Planktonic foraminiferal assemblage and paleoceanography of the Plio-Pleistocene sequence at IODP Site U1499 in the northern South China Sea

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The South China Sea (SCS) is a marginal sea located in the tropical zone of the western Pacific with an average depth of ca. 1,140 m. The East Asian monsoon affects the climate system in this area by the prevailing seasonal winds. Such influence of the East Asian monsoon is expected to be stronger during the glacial period and weaker during the interglacial period.

During Internatinal Ocean Discovery Program (IODP) Expedition 367, drilling of Site U1499 was conducted near the outer shelf of the northern SCS in 2017. As an onboard result of this site, sediments from Oligocene to Present were recovered and the upper sequence especially contains abundant foraminiferal fossils. The purpose of the present study is to clarify temporal changes of planktonic foraminiferal assemblage in the northern SCS from approximately 4 to 1 Ma.

As a result, 80 species belonging to 19 genera of planktonic foraminifera were detected. According to multivariate analyses of the foraminiferal assemblage, we determined the temporal change into four stages: Stage A (ca. 4.1 to 3.4 Ma), Stage B (ca. 3.4 to 1.8 Ma), Stage C (ca. 1.8 to 1.45 Ma) and Stage D (ca. 1.4 to 1 Ma). During Stage A, SCS had been stratified by oligotrophic tropical surface water and relatively cold subsurface water with a shallow thermocline. At the next Stage B, the thermocline was deepened and SCS was occupied by a subtropical oligotorophic water. In turn, the thermocline shoaled and subsurface species of planktonic foraminifera were increased during the Stage C. After that, the Stage D is characterized by alternative changes between subtropical surface components and cold-temperate components caused by the glacial-interglacial changes.

Keywords: South China Sea, Planktonic foraminifera, Pliocene, Pleistocene, International Ocean Discovery Program