

## Late Pliocene-early Pleistocene paleoceanographic evolution of the Sea of Japan

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The stratigraphic distribution of molluscs and planktonic foraminifera within a sixth-order depositional sequence of the early Pleistocene Omma Formation in central Japan provide several information on the Sea of Japan since 2.5 Ma. During substage I (2.5-1.71Ma, oxygen isotope stage 60/59), cold northern surface water prevailed due to the closure of the sea's southern entrance. During substage II (1.71-1.52 Ma, stage 51), the warm Tsushima Current flowed into the sea from the south during interglacial highstands. During substage III (1.52-0Ma), isolation of the Sea of Japan was reinforced by narrowing and/or shallowing of the northern entrance. These changes were caused by some local tectonic movements that affected topography of the southern and northern straits.

The stratigraphic distribution and abundance of molluscs and planktonic foraminifera within a sixth-order (41-k.y.) depositional sequence of the early Pleistocene Omma Formation in central Japan provide several important information on the Sea of Japan since 2.5 Ma. The sea possibly experienced three substages in the paleoceanographic history since then. During substage I (2.5-1.71Ma, oxygen isotope stage 60/59), cold northern surface water prevailed due to the closure of the sea's southern entrance. During substage II (1.71-1.52 Ma, stage 51), the warm Tsushima Current flowed into the sea from the south during interglacial highstands. During substage III (1.52-0Ma), isolation of the Sea of Japan was reinforced by narrowing and/or shallowing of the northern entrance. These changes were caused by some local tectonic movements that affected topography of the southern and northern straits. Inflow of the Tsushima Current resulted in migration of warm-water organisms into the Sea of Japan during interglacial stages, and acted as a barrier to the migration of terrestrial organisms between East Asia and Japanese Islands.