

Last ca 2500 Yr History of the Harmful Algal Blooms in South China Reconstructed on Organic-Walled Dinoflagellate Cysts

Authors : Anastasia Poliakova

Abstract : Harmful algal bloom (HAB) is a known negative phenomenon that is caused both by natural factors and anthropogenic influence. HABs can result in a series of deleterious effects, such as beach fouling, paralytic shellfish poisoning, mass mortality of marine species, and a threat to human health, especially if toxins pollute drinking water or occur nearby public resorts. In South China, the problem of HABs has an ultimately important meaning. For this study, we used a 1.5 m sediment core LAX-2018-2 collected in 2018 from the Zhanjiang Mangrove National Nature Reserve (109°03'E, 20°30'N), Guangdong Province, South China. High-resolution coastal environment reconstruction with a specific focus on the HABs history during the last ca 2500 yrs was attempted. Age control was performed with five radiocarbon dates obtained from benthic foraminifera. A total number of 71 dinoflagellate cyst types was recorded. The most common types found consistently throughout the sediment sequence were autotrophic *Spiniferites* spp., *Spiniferites hyperacanthus* and *S. mirabilis*, *S. ramosus*, *Operculodinium centrocarpum* sensu Wall and Dale 1966, *Polysphaeridium zoharyi*, and heterotrophic *Brigantedinium* ssp., cyst of *Gymnodinium catenatum* and cysts mixture of *Protoperidinium*. Three local dinoflagellate zones LAX-1 to LAX-3 were established based on the results of the constrained cluster analysis and data ordination; additionally, the middle zone LAX-2 was derived into two subzones, LAX-2a and LAX-2b based on the dynamics of toxic and heterotrophic cysts as well as on the significant changes (probability, $P=0.89$) in percentages of eutrophic indicators. The total cyst count varied from 106 to 410 dinocysts per slide, with 177 cyst types on average. Dinocyst assemblages are characterized by high values of the dust-depositional degradation index (kt) that varies between 3.6 and 7.6 (averaging 5.4), which is relatively high and is very typical for the areas with selective dinoflagellate cyst preservation that is related to bottom-water oxygen concentrations.

Keywords : reconstruction of palaeoenvironment, harmful algal blooms, anthropogenic influence on coastal zones, South China Sea

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