Chronostratigraphy and depositional environments around the boundary between the Miura and Kazusa groups (Pliocene–Lower Pleistocene) on the northern Miura Peninsula, Pacific side of central Japan

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Abstract

This study presents the chronostratigraphy and depositional environment around the boundary between the Mio-Pliocene Miura Group and the overlying Plio-Pleistocene Kazusa Group, forearc basin fills on the northern Miura Peninsula, Pacific side of central Japan. The upper part of the Ikego Formation (Pliocene) composing the uppermost Miura Group consists mainly of tuffaceous sandy mudstone (90 m in the maximum thickness). The Urago Formation (Pliocene to lowermost Pleistocene) composing the lowermost Kazusa Group attains 230 m in the maximum thickness and consists of the sandstone-dominated (5–30 m in thickness) and muddy sandstone-dominated facies (20–60 m in thickness). According to correlation of the tuff beds, the eleven key tuff beds are intercalated in the both Urago and upper part of Ikego formations.

Last occurrence datum (LO) of *Sphenolithus* spp. (3.65–3.52 Ma) and LO of *Discoaster tamalis* (2.87–2.80 Ma) were determined within the upper part of the Ikego Formation, and the latter datum plane was also recognized within the lower part of the Urago Formation, which is consistent with the correlation of the tuff beds.

Above LO of *D. tamalis* in the Urago Formation, LO of *Discoaster surculus* (2.54–2.49 Ma), KGP tephra (ca. 2.5 Ma) and LO of *Discoaster pentaradiatus* (2.51–2.39 Ma) were also recognized in ascending order. With magnetostratigraphy, the nine horizons of normal polarity and the one horizon of reverse polarity in LO of *D. tamalis* of the Ikego and Urago formations are applied to the Gauss Chronozone (3.60–2.58 Ma) and either the Mammoth (3.33–3.21 Ma) or the Kaena (3.12–3.03 Ma) subchronozones, respectively. In addition, there are the two horizons of normal polarity and the one horizon of reverse polarity above LO of *D. tamalis* in the Urago Formation, in ascending order, which represents the boundary between the Gauss and Matuyama chronozones (2.58 Ma).

As a result, the Urago Formation conformably overlies the Ikego Formation because both of the formations are partly time-equivalent as indicated by the same tuff beds and LO of *D. tamalis* recognized in the both formations. The conglomerate beds that used to be considered as the basal conglomerate beds on the the Kurotaki Unconformity (3.0 to 2.4 Ma), are limited in the lateral distributions and apparently intercalated in the different horizons.

Molluscan fossils were sampled from three localities of the Urago and the overlying Nojima formations. The obtained molluscan fossils are characterized by deep-water species, such as *Ginebis japonicus*, *Phanerolepida transenna*, *Profundinassa babylonica*, *Limopsis tajimae* and *Halicardia nipponensis.* Some of these fossils occur sporadically in the bioturbated muddy sandstones, which suggest that they are autochthonous. The paleobathymetries are estimated using the

bathymetric ranges of habitats where extant species of the autochthonous ones are living: the Urago and Nojima formations were deposited at the water depth of 400–600 m and 400–500 m, respectively. The bathymetric estimation of the Urago Formation is deeper than the previous estimation based on the benthic foraminiferal assemblage (30–200 m), probably because more than a little amount of shallow-water-derived benthic foraminifers had been reworked into the sandy deposits of the Urago Formation. According to the paleobathymetry of the Ikego Formation (500–2000 m) estimated previously from the benthic foraminiferal assemblage, there is not significant paleobathymetric difference among the Ikego, Urago and Nojima formations. As conclusions of this study, the Miura and Kazusa groups would have been successively deposited in upper-slope environment with less lack of deposits in the Miura Peninsula region during the formation of the Kurotaki Unconformity in the Boso Peninsula region.