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The R/V Ewing left Barbados on schedule at 1000 local time >on August 18. Hydrosweep, 3.5kHz and magnetometer data were collected during the transit from Barbados to the work area at the Vema Fracture Zone. We followed a route a few miles north of the most direct route in order to acquire magnetics and bathymetric data >along a seafloor spreading flow line. A possible mud diapir was noted seaward of the deformation front of the Barbados Accretionary Prism (12 46'N, 57 13'W), and a meandering channel was crossed on the edge of the Demerara Abyssal Plain (12 20'N, >51 00'W). Much of the transit was made into a headwind and >opposing current, and the transit was consequently slower than >anticipated.

Two Hydrosweep roll bias tests were performed during the passage across the abyssal plain. These tests, which involving running the same line in opposite directions over a flat seafloor, demonstrated that Hydrosweep's seafloor is tilted for several hours after a rapid turn, presumably due to disturbance of the vertical reference. Consequently, all turns during Hydrosweep surveys of this leg have been made at 10 /minute.

From August 15 through 18, we mapped the southern transverse ridge of the Vema Fracture Zone from 45 10'W to >44 00'W with Hydrosweep, magnetics, and 3.5kHz. Hydrosweep >has been working well, but in this extreme and variable relief, with >the bow thruster covers off, we need to survey at 8 knots to >preserve the data quality. The new Sun-based software for realtime >display and beam editing of Hydrosweep data is up and running satisfactorily, and undergoing continuing improvement. >

Our Hydrosweep mapping showed that west of 44 42'W, >the transverse ridge is severely asymmetrical, and of relatively >modest relief. The northern side of this westernmost portion of the >ridge drops precipitously (36 slope) from about 3200m water depth >down to the turbidite-filled floor of the fracture zone valley at >5000m; the side away from the fracture zone, in contrast, slopes >only ~7 southward. The abyssal hill texture continues >uninterrupted up onto the gently-sloping southern side, and we infer >that this westernmost portion of the transverse ridge has been >formed by a relatively straightforward flexure. At 44 38.5'W, the >scarp on the north side of the transverse ridge is interrupted by a >huge (6km diameter) amphitheater, interpreted as a fault-influenced >collapse feature. East of this amphitheater, the character of the >transverse ridge changes, and we find the shoalest section of the >transverse ridge. It is in this region that a cap of shallow water >limestone was documented by dredging during cruise RC2104, and >it is this limestone cap that is scheduled for drilling as a test hole for >the ODP Diamond Coring

System (DCS). The limestone cap >segment of the transverse ridge is more nearly symmetrical (northern >flank: 23 ; southern flank: 20), and flat topped. The shoalest point >is at 450m, towering four and half kilometers above the adjacent >fracture zone floor.

On August 17, we dredged the south side of the limestone >cap at 44 02'W (station EW9305-1D). The dredge was hung up >on the limestones for several hours, but in the end recovered a large >(half meter in diameter) bioconstructional limestone boulder, >probably an altered fossil coral, resting on a pedestal of consolidated >biogenous calcarenite. In addition, the dredge recovered smaller >fragments of heterogeneous biogenous limestones, and some small >(cm size) rounded pebbles, possibly beach pebbles. >

On August 18, we conducted a camera tow along the crest >of the transverse ridge, looking for areas suitable for emplacement >of an ODP barerock guidebase. The tow covered the shallowest >portion of the ridge, from 44 24'W to 44 18'W, in water depths >ranging from 450m to 750m. Upon launch, the WHOI pinger was >found to be pinging much too fast, then much too slow. The camera >sled was recovered, the pinger was replaced, the sled was >relaunched, and the rest of the lowering went smoothly. The film >has been developed at sea, and the photo quality is excellent. >Outcrops, interpreted as limestone, were noted in several areas. >Some of the outcrops are similar in appearance to the fossil coral >recovered in dredge EW9305-1D; others are light-colored, >smoothly-textured and lack the abundant, characteristic cavities of >sample EW9305-1D. The sediment between the outcrops was >commonly rippled, indicating significant bottom currents. >