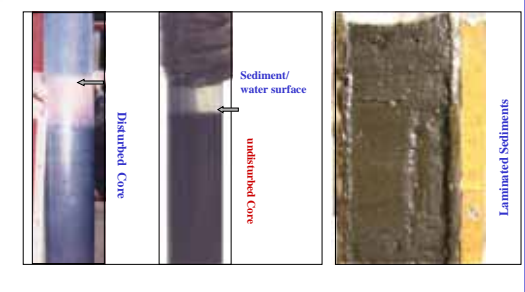
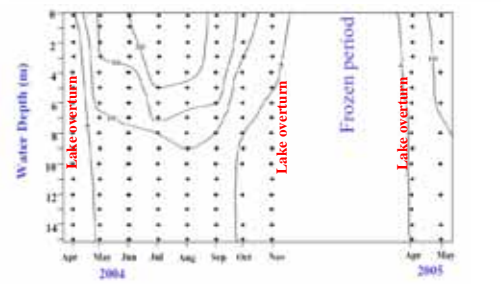
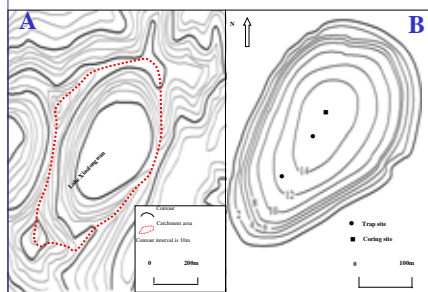
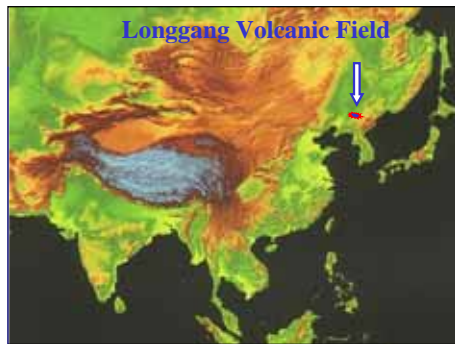
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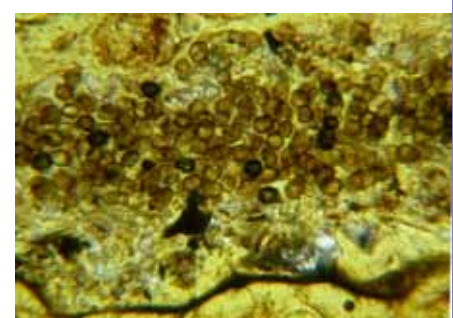
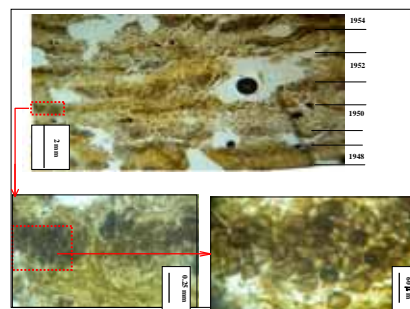
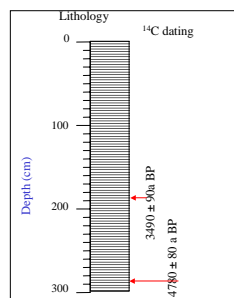
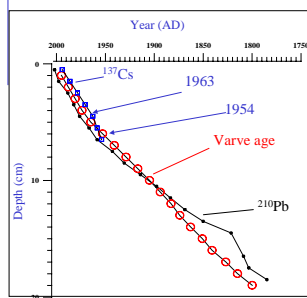
We reported a special type of lamination recorded in the sediments of Lake Xiaolongwan, northeastern China. The lamination consists of light- and brown-colored laminate couplets in the thin sections. The brown colored layer composes of entirely dinoflagellate cysts. The light colored layer consists of organic matter (plant detritus, diatoms, chrysophyte cysts) and clastics. Preliminary sediment trap results show that distinct peak of dinocyst flux occurred in November. The dinocyst flux reaches its absolute maximum of 1.0×10^6 cysts $m^{-2} d^{-1}$ in the November of 2004, which takes up 57% of total dinocyst flux of the whole year. The dinocyst flux maximum also corresponds to the peaks of diatom flux and chrysophyte stomatocyst flux in the November. They suggest red tides blooms occur in this freshwater lake. We speculated that the dinocyst flux maximum could be related to autumn overturn for both carrying abundant nutrients, and cysts for germination from the lake bottom. Additionally, it may also attribute to increasing dissolved organic matter after forest defoliation. Independent chronology data derived from ¹³⁷Cs and ²¹⁰Pb show a good agreement with counting laminations. Based on the lamination formation interpreted from the sediment trap data and independent chronology data, the dinocyst laminations are annually laminated, probably could be called as dinocyst varves. However, it is difficult to relate these cysts to their parent species for no enough feature of the cysts. We speculate that these cysts probably have affinities with species of *Peridinium*. Detailed investigations (cyst germination experiment, monthly water chemistry etc.) should be carried out to understand dinoflagellate bloom in this freshwater lake. The dinocyst laminations provide us an uncommon archive for understanding why and how certain species periodically bloom continuing several thousands years.



