Production, transport and deposition of reef sediments around Hatenohama (Kume Island, Okinawa), based on sediment properties and radiocarbon ages

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Topographic changes of reef islands and beaches are predicted to occur due to sea-level rise associated with global warming. Tectonic movements (uplift) also influence the topographic changes of these environments in tectonically active margins. To predict the future topographic changes, it is important to understand their formation history and the process of production, transport and sedimentation of reef sediments. Here we show the production age and transport and depositional processes of surface sediments around Hatenohama, Kume Island (Okinawa, Japan), based on their sediment properties and radiocarbon (^{14}C) ages.

Results of grain-size compositions showed that surface sediments are finer from the north to the south. Results of bioclast compositions showed that coral fragments are more abundant than mollusk shells and foraminiferal tests. Results of ^{14}C ages showed that the most common ages are Modern for coral fragments, 1500—2000 cal yr BP for foraminiferal tests and bulk fine sand, and 5000—5500 cal yr BP for fossil corals on north and central emerged reefs.

These results suggest that gravels (coral fragments) are produced on north and south reefs, and transported and deposited around both reefs. Coarse sands (foraminiferal tests) are mainly produced behind the north reefs, transported southward, and party deposited on a reef island on the central reefs, while the most are transported southeastward through channels and deposited in the depression behind the south submerged reefs. Fine sands are produced around the north and south reefs. The fine sediment produced on the north reefs are transported to a lagoon behind the central reefs through a channel, while the fine sediment produced on the south reefs are transported and deposited to both north and south directions.

The most common ages of foraminiferal tests and bulk fine sands at 1500—2000 cal yr BP are likely caused by the emergence of north and central reef crests due to a relative sea-level fall at late Holocene and by enhanced erosion, production and transport around the reefs.

Keywords: Reef sediment, Radiocarbon age, Foraminifera

