A high resolution record of heavy metal deposition in sediment core, White Lake, New Jersey, USA

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Heavy metals in lake sediments whether retain all information of those elements, or only a small fraction of deposition records. In particular mercury and lead are typical global scale contaminants, due to the dominance of the atmospheric transport, and the relatively long residence time of these elements in the atmosphere. Here, we take used of the factor scores (natural and anthropogenic source) and enrich factors of mercury and lead for sediment core at WL3-2, White Lake, New Jersey and try to establish a high resolution record of heavy metal deposition at regional to global scales. The results presented here are in general agreement with atmospheric deposition records (ice core, peat bog) from American and Europe (Fig 1).

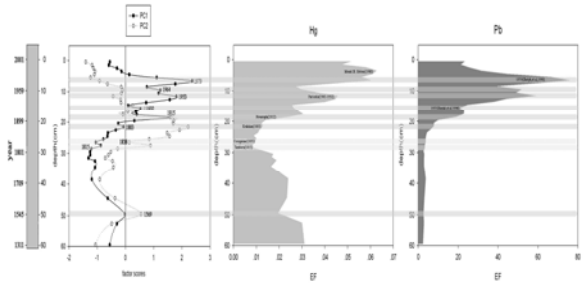

Figure 1 Timeline of main pulses of heavy metal observed in the sediment core and their interpreted sources and referred to in the text.

The heavy metal deposition records in North-east USA are obtained by studying the sediment record in White Lake. The time sequence of heavy metal deposition records are established and their characteristics are also showed respectively. Especially, our lake deposition records share the synchronous characteristics with many other atmospheric deposition records in North America and Europe. The deposition records also show many deposition events of heavy metal in history, and we believed most of these events are related with volcano eruption, the activities of human being.

Holocene phototrophic history and monsoon evolution of Qinghai Lake: Evidence from diffuse reflectance spectrophotometry

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Lake sediments contain important biological and geochemical information, which can be used as proxies of paleoenvironment, paleoecology and paleoclimatology. As biomarkers of lacustrine phototrophic production, sedimentary pigments contain information of climatic and environmental changes. We have demonstrated that diffuse reflectance spectroscopy (DRS) can be used as a rapid and quantitative tool to measure the phototrophic pigments chlorophyll-a (670 nm), phycocyanin (620 nm) and bacteriochlorophyll-a (Bchl-a)(850 nm). The changing abundances of chlorophyll-a, phycocyanin and bacteriophaeophytin-a (Bph-a) may indicate the evolution of algal blooms and the productivity of anoxygenic phototrophic bacteria (APB) in Qinghai Lake. Both the algal and APB blooming events are correlated with the enhanced freshwater influx. We suggest that solar insolation sets the stage for the blooms through its control over monsoon temperature and rainfall as well as nutrients. The blooms of algal and APB in Qinghai Lake appear as discrete centennial-scale monsoon events likely linked to solar activities. Our results indicate the superimposition of solar induced century-scale warming events on orbital climate changes, and highlight the need to improve our understanding of the role of sudden centennial events in the anthropogenic climate change both in the past and future.