

New constraints on the volcanic and tectonic evolution of SW Japan since 15 Ma from IODP EXP. 322 in the Shikoku Basin

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Tectonic model and origin of volcanism for Southwest Japan and the Philippine Sea Plate (PSP) since Middle Miocene have been controversial between “fixed TTT junction hypothesis” and “migrating TTT junction hypothesis” (Kimura et al., 2014). This study aims to provide new constraints on the volcanic and tectonic evolution of Southwest Japan since 15 Ma based on occurrence, mineral composition and fission-track dating of tuff beds and sandstone within two drill holes in the Shikoku Basin during EXP.322, IODP NanTroSEIZE seismogenic zone experiments. Large amount of tuffs with broad mineral composition had accumulated during 15-14.5 Ma, possibly because of swift subduction of the PSP. During 14.5-10.5 Ma, tuff deposition attenuated while large submarine fan sandstones had deposited in the Shikoku Basin until 12 Ma. Mineralogy and detrital fission-track dating of sandstone indicated that sources of sandstone were the Kumano Acidic Rocks and other parts of SW Japan. During 10.5-8 Ma, tuff and turbidite deposition ceased while rate of hemipelagic sedimentation decreased, suggesting quiet volcanism and tectonics in SW Japan. During 8-7 Ma, andesitic tuffs and scoria possibly derived from Izu-Bonin Arc temporarily increased with contemporaneous deposition of channelized volcanoclastic sandstone and sheet-like tuffaceous sandstone. After the second quiet period of volcanism during 7-5.5 Ma, tuff intercalation increased at 5.5 Ma. The present results contradict the “migrating TTT junction hypothesis” and support the “fixed TTT junction hypothesis” that Izu-Bonin Arc had collided with central Japan by 15 Ma with swift subduction of young Shikoku Basin, which resulted in Middle Miocene outer arc volcanism in SW Japan. This study also implies cessation of subduction of the PSP during 10.5-6 Ma, followed by resumption of subduction.

Keywords: SW Japan, Philippine Sea Plate, tectonics, volcanism, IODP