Dive No.	K 215	Date	2001/9/13
PI	Name	Affiliation	
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English	Peter Lipma	U.S. Geological Survey	
Specialty	Volcanology, Geology		
Purpose	The Hilo Ridge is one of the three major submarine rift zones that are well defined on Hawaii Island, along with Puna Ridge (Kilauea) and Ka Lae (Mauna Loa). The Hilo Ridge, previously interpreted as the submarine extension of an east rift zone of Mauna Kea, may alternatively be the east rift zone of a highly elongate large Kohala edifice (Holcomb et al, 2000; Kauahikaua et al., 2000); as such, it could also provide important samples of early Kohala growth. Basalt samples from the deep-water lower slope of the Hilo Ridge will have far better quality for petrologic study than subaerial tholeiite material from Kohala, and may provide the first reliable materials to characterize this large Kea-trend volcano. The distal site may provide abundant picrite samples for comparison with submarine rift zones of other volcanoes, and study of Mn coatings in comparison with Hana Ridge (Haleakala) and South Kona bench (Mauna Loa) may provide information on eruption ages. This dive will provide opportunities along the distal Hilo Ridge to make geological observations, collect rock samples, evaluate rift structure and morphology, and make petrologic correlations with source volcano.		
Area	Distal Hilo Ridge, 40 km east of Hawaii Island		
Site	Lower south slope of the Hilo Ridge		

	Latitude	Longitude	Time	Depth (m)
Landing	19° 50.19’ N	154° 32.28’ W	09:26	4051 m
Leaving	19°31.28’N	154° 33.40’ W	14:50	3176 m

Dive Distance	~2100 m	Deepest point	4052 m
Dive summary	The dive traverse NW up a steep spur on the southern side of the distal Puna Ridge. All rocks exposed were basaltic pillow lavas, variably mantled by sand and talus. The lavas form two groups by composition and elevation: a lower sequence of olivine-bearing (5-10%) basalts to 3815 m depth (6 samples), and an upper group of coarsely porphyritic picrites (25-30% olivine).from 3777 m to the top of the dive at 3208 m (13 samples). Small-scale bottom morphology was far more complex than illustrated by the bathymetric map. Notably many pillow mounds rise 20-40 m above the general slope, probably marking sites of satellitic vents fed either by subsurface lava tubes or fractures generated by dike injection along the rift axis. The presence of such vents, along with the general coherence of lava compositions suggests that all the samples may have been generated by just two eruptive events (something to be tested by geochemical study. While much of the slope was characterized by virtually unbroken pillows and pillow lobes representing primary depositional surfaces, some steeper slopes expose mainly broken pillows and pillow rubble that likely represents the break-away scars from landslides and slumps. A particularly large slide scar is present along the southwest side of the traverse ridge for about 600 m laterally from about 3610 to 3575 m depth. Mn coatings on primary lava average about 1 mm; thicknesses are less in landslide-scar samples.		
Payload	One sample basket (divided into 9 boxes), 4 push-core samplers		
Visual Records	VTR1, Still camera		
Sample	Rocks: 17 sites with 19 samples Cores: 1		

Video highlights	1025-27, 1035-38, 1040-41, 1135-37, 1212-25, 1338-48, 1418-21
Key words	Hilo Ridge, basalt, pillow lava