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東シナ海表層水の Ba/Ca 比と塩分との関係
A relationship between seawater Ba/Ca ratio and salinity in surface waters in the East China Sea

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Planktonic foraminifera Ba/Ca ratio has been discussed as a paleo-salinity proxy (e.g., Lea and Spero, 1994; Honisch et al., 2011). An advantage of this proxy is that Ba^{2+} incorporation into living planktonic foraminifera shells is linearly dependent on [Ba^{2+}] in the water, with a constant partition coefficient for Ba (D_{Ba} = 0.15), independent of environmental parameters such as temperature, salinity, and pH. Applying this proxy to estimate past sea surface salinity requires a modern relationship between seawater Ba/Ca and salinity. In addition, single source for river water might be a prerequisite to make a binary mixing of river waters with high [Ba^{2+}] and saline seawater with low [Ba^{2+}]. The Changjiang River accounts for about 90% of the total river discharge in the East China Sea (ECS). Therefore, it is considered that planktonic foraminifera Ba/Ca ratio can be used to estimate paleo-salinity proxy in the ECS.

In this study, we collected surface seawater samples (upper 100 m depth) in the Yellow Sea and the ECS during KH13-4 cruise in early July 2013 (*R/V Hakuho-Maru*), and investigated a relationship between seawater Ba/Ca ratio and salinity in the ECS. Seawater samples were filtered by 0.2 μm membrane filter onboard. Ba/Ca ratios were measured by an isotope dilution method using ICP-MS (HP4500). Analytical precision of Ba/Ca ratio was 0.9%.

Seawater Ba/Ca ratios were strongly correlated with salinity although the Yellow Sea and the ECS represented different regression lines. Freshwater sources in the Yellow Sea represented higher [Ba^{2+}] than the freshwaters in the ECS. In the eastern part of the ECS (i.e., northern Okinawa Trough) where the eastward flowing Changjiang diluted water mixes with the Kuroshio water, we found the following relationship between seawater Ba/Ca and salinity: Ba/Ca (μmol mol-1) = 36.0 — 0.95×salinity (r^2 = 0.87, 0-30 m, 33-34.5 psu). We will also present planktonic foraminifera Ba/Ca ratios of core-top ECS sediments, and discuss the possibility of using shell Ba/Ca ratios as an independent paleo-salinity proxy in the ECS.

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