Sedimentary records of mercury in the Okinawa Trough during the late Pleistocene

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A millennial-scale paleoceanogrpahic record of the Okinawa Trough for the last 20,000 years was reconstructed based on variations in total mercury (THg) concentrations of the core sediments. THg concentrations showed a relatively wide range (40~350 ng/g) throughout the core, and dramatically increased upward from the bottom of the core, especially with an abruptly large increase at the core depth of ca. 100 cm. Such variations can be divided into three distinct intervals (Unit I, II and III), reflecting major paleoceanographic changes during the late Pleistocene. It might be associated with a systematic development of Kuroshio Current in East China Sea (ECS), coupled with the sea-level changes. Unit I (~20–15 ka), corresponding to the low sea-level stands, was characterized by constant and low THg concentrations, implying most of sediments were derived from the Changjiang and/or paleo-Huanghe, and further the Kuroshio Current was still absent in this area. A relatively high THg concentrations in Unit II sediments (15–9.4 ka) revealed the input of some mercury from the southerm Okinawa Trough with several active hydrothernal fields, with the inflow of Kuroshio Current. Unit III sediments (9.4 ka–Present) were characterized by the highest THg concentrations with some fluctuations. During this period, a significant sea-level rise and gradual landward retreat of river mouths led to decrasing terrigeneous sediments from mainland China rivers into the trough [1]. Accoridnlgy, such promiant high THg concentrations in Unit III were largely associated with fully evolved Kuroshio Current and/also low terrigeneous sediment input (i.e., low sedimentation rate). Interestingly, an abrupt decrease at approximately 4-5 ka appeared to have been caused by a decrease in input of mercury from the southern area of the trough in association with a suppression of the Kuroshio Current. Consequently, sedimentry mercury might be useful proxy for better understanding and reconstructing the paleoceanographic changes in ECS shelf, especially with related Kuroshio Current evolution.

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