WHAT DO WE MEAN BY REEF GROWTH?

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Based on investigations of several Caribbean reefs, as well as the recent literature, three primary parameters describing reef construction are proposed. These include: 1) Calcification (primarily by scleractinian corals and algae on modern reefs), 2) Net Framework Production (material remaining after bioerosion), and 3) Reef Accretion (lateral or vertical displacement of the reef surface over time). While these factors are all intimately related, they are not interchangeable.

On shelf-edge reefs of St. Croix, U. S. Virgin Islands, it has been shown that less than 40% of the material incorporated within the reef (calcification) ultimately remains there (net framework production). The balance is bioeroded sediment. At Salt River (St. Croix), the reef-accretion rate is 25%-50% of calcification, and net framework production is approximately 50% of reef accretion, owing to the cavernous porosity that dominates this reef system.

In such systems where biologically produced sediment is removed by storms, measurements of calcification are not directly comparable to either rates of net framework production or reef accretion recorded in cores. In contrast, systems like One Tree Reef in the Pacific logically yield better agreement between calcification and accretion measurements, because much of the sediment produced by bioerosion remains within the reef system over the long term.

Quantifying patterns of accretion can be likewise complex. At both Cane Bay and Salt River (St. Croix), accretion rate increased with depth along the shelf margin at water depths between 15 and 30 meters, where the deposition of

displaced reef blocks from shallower reef environs dominated the accretionary picture. In Nonsuch Bay, Antigua, accretion rates were similarly highest (ca. 4-5 m/1000 yrs) in rubble-dominated zones. Thus, our criteria for "ecological" reefs in the ancient must become more sensitive to distinguishing in-place reefs from reefs with everything in place.