

New Mg/Ca calibration for bottom water temperature by benthic foraminifera *Uvigerina akitaensis*

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To clarify the past bottom water temperature is important for understanding the global thermohaline circulation and the roles of bottom water as a sink of atmospheric CO₂. However it is still not succeeded to know the past bottom water temperature because existing calibration by magnesium-calcium ratio (Mg/Ca) of benthic foraminifera are applied for relatively shallower water depths and higher temperature (~5 degree C). It is needed to make calibrations in lower temperature ranges to know the small changes of bottom water temperature.

The benthic foraminiferal genus *Uvigerina*, is known as an infaunal species. This genus is widely distributes in the world ocean basins and has been used for paleoceanographic reconstructions. In the western Pacific, *Uvigerina akitaensis* (Asano) frequently occurs in the Japan Sea, western North Pacific and adjacent oceans. This species lives in cold water range of 0 - 5 degree C, therefore it should be useful to make calibration in lower temperature. We focused on this species and analyzed Mg/Ca to establish the calibration equation for bottom water temperature.

Surface sediment samples were collected 30 stations from the Japan Sea (off Niigata, Akita, Okushiri, Ishikari, and Soya) and Pacific ocean (off Tokachi and Erimo) by the Grab sampler during the cruise of the Hakurei-Maru (GH90 - GH03 cruises) of the Geological Survey of Japan. The shells of *U. akitaensis* were cleaned by oxidative chemical treatments and were analyzed trace metal analysis by HR-ICP-MS.

Mg/Ca of *U. akitaensis* were 0.65 ~1.03 mmol/mol in bottom water temperature range of 0.4 ~4.3 degree C. Mg/Ca values increased about 0.09 mmol/mol with 1 degree C and a weak exponential relationship was observed between temperature and Mg/Ca. As the results, we concluded that Mg/Ca of *U. akitaensis* was useful tracer for bottom water temperature in the western North Pacific.