

Two steps of onset of the modern geodynamic framework; ~6Ma and ~2.5Ma in east Asia and western Pacific margin

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Cenozoic east Asia and western Pacific margins are complicatedly active region on the Earth and several geodynamic events are keys to understand the whole tectonic framework; back-arc rifting and spreading, space-time transition from extensional to compressive stress regime, and a culminated collision as a result of subduction in modern geodynamic framework.

Ocean drilling in the Nankai Trough forearc suggests a new scenario for the evolution of the Nankai subduction zone. Seismic reflection studies coupled with drilling have demonstrated that two episodes have controlled the recent evolution of the Nankai forearc: a resurgence of subduction at ~6 Ma after cessation since ~12 Ma and rapid growth of the accretionary prism since ~2.0-2.5 Ma because of the influx of large amounts of terrigenous sediments from the Japan Alps to the Nankai Trough (Kimura et al., 2018). Both episodes were synchronous with large-scale plate reorganizations; westward subduction of the Philippine Sea Plate initiated both in the Ryukyu and the Philippine trenches at ~5-6 Ma. Rifting in the Okinawa and Mariana troughs started at ~6 Ma. Compressive tectonics in northeast Japan started at ~3-2 Ma (e.g., Sato, 1994; Regalla et al., 2013; Boston et al., 2017) and resultant mountain building with active surface erosion commenced in central Japan at ~2 Ma. The ~5-6Ma is the timing when the subduction of the Pacific Plate along the Izu-Bonin Trench switched from the trench retreat to advance as well-inferred from a geometry of subducted slab in the Izu-Bonin Trench (Miller et al., 2006; Faccenna et al., 2017). The recent compressive tectonic phase might be due to the initiation of convergence of the Amurian Plate with the Okhotsk Plate along the eastern margin of the Japan Sea and the strong punctuated collision and indentation of the Izu-Bonin Arc at ~6.0 Ma and ~1.0 Ma in central Japan.

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