

Supratidal beach sediment cores as recorders of long-term environmental and ecological changes in coral-reef ecosystems

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Coral reef ecosystems have been degraded worldwide. Modeling and culturing studies have been conducted to predict future outcomes of coral reef ecosystems. However, few studies conducted long-term (10-100 years scale) environmental changes and associated ecological changes in coral reef ecosystems, data on which would provide insight into long-term effects of global environmental changes and anthropogenic impacts on coral reef ecosystems. Here we focused on supratidal sediment cores as potential recorders of long-term (10-100 year scale) environmental and ecological changes in coral reef ecosystems. Approximately two-meter sediment cores were taken from supratidal zones of Sesoko Beach (Sesoko Island, Okinawa) and Yakomo Beach (Okinoerabu Island, Kagoshima). Sedimentary structure, grain size composition, bioclastic composition, and radiocarbon ages of bioclasts (coral/mollusk/foraminifer) were examined. Based on sedimentary features and grain-size variations, cores were divided into three parts (lower, middle and upper units), each of which indicates intertidal, storm, and aeolian deposits, respectively. Radiocarbon ages of coral fragments suggest that the two-meter cores were deposited in recent times (after 1950 yr AD). Bioclastic compositions indicate no ecological changes since the deposition of these cores. The shell morphology and weight of *Baculogypsina* (symbiont-bearing hyaline foraminifers) indicate that the modern tests grew larger and heavier than fossil tests (ca. 1300 yr AD), which are possibly due to biological consequences of ocean acidification and global warming.