Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SCG008-11 Room:301A Time:May 26 11:15-11:30

Formation of continental crust at the Izu-Honshu collision zone

Yoshihiko Tamura[1*]

[1]IFREE, JAMSTEC

The tectonic setting of arc-arc collision and arc accretion in the Izu-collision zone is similar to that of Archean orogenic belts (e.g. Taira et al., 1992). Understanding the petrological processes of granite formation in the Izu-collision zone, where the geodynamic information is not modified by polyphase deformation and metamorphism, may contribute to understanding ancient orogenic belts, especially those related to collisional settings. The Pacific plate began subducting beneath the Philippine Sea plate about 50 million years ago to produce the currently active Izu-Bonin-Mariana (IBM) arc. The collision between the northern IBM arc system and the Honshu arc of the Eurasia plate has been occurring since the middle Miocene (c. 15 Ma) as a consequence of the northwestward migration of the Philippine Sea plate. The collision has led to the accretion of IBM arc crust to the Honshu arc, associated with a southward migration of the plate boundary and trench system. Neogene granite plutons are widely exhumed by tectonic uplift associated with arc collision. Tamura et al. (2010) integrated new geochemical results with recent geophysical imaging of the arc and concluded that Miocene plutonic rocks in the Izu collision zone were derived from the Eocene-Oligocene middle crust, which was partially melted, remobilized and rejuvenated during the collision. Similar rejuvenating processes may have operated in other collision zones. Moreover, (1) the mafic arc lower crust is missing at the collision zone (Kitamura et al., 2003) and (2) the aseismic Philippine Sea plate, which is subductiong to depths of 130-140 km without evidence of a tear or other gap, has been detected even beneath areas 120 km NW of the collision zone (Nakajima et al., 2009). Thus, collisional coalescence accompanies delamination of arc mafic lower crust. Both processes are inevitable at the collision and necessary to yield continental crust.

Keywords: granites, middle crust, crustal structure, arc magmas, andesite