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

Quong Ang Chu1, Rui Bo1, Andrés Boltovskoy3, Liu Qiang1, Qing Sun2, Jintai Han1, and Jia Li1

1 Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China;
2 The Geological Analysis Center, Beijing, China;
3 Departamento Científico Ficología Museo de La Plata Paseo del Bosque 1900 La Plata Argentina.

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 comprises 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 $1.0 \times 10^6$ 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 $^{137}$Cs and $^{210}$Pb 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 firewater lake. The dinocyst laminations provide us an uncommon archive for understanding why and how certain species periodically bloom continuing several thousands years.

Who is the parent species of these cysts?

- *Ceratium furcoides*
- *Peridinium volzii*

Live cells from water samples Collected in Sep., 2004

Monthly fluxes from sediment traps and variations of temperature and precipitation

Preliminary dating Result

Dinocyst varves

Thank you!