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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 magnetic 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 involved 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. >