A: Catchment of Xiaolongwan Lake
B: Bathymetry of the Lake, and coring, sediment trap sites

Water temperature data of Lake Xiaolongwan from April 2004 to May 2005 (interpolated isotherms in degrees centigrade, dots mark temperature profile).

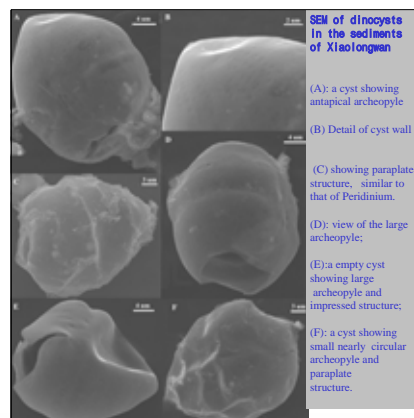
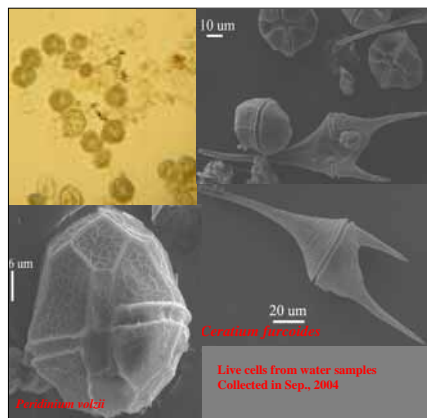
Coring problem in the lake and method



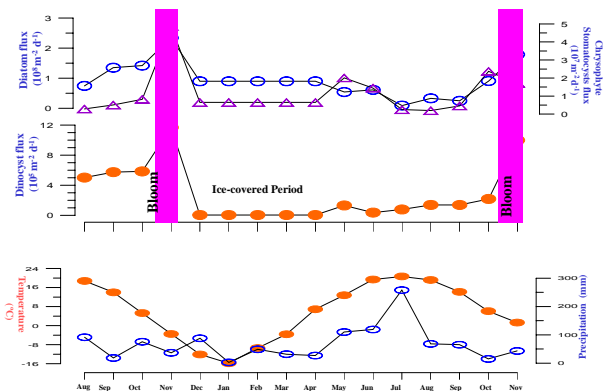
Preliminary dating Result

Dinocyst varves

Who is the parent species of these cysts?



SEM of dinocysts in the sediments of Xiaolongwan
(A): a cyst showing antapical archeopyle
(B) Detail of cyst wall
(C) showing paraplate structure, similar to that of *Peridinium*.
(D): view of the large archeopyle;
(E): a empty cyst showing large archeopyle and impressed structure;
(F): a cyst showing small nearly circular archeopyle and paraplate structure.



Monthly fluxes from sediment traps and variations of temperature and precipitation



Thank you !