K129-007 **Room: 201B** **Time: May 19 15:30-15:45**

The Origin of the Sheeted Dike Complex beneath the Intermediate- Versus Superfast-Spread Mid-Ocean Ridges

Susumu Umino[1]

[1] Inst. Geosci., Shizuoka Univ.

http://sepc5077.sci.shizuoka.ac.jp/~guest/Staff/Umino_j.html

ODP Hole 1256D, drilled by ODP Leg 206 and IODP-Expeditions 309 and 312, is situated on 15-Ma oceanic crust formed at the superfast (220 mm/yr) spread East Pacific Rise on Cocos plate off Costa Rica. Hole 1256D penetrated the entire upper oceanic crust from 250-m thick sediments, 811-m thick extrusives (including the Transition Zone) and a thin (346 m) sheeted dike complex (SDC) and drilled 105 m into the upper gabbro.

The extrusive rocks are dominantly sheet flows with minor intervening pillows. The Transition Zone and the Sheeted Dikes are marked by the presence of brecciated basalt cut by numerous fine veins and cataclastic stringers, and thin glassy to aphanitic dikelets in-situ fragmented into hyaloclastite. Intimate association of brecciation-dike intrusion-hydrothermal fluid circulation increases downhole in frequency. The massive hosts are aphyric and non-vesicular holocrystalline or doleritic basalts. The lower portion of the sheeted dikes are altered and locally recrystallized to Granoblastic Dikes. Gabbroic rocks range from gabbro to oxide gabbro, opx-bearing gabbro, gabbronorite and quartz diorite.

Hole 504B is the deepest drill hole that penetrated 1815 m into 6.9-Ma oceanic basement formed at Cocos-Nazca Spreading Center, asymmetrically spread at 36 mm/yr to the south and 30 mm/yr to the north. The 506 m-thick pillow-dominated extrusive rocks are gradually replaced by subvertical dikes and changes into 100% sheeted dikes more than 1056 m in thickness. Seismic layer 2/3 boundary lies 1200 m in depth within the sheeted dikes and is associated with gradual change in porosity and alteration, but not a lithological transition from sheeted dikes to gabbro.

Lithostatic and magmastatic pressure estimates show that the pillow-dominant extrusives and the lower extrusive/intrusive ratio for 504B crust result in a lower level of neutral buoyancy (LNB) of uprising magma, which favors the intrusion of dikes at this level in the upper crust. In contrast, the dense sheet flow-dominant 1256D crust has LNB at very shallow levels, which are favorable for eruption rather than dike intrusion throughout most part of the upper crust except the less dense uppermost extrusives. This resulted in the higher extrusive/intrusive ratio for the 1256D crust. After passage of dikes, fractures were left behind which hosted the hydrothermal circulation. Shallow LNB in the 1256D crust eliminates the density-control for the origin of the poorly developed SDC. We present that the combination of stress reduction of the upper crust and the rate of magma supply could yield the preferential conditions for the formation of the SDC beneath the superfast-spread East Pacific Rise.