



Stable isotope patterns in *Porites* corals in the context of biological records of stress events

J.D. True

James Cook University School of Marine Biology and Aquaculture

The tissue layer of massive *Porites* corals, which forms a thin layer at the outer margin of the colony, has proved to be a sensitive indicator of incipient and sub-lethal stress. Overlying seasonal patterns corresponding to sub-annual variations in skeletal growth are rapid or gradual declines associated with both chronic and acute stress events. Similarly, in stable isotope traces obtained from coral skeletons, sub-annual patterns normally associated with seasonal environmental fluctuations are overlain by more complex patterns thought to correspond to exceptional environmental conditions. Using long-term manipulative field studies as bases to collect isotopic and biological records from corals exposed to both natural and artificial stress events, it was possible to gauge how directly environmental conditions influence the skeletal proxy record. Interpretation of the nature of a stress event from the proxy record is complicated by biological factors. It was found that skeletal growth rates change under certain types of stress. Chronic and acute environmental stress events appear to influence the skeletal proxy record differently, even though both types of stress eventually induce bleaching responses in corals. Successive stress events also appear differently in the proxy record according to the stress history of the colony; the sensitivity of the isotope proxy in recording a particular event may be diminished following certain stress events. These findings shed light on why it has so far been difficult to reconcile coral proxy records from different studies.