

Development of faro topography in the Indian Ocean atoll

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Faro (little ring-shaped reef, miniature atoll) is a circular reef, usually less than 3 or 4 km in diameter surrounding a shallow secondary lagoon of depths generally less than 20 m which is a characteristic feature in Maldivian coral reef. Because faros rise from the lagoon floor and edges of atolls, their mode of formation must differ from oceanic atolls whose foundations extend to great ocean depths (McLean 2011). However, there has been no substantive study of faros in Maldives.

Holocene reef structure and formation process are observed through an ocean-lagoon transect across the atoll-rim by observations of drilling cores and submarine exposure of reef interior at North Male Atoll, Maldives. We found a distinct faro formation during the Holocene reef development in Male Island which is the first report for substantive study on faro development.

The drilling penetrated 53.5m is conducted at the southeastern part of Male Island where former reef-crest lies under the present reclaimed land. Five reef units are defined from lithofