oceanography

Gathered from the mid-program report of the Tektite II underwater research program at St. John, Virgin Islands

GEOCHEMISTRY

Measuring composition of seawater

Almost all measurements of the chemical properties of deep seawater are made by bringing samples to the surface and analyzing them in a laboratory. A legitimate question is whether this process affects the properties being studied.

Tektite II researchers found evidence that it does, especially for oxygen measurements. Oxygen samples taken directly on the bottom of Lameshur Bay and then quickly analyzed in the underwater habitat's laboratory differed significantly from samples taken and fixed in the classical way (from the surface), report Dr. Paul Cratin, Richard W. Curry and Roger J. Dexter of the University of Miami's Institute of Marine and Atmospheric Sciences.

The differences can be attributed in part to the escape of gases, which results from the decrease in pressure and the increase in temperature as the classical sample is brought to the surface. But activity of the living organisms trapped in the sample also influences the composition, especially when the sample is not analyzed for several hours after collection—the normal delay in the surface method.

"It is (our) feeling," say the investigators, "that research involving biologically active or rapidly changing parameters which are to be studied over a daily period must be performed out of an underwater laboratory in order to obtain the desired precision and accuracy."

MARINE BIOLOGY

Behavior of spiny lobster

Resuming studies they began last year during Tektite I, Dr. John G. VanDerwalker of the U.S. Department of Interior and Ian Koblock of the College of the Virgin Islands this year attached sonic pingers to several lobsters to study their nocturnal migrations.

They confirmed that lobsters have a well-developed navigation system. It enables them to leave a burrow in the late evening, travel as far as 1,000 feet out onto the sand plain and return to their burrow in the early morning.

GEOLOGY

Organic reworking of sediments

In most shallow marine geologic environments, the processes of sedimentation are governed largely by wave and current action. But near coral reefs, organisms play the major role in distributing and reworking sediments.

The actual degree to which organisms rework the bottom sediment has been largely unknown, but Drs. H. Edward Clifton and Ralph E. Hunter of the U.S. Geological Survey, Menlo Park, Calif., made observations and performed experiments in four different settings. The experiments document the rapid rate in which organisms rework the sediments and indicate that the style of reworking is related to the environmental setting.

In addition the effects of specific organisms were documented: Rays make large circular excavations, triggerfish and trunkfish blast small deep holes by hydraulic jetting, goatfish thoroughly sift the upper sand surface, eels burrow into it and large hermit crabs in conch shells plow deep furrows. One sand tilefish observed in detail over two days collected 500 large fragments of coral and shell debris, which he then used to construct a solid, interlocking roof for his den.

MARINE GEOLOGY

Sea–level history of St. John

One way to find evidence of lower sea levels in the past is to search for signs of former beaches now preserved in shallow waters. Lawrence Phillips of the U.S. Geological Survey and Denny Bowman of the University of Texas identified a former period of low sea-level at St. John at a present depth of about 45 feet.

Relict, eroded, extremely hardened beachrock was found as continuous sheets at depths of 40 to 46 feet. Where beachrock was lacking, a wave-cut platform, 100 to 200 feet wide, was found at a depth of 46 feet seaward to 57 feet. Large numbers of well-rounded rocks and boulders were found on the surface or within the sediment just beyond the wave-cut platforms.

The sea-level changes observed on the coast of St. John, they conclude, relate to the history and development of the Virgin Islands and possibly to the eastern Caribbean Island chain. The initial radiometric age dates suggest that the rise of sea level occurred within the relatively recent geologic past, probably the late Pleistocene Epoch, which ended 10,000 years ago, and that it was due to a local structural subsidence rather than a worldwide change in sea level.

MARINE BIOLOGY

Fish behavior near traps

Normally the only way to study how fish react to certain types of traps is to analyze how great a catch is made with each kind. William L. High and Dr. Alan J. Beardsley of the U.S. Bureau of Commercial Fisheries had a unique opportunity to make direct observations over a 12-day period of fish behavior near three kinds of traps placed on the bottom of Great Lameshur Bay.

They found that the precise location of traps is a major factor in capturing success. A trap placed 15 feet from a squirrelfish congregating area will capture considerably fewer fish than the same trap placed 10 feet closer. Usually traps placed on a sand bottom close to coral ledges are more successful than those placed directly on the reef.

Catch rates were not greatly altered by baits used, they found. Usually equal numbers of fish were captured with unbaited and baited traps. The gate on the typical wire trap used in the Virgin Islands generally keeps fish from escaping but also prevents lobsters from entering. An experimental aluminum-nylon sablefish trap captured a number of lobsters, however.