

Reconstruction of a Collapsed Lava Lake at Southern East Pacific Rise and its Implication to the Mechanism of Lava Lake Formation

Akiko Tanaka[1], Severine Rosat[2], Kiyoyuki Kisimoto[3], Tetsuro Urabe[4]

[1] Geological Survey of Japan, [2] Ecole et Observatoire des Sciences de la Terre, [3] Marine Geology Dept., GSJ, [4] Earth and Planetary Science,

Univ. of Tokyo,

<http://www.gsj.go.jp/>

An ultra-high resolution topographic map of a collapsed lava lake on ridge crest of the superfast-spreading Southern East Pacific Rise (17-25.4'S) was constructed at 20 cm gridding. This is the first attempt to reconstruct the topography of a collapsed lava lake at magmatically robust mid-ocean ridge system. Original data was acquired during the MOAI '98 Cruise using a pencil-beam scanning sonar (MESOTECH sonar) that is installed on the submersible Alvin. The map covers an area of 200m x 350m on Oasis hydrothermal site (17-25.4'S, 113-12.3'W) where low temperature fluids (6 Celsius degree) are venting from a collapsed lava lake, a few to 10 meters deep.

An ultra-high resolution topographic map of a collapsed lava lake on ridge crest of the superfast-spreading Southern East Pacific Rise (17-25.4'S) was constructed at 20 cm gridding. This is the first attempt to reconstruct the topography of a collapsed lava lake at magmatically robust mid-ocean ridge system. Original data was acquired during the MOAI '98 Cruise using a pencil-beam scanning sonar (MESOTECH sonar) that is installed on the submersible Alvin. The map covers an area of 200m x 350m on Oasis hydrothermal site (17-25.4'S, 113-12.3'W) where low temperature fluids (6 Celsius degree) are venting from a collapsed lava lake, a few to 10 meters deep.

The collapsed lava lake extends for 250 meters in length in parallel to the spreading axis with mean width of 10 meters on the western flank of the ridge crest. The estimated volume of lava that drained out is about 7,000 m³ (0.7×10^{-5} km³) which indicate minimum amount of lava erupted from single event. Such a small amount of melt and frequent contacts between "young" and "younger" flows indicate that the characteristics of the volcanism is frequent eruption of very small amount of magma at superfast-spreading ridge system. The lava is likely to be supplied from its northern end where the depth of the collapsed lava lake reaches the maximum of and is modified by active venting of low-temperature fluid. Submersible observation indicates neither fracture nor ditch around the lava lake. Therefore, the lava drained out through porous piles of pillow lava that consists of lake wall.