

Toward reconstruction of oceanic plate paleogeography in the NW Pacific: a subject from the NE Japan arc.

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Spatial distribution of oceanic plates in the Mesozoic NW Pacific has been indirectly assumed extrapolating from magnetic anomalies tracked back to the mid-Pacific. However, common occurrences of suprasubduction ophiolites and arc terranes, existence of the Philippine Sea plate originated in the Jurassic, and lower mantle tomography suggesting remnants of subducted slab in the mid-Pacific all imply that plates occupied NW Pacific were distinct from those in the middle to east Pacific in the Mesozoic. To test this possibility, it is important to reconstruct oceanic plates from geology and chronology of accretionary complexes and ophiolites independently from the traditional methods based on magnetic anomaly. Here we present a subject for the oceanic plate reconstruction raised from NE Japan.

In this study, we determined U-Pb ages of zircons extracted from a tuff bed in a coherent clastic sequence of the Cape Shiriya accretionary complex (Shimokita Peninsula) at the northeastern tip of the North Kitakami belt. These zircons yielded a mean age of ca. 130 Ma (about Hauterivian / Barremian boundary). Almost identical ages were also obtained from the youngest zircon grains in sandstone. The 130 Ma age is concurrent with (a) Trench sedimentation in the Idonnappu accretionary zone, (b) high-P/T metamorphism in the Kamuikotan zone, and (c) island arc volcanism in the upper Sorachi Group, all in the central Hokkaido far in the east. A shift of the NE Japan trench from the North Kitakami belt to central Hokkaido has been assumed, with contemporaneous onset of arc volcanism in central Hokkaido. However, our result implies dual subduction in the both areas at 130 Ma. If this hypothesis stands, arc-trench system in central Hokkaido could have formed not along the Eurasian continental margin but belonging to another plate.

We also dated a diorite dike as a member of microdiorites, which commonly occur associated with serpentinites in central Hokkaido. These rocks have been attributed to Cretaceous arc magmatism based on chemistry and K-Ar ages. The diorite sample yielded a 160 Ma zircon U-Pb age of Late Jurassic, within the period of trench accretion in the North Kitakami belt. This age thus also suggest the hypothesis of dual subduction, where arc activity occurred outside the trench of Eurasian continental margin.

NE Japan has been held other problems difficult to be explained by simple, single subduction schemes. For example, adakite magmatism (suggesting slab melting) in the Kitakami mountains occurred contemporaneously with lawsonite-blueschist metamorphism (suggesting very cold subduction) in the Kamuikotan zone. Our new age data encourages to test possibilities that another subduction zone existed in the NW Pacific distinct from Eurasian active continental margin at least during Late Jurassic to middle Early Cretaceous.

Keywords: Pacific, oceanic plate paleogeography, zircon, U-Pb age, accretionary complex, ophiolite