

## Late Cretaceous sea-level changes and tectonic history recorded in the forearc sedimentary successions of the Northeast Japan

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Elucidating tectonic history of the Cretaceous East Asian continental margin provides us essential information to understand the origin of modern Japanese islands and paleo-biogeography of terrestrial fauna and flora, with implications for connection with the Eurasia continent. One of the keys to reconstruct the geologic history of the NE Japan is the Upper Cretaceous to Paleogene siliciclastic sedimentary successions that filled a N-S trending large fore-arc basin (the Yezo forearc basin) along the Pacific margin. The Futaba, Kuji, and Yezo groups are known as representative strata among these successions, and have been well studied. Especially the Kuji and Futaba groups were accumulated in shallow-marine and non-marine environments, and their facies changes were reflected by relative sea-level changes attributed to global eustasy and regional tectonic uplift/subsidence. The previous studies for these two groups, however, have not fully made it clear that the observed depositional changes were derived from local tectonic effects or global eustatic sea-level changes due to lack of precise age controls. To address this issue, here we provide the latest age model of the Kuji Group and partly revised regional sequence stratigraphic correlation. Comparing our age-calibrated depositional sequences of the Kuji Group with an available global sea-level reconstruction would separate the influence of eustasy from that of regional tectonics which formed the Yezo forearc basin sedimentary successions.

The Kuji Group is distributed along the northeastern coastal area of the Iwate prefecture. The group mainly comprises sandy siltstone, coaly mudstone, sandstone and conglomerate, with intercalated coal and felsic tuff beds. The total thickness is over 700 m. It unconformably overlies the pre-Cretaceous accretionary complex and lower Cretaceous granitoids, and is unconformably overlain by the Paleogene siliciclastic succession. The Kuji Group is divided into three lithostratigraphic units: the Tamagawa (marine and non-marine), Kunitan (marine), and Sawayama (non-marine) formations, in ascending order. The overall succession consists of at least four largely upward-fining sequences. Previous studies on sedimentary facies analysis divided them into five depositional sequences derived from the third-order sea level change (DS1 to DS5) (Ref. 1).

The newly established age model, based on carbon isotope stratigraphy and U–Pb ages, indicates that the depositional sequences in the Kuji Group is correlated with the middle Turonian to middle Campanian stages. The DS2 to DS4 in the Kuji group are likely coeval with the depositional sequences of the adjacent Futaba Group (the Coniacian to Santonian stages) (Ref. 2). Relative sea-level changes recognized in the DS1 to DS4 are mostly consistent with the second- and third-order global eustasy (Ref. 3). In contrast, the DS5, equivalent to the Sawayama Formation of the Kuji Group, represents lowstand systems tract (non-marine fluvial facies) with maximum thickness of 200 m. Similarly, development of shallower facies is implied in the Hakobuchi Formation (the Campanian stage; Ref. 4) of the Yezo Group, accumulated in the northern sub-basin. These coeval relative sea-level falls are apparently inconsistent with contemporaneous global transgressive trend, and thus are interpreted to reflect basin-wide uplift of the forearc region in the early Campanian. Here we provide a new constraint for the age of the major tectonic event occurred in the Late Cretaceous East Asian continental margin, possibly related to the change in

subducting oceanic plate motion (e.g. Ref. 5).

#### References

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