

Influences of East Asian summer and winter monsoons on the millennial-scale color alternation of Japan Sea sediment

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Millennial-scale total organic carbon (TOC) content in the Japan Sea sediments is characterized by the Dansgaard-Oeschger (DO) event like variability. The DO-like pattern of TOC is thought to reflect the East Asian summer monsoon induced productivity and stratification change. However, TOC content is also influenced by changes in the oxygen content of the bottom water. Here, we conducted Br measurement of two sediment cores retrieved from close sites with different depth, 400 and 850 m water depths, off the Wakasa Bay in the southern Japan Sea. The deeper sediment core (WB6: 850 m) shows clear dark-light color alternations, and parallel laminations are observed in some dark layers. On the other hand, the shallower sediment core (WB4: 400 m) shows gradual color change and no lamination is observed throughout the core. Since the analyzed Br/Ti shows a strong positive correlation with the marine organic carbon (MOC) contents estimated by TOC and their carbon isotope, we use Br/Ti as a MOC content proxy. The MOC contents of two sediment cores show generally similar variations but details are not similar. The WB6 shows a larger MOC amplitude and higher frequency fluctuation than that of WB4. We infer that the MOC change in the shallower WB4 core mainly reflects primary productivity because no anoxic condition is indicated by sediment structures and that in the deeper WB6 core is influenced by both productivity and oxygen level of the bottom water, which is regulated by ventilation due to winter cooling. Since the MOC fluctuation of WB6 is more similar to the Greenland ice core isotope record than WB4, it is suggested that the MOC variation (alternation of dark and light color) in the deeper Japan Sea sediment is caused by both East Asian summer and winter monsoon variations.

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