

Source apportioning of sedimentary PAHs in an urban reservoir by combined compound-specific radiocarbon analysis and petroleum-biomarker analysis

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Introduction

This study demonstrates an application to source apportioning of PAHs in an urban reservoir by using combined the PAHs-specific radiocarbon analysis and petroleum biomarker analysis. Sediment core of 40cm was collected in the Sakurada Moat of the Imperial Palace, Tokyo. The main focus in this study is to exactly reconstruct source-dependent PAHs inputs in order to examine a long-term impact and persistence of sedimentary PAHs in the environment.

Results & discussion

Direct source apportionment of PAHs from fossil carbon and modern carbon was carried out by using advanced chemical technique known as compound-specific radiocarbon analysis (Eglinton *et al.*, 1994). The results of PAHs-specific radiocarbon analysis demonstrated that sedimentary PAHs in the urban reservoir were mostly derived from fossil fuel combustion throughout the core (values of fM [fraction of modern carbon] ranged from 0.06 to 0.21; Kanke *et al.*, submitted).

However, this technique could not delineate specific sources to produce PAHs i.e. petroleum, coal and so on. To better understand detailed PAHs source signature in the moat sediment, GC/MS analysis of triterpanes, known as petroleum biomarker, to trace petroleum source input was examined. ΣPAHs concentration to Σtriterpanes concentration ratio (ΣPAHs/Σtriterpanes ratio) in the Sakurada Moat had an increasing trend with depth and maximized at bottom section of the core. These results suggested that a dominant source of PAHs to the Sakurada Moat might be non-petroleum-related products (such as coal combustion) in around 1950s. Our results showed that combined PAHs-specific radiocarbon analysis and petroleum-biomarker analyses are a powerful tool to contribute to detailed source identification of PAHs.

More detailed data will be presented in the conference.

Ion-microprobe U-Pb age of Neoproterozoic phosphorite from South China

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Material

Direct ion-microprobe U/Pb dating using SHRIMP II was performed on phosphorite specimens collected from the Neoproterozoic Doushantuo Formation in the Sinian type section (Yangtze Gorge area, Hubei, South China). The analyzed specimens are laterally extensive phosphorite nodules consisting of rounded oolitic grains, which was precipitated from PO₄³⁻-rich seawater over a relatively short time. Preservation of delicate microbial structures indicates that the phosphorite has not been subjected to serious diagenetic alteration.

Results

Analysed 21 areas (30-µm diameter) on the apatite cortexes were selected referring X-ray back-scattering images to avoid intragranular impurities. The results yielded a total Pb/U isochron age of 751±57Ma (2σ; MSWD = 1.4).

Discussions

The age is significantly older than a recent date for stratigraphically equivalent phosphorite-bearing strata at Weng'an (Guizhou province, ca. 600Ma; Barfod *et al.*, 2002), which contain the oldest occurrence of well-preserved multicellular animals. The Neoproterozoic phosphorite-bearing strata in South China block are not coeval stratigraphic units. The age difference may result in a more-evolved fossil assemblage in the Weng'an section. Our results also address global correlation of the Sinian glaciation, and supports correlation with the Sturtian glaciation stage that has been suggested by paleomagnetic studies (e.g., Evans *et al.*, 2000). Although the Neoproterozoic of the South China block contains important records of animal evolution, problems of stratigraphic correlation remain. For this purpose the method used here is applicable to Neoproterozoic phosphorite-bearing strata with unknown ages.

References

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