

Rethinking submarine geological map of the island of Hawaii

Hisayoshi Yokose[1]

[1] Dept. Earth Sci., Kumamoto Univ

KR01-12 cruise of Japan Marine Science and Technology Center using ROV KAIKO and its mother ship R/V KAIREI were carried out around Hawaii islands in the early fall of 2001. During this cruise, Nine dives of ROV KAIKO were made on submarine flank of the island of Hawaii: West Hilina landslide area (K207, K208, K209), Pololu landslide area (K213), Hiro ridge (K215), South Kona landslide area (K210, K211) and North Kona landslide area (K218, K219). Single channel seismic reflection data were also collected from vicinity of the above dive sites. These areas have never been systematically studied using submersible due to the bad sea state and /or the depth of outcrops. Valuable information about the submarine geology and in situ rock samples from west, southwest and northeast franks of the island of Hawaii were obtained. These results allow us to reevaluate the submarine geology of the island of Hawaii.

Some critical differences are found between the dive observations and the proposed submarine geological maps created by means of the USGS GROLIA side-scan survey data and precise bathymetric maps (e.g., Moore et al., 1994; Moore and Chadwick, 1995). There are four main differences. (1) Outcrops in the North Kona landslide area dose not show prominent slump structure, but are preserved original flow morphology of pillow lavas and its related rocks. The ridge of the western submarine flank of Hualalai may be composed of pillowed basaltic flows and its intrusive equivalent. (2) Southwest submarine flank of Mauna Loa, called West Hilina landslide area, is mostly composed of pillow lava. (3) In the northeastern submarine flank of the Kohara, called Pololu landslide area, the strata observed by submersible is composed mainly of pillow lavas accompanied with a small amount of volcanoclastic rocks. (4) Abundant volcanoclastic rocks, such as hyaloclastite and debris flow deposits, were observed only in the South Kona landslide area both in distal and proximal sits.

Submarine geological map of the island of Hawaii have been revised on the basis of the dive observations, precise bathymetric maps, SCS data, and compilation of previously reported works. The map reveals that almost entirely submarine flank of the island of Hawaii may not be dominated by fragmental lava debris, hyaloclastite (Moore and Chadwick, 1995), but composed mainly of pillow lavas and related rocks. Thick volcanoclastic rocks occurs in a restricted area where headwall of a large scale landslides are suspected. This restriction implies that the landslides involve volcanoclastic deposits, and is consistent with a hypothesis that thick volcanoclastic deposits are a key factor for the large scale landslide on the volcanic apron (Moore and Chadwick, 1995; Yokose, 2001).