

Quaternary Paleoceanography and Global Climatic Change in Choshi Region, Boso Peninsula: Physical Property Implications

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We have studied the high sedimentation hemipelagic mudstone, at the margin of the tectonically active Kazusa forearc basin, to test the Milankovitch control on the physical property record, where this succession was deposited during the globally recognized glacial-interglacial cycles. For this study, a scientific drilling was conducted in hemipelagic mudstone in Choushi, and a 250-m core was recovered. The study involved a high resolution MST and downhole logging records, in combination with facies analysis of the core. The physical property record of hemipelagic mudstone reveals the possibility of Milankovitch control, in many orbital parameters, but for reliable correlation with global climatic change we still need chronostratigraphic control for this succession.

During the Plio-Pliocene movement, a forearc basin developed in the Boso peninsula, in response to the subduction of the Pacific and Philippine sea plates beneath the Eurasia plate. At the center of the basin, a terrigenous succession up to 3-km-thick of the Kazusa group was deposited. The glacio-eustasy has been shown to be the prime control on the sediment accumulation of the middle Kazusa group (Pickering et al., 1999). Lithology at the northern margin of the basin at Choushi is quite different from the main part of the Kasuza Basin. It is a hemipelagic mudstone with high sedimentation rate, deposited during the globally recognized glacial-interglacial cycles; stage 21 to the present, which offers the opportunity to link and correlate the physical properties records with climatic change, in a tectonically active forearc basin. In order to test the Milankovitch control on the physical property record, a high-resolution study for physical properties and facies analysis were carried out.

For this study, the drilling of a borehole in Choushi was conducted, and 250-m core was recovered. The physical property measurements include: downhole geophysical logging (natural gamma ray, electrical resistivity, density, and caliper logs (at 5-cm interval); Multi-sensor-track (MST), where GRAPE density, and magnetic susceptibility were measured at 2-cm intervals on the whole-round core. On the working halves of the core, color was measured by computerized colorimeter (2-cm interval), and volume and density were measured by using a high precision and fully automatic density analyzer. Index properties (grain density and porosity) were calculated. Sand fraction was microscopically studied for provenance. Seismic profiling off Boso Peninsula will be conducted to integrate drilling data with seismic stratigraphy. The physical property record of hemipelagic mudstone reveals the possibility of Milankovitch control, in many orbital parameters, but for reliable correlation with global climatic change we still need chronostratigraphic control for this succession.