

## Paleoceanographic change in the western North Pacific during MIS 20-18 based on Mg/Ca-temperature, oxygen and carbon isotope records from Chiba composite section deposited in Boso Peninsula, southeastern part of Japanese islands

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Marine Isotope Stage (MIS) 19 is one of the analogues for the present interglacial period in terms of orbital parameter: low-amplitude precessional insolation variability modulated by the 413-kyr eccentricity cycle. Thus, knowledge of natural climate variability during the time period between MIS 20 to 18 helps to understand the future climate change.

The Kuroshio Current, a western boundary current in the North Pacific, transports warm saline waters from low- to high-latitude and thus plays a crucial role in heat transport in East Asia. Previous studies revealed high SST variability during the last 144 ky off central Japan, with peak SSTs during early MIS 1 and the MIS 5a/4, 5c/5b and 5e/5d transitions, primarily caused by the latitudinal shift of the Kuroshio–Oyashio Currents.

Here, we present Mg/Ca-based temperature, and oxygen and carbon isotope ( $\delta^{18}\text{O}$ ,  $\delta^{13}\text{C}$ ) records of planktic foraminifers *Globigerina bulloides* and *Globorotalia inflata* in Chiba composite section and reconstruct gradients of surface and intermediate water temperature ( $\Delta T$ ) and vertical  $\delta^{13}\text{C}$  ( $\Delta \delta^{13}\text{C}$ ). Compared to Oyashio water, the Kuroshio is characterized by more oligotrophic, stratified with warm surface water. Therefore, the high  $\Delta \delta^{13}\text{C}$  and  $\Delta T$  with warm surface water suggest the increase in the Kuroshio influence. The results indicate that both  $\Delta \delta^{13}\text{C}$  and  $\Delta T$  increased during the transition from MIS 20 to 19, which suggests the increase in influence of the Kuroshio water. The  $\delta^{18}\text{O}$  of *G. bulloides* shows low values with high amplitude still in the late MIS 19, suggesting the warm surface water. This further suggests the strong influence of the Kuroshio water, which is also supported by relatively high  $\Delta \delta^{13}\text{C}$ ,  $\Delta T$  and microfossil assemblage. A recent study based on grain size analyses from Loess- palaeosol sequence in northern China suggest weak East Asian winter monsoon and Siberian High during late MIS 19, triggered by a very weak precessional insolation minimum leading to warm summer conditions unfavorable to Northern Hemisphere ice-sheet build-up at the inception of each of MIS 20, MIS 18. This study suggests that the strong Kuroshio Current during late MIS 19 might have played a crucial role in enhancement of poleward heat transport that helped to warm up the middle to high latitude and suppress the development of Siberian High.

Keywords: Chiba composite section, Kuroshio, East Asian winter monsoon