# Millennium scale paleoceanographic changes in high sedimentation IMAGES core MD01-2412 in the southwestern part of the Sea of Okhotsk

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The Sea of Okhotsk is the area of sea where the sea ice is formed in the lowest latitude in the Northern Hemisphere. The formation of the sea ice is thought to influence the climate of the northwestern Pacific Ocean and the production of the north Pacific intermediate water so that it may be involved in the formation of sea ice concerning with low temperature, high salt, high dissolved oxygen concentration. On this point of view, it is very important of the elucidation of change in the sea ice in the long time scale in the Okhotsk Sea for understanding of climatic changes in the high latitude of Pacific Ocean. We focused on paleoceanographic changes during 100 ka near Shiretoko Peninsura in the southeastern part of Okhotsk, where seasonal changes of surface currents are very obvious in the present, expecting amplified climatic and oceanographic changes recoded in the sediment core. In this presentation, we will review age model of IMAGES-MD01-2412 core and major topics of our research. Recovered core was the second longest core by the R/V Marione France. Age of bottom of core was estimated at about 100 ka, so that time resolution of the record will be expected very high.

# Carbon isotope record of kerogen from ~2.7 Ga Tumbiana Formation, Western Australia

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The ~2.7 Ga Tumbiana Formation is characterized by wide occurrence of oxygenic stromatolites [1] and anomalously $^{13}$C-depleted kerogen (<–40‰) in the carbonate rocks [2]. It has been hypothesized that the onset of oxygen release resulted in the appearance of $O_2$-dependent methanotrophy, which would have produced the isotopic anomaly [2]. In order to reconstruct the biological activity at that time, it is necessary to investigate stratigraphical and petrographical distributions of the isotopic anomalies. Organic and carbonate carbon isotopic analyses of various lithologies were performed for 2.8 to 2.6 Ga Fortescue Group, Pilbara craton, Western Australia. The organic carbon shows wide range of $\delta^{13}C$ values from –10.3 to –51.9‰. This variation is closely related to the lithology of the host rock. In the Tumbiana Fm., organic carbon in siliceous mudstones (average $\delta^{13}C_{org}$: –48%) is more depleted in $^{13}$C by ~10‰ than those in cross-laminated sandstones (average $\delta^{13}C_{org}$: –39%) of the same stratigraphic horizon. Similar difference is also observed in a single hand specimen, which consists of alternation of rippled sandstones and mud drapes. This indicates the presence of two distinctive sources of organic carbon. One is highly depleted in $^{13}$C (up to –50‰), suggesting its methanotrophic origin. The other is possibly derived from photoautotrophs. Further, in spite of the isotopic heterogeneity in each horizons, the $\delta^{13}C_{org}$ values of mudstones and cherts seem to change systematically through the entire Fortescue Group. The $\delta^{13}C_{org}$ values of about –24‰ suddenly decrease down to –51‰ at a middle horizon of the Tumbiana Fm., and gradually increase up to –33‰ toward the Marra Mamba Iron Fm. This trend may correspond to the appearance of methanotroph, and decrease of its activity.

**Reference:**

[1] Buick 1992, *Science* 255, 74-77; [2] Hayes 1994, in *Early Life on Earth*, 220-236