

Detailed litho-stratigraphy and sedimentary environment of upper part of Kokumoto Formation with the L-M Pleistocene boundary: the Chiba section, Central Japan

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The Lower -Middle Pleistocene Kazusa Group, deposited on mainly bathyal -shelf in the Pacific Ocean with many kind of fossils, distributes widely in Boso peninsula. The Kazusa Group exposes continuously along Yoro river, Chiba section, type section of the group. The Kazusa Group consists of Kurotaki Formation (mainly tuffaceous gravelly sandstone), Katsuura F. (mainly alternation of sandstone with slump bed), Namihana F. (mainly siltstone with slump bed), Ohara F. (muddy alternation of sandstone and siltstone), Kiwada F. (muddy alternation of sandstone and siltstone with slump bed), Otadai F. (alternation of sandy alternation and muddy alternation of sandstone and siltstone), Umegase F. (mainly sandy alternation of sandstone and siltstone), Kokumoto F. (alternation of thick siltstone and sandy alternation of sandstone and siltstone), Kakinokidai F. (sandysiltstone with sandstone) and Chonan F. (alternation of thin sandstone and thin siltstone) in ascending order (Mitsunashi et al., 1959). Total thickness of the Kazusa Group is over 2,000 meters with over 50 marker tephra beds. Tapid depositional rates of 2.0-2.5 m/ky are obtained for the Kazusa Group. Therefore the Chiba section have high potential for international stratotype section (Kazaoka et al., 2015).

Kokumoto Formation, about 350 meter thick, is composed of the lowermost part, the lower part, the upper part and the uppermost part in ascending order. The lowermost part, about 60 meter thick, consists of thick siltstone with thin sandstone bed and marker tephra, Ku6 and ku5. The lower part, about 120 meter thick, consists of sandy alternation of sandstone and siltstone with Ku3 tephra. The upper part, about 80 meter thick, consists of thick siltstone with thin sandstone and marker tephra (Byakubi zone (Byk-G, Byk-F, Byk-E, Byk-D, Byk-C, Byk-B and Byk-A), Koss2, Koss1-B, Koss1-A, Kosp-C, Kosp-B, Kosp-A, Tap-B, Tap-A, Tas-C, Tas-B, Tas-A, Ku2 and Ku1). Especially maker tephra are interbedded every 0.1-7.0 ky in the thick siltstone from Byk-E to Ku2 horizon. The Matuyama-Brunhes boundary is between Byk-C and Byk-B. Uppermost part, about 90 meter thick, consists of sandy alternation of sandstone and siltstone with Ku0.1 tephra.

The upper part, thick siltstone, is interbedded with thin, 1-3cm thick, sandstone every 0.3-3 m thick and thin, 1-5 cm thick, sandysiltstone every 0.1-0.25 m thick without slump bed and thick mudflow bed. The siltstone have bathyal and sublittoral benthic foraminifera and many trace fossils. Grain size distribution in the siltstone have bimodal grain group (Nishida et al., 2015). Main grain group is composed of fine silt and sub group consists of very fine sand. These characteristics show hemipelagic sedimentary environment in deep sea and very fine sand flow often into, namely deep sea slope. The thickness from Byk-G to Byk-A change little laterally in the central part of Boso Peninsula. This show that the fracks deposited approximately uniformly. It is presumed that clastic sediments were supplied little around here from source mountain area, because this horizon is warm stage, MIS 19.

Keywords: L-M Pleistocene boundary, Kokumoto Formation, Kazusa Group, Maker Tephra, Byk-E, MIS 19