

**SEDIMENT TRANSPORT PROCESSES OF SALT RIVER
SUBMARINE CANYON ST. CROIX,
U. S. VIRGIN ISLANDS**

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Purpose: To determine sediment transport processes (Report No. 78-9)

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Accomplishments: Sixteen short-core (15-cm) sediment samples were taken from the canyon floor to determine the nature of the canyon fill. The coarsest sand occurred near the base of the west wall, confirming that this low trough was a zone of higher current activity. Other statistical parameters showed little systematic variation and no trends are readily apparent at this time.

Measurements were also made to characterize wall "roughness." The data show that there are systematic changes in wall roughness along either wall, from wall to wall, and with depth. In general, the west wall is more irregular than the east with the majority of the wall roughness being confined to the upper transect.

Experiments were also set up to measure directly the sediment transport rates during both storm and nonstorm conditions. Eight sediment traps were attached to the canyon walls at various sites to collect the sediment entering the canyon from the adjacent shelf. On the canyon floor, four bedload traps were buried at a depth of 30 m along the excursion limit line. As part of an ongoing West Indies Laboratory study in Salt River Canyon, five sediment tracer experiments were

monitored before, during, and/or after the mission. At each site, sand was removed, washed, dried, and impregnated with a fluorescent material. The sediment was then reintroduced and allowed to move for a given length of time. The data from these experiments will be used to calculate daily transport values for the east and west canyon walls and the canyon floor. Based on these data, daily and annual transport rates will be calculated and a sediment transport model constructed. While analysis is incomplete, some conclusions can be made. First, the major areas of transport certainly vary from storm to nonstorm conditions. During nonstorm conditions, most of the sediment introduced to the canyon comes down the west wall. Furthermore, sediment appears to be stored in the canyon during nonstorm conditions. In contrast, during storms most of the sediment is introduced over the east wall in response to the dominant northeast swell and seas. Storm surges are dominant movers of sediment in Salt River Canyon. During storm conditions (5 to 14 days per year, on the average), 11,000 to 35,000 kg are introduced to the canyon and moved seaward through its axis. During the other 351 to 360 days of the year, only twice that amount is moved. The data seem to support our premise that storm events are extremely important and should be closely observed.

Unfortunately, the time period during which storms occur was later than usual in 1978, and did not coincide with the "time-window" set for the mission. Because the storms did not occur as anticipated, the mission was used to determine base-line data for the Canyon and to set up experimental traps to be

monitored by surface-based divers during later storms. An attempt will be made to schedule a mission at a later date during a storm period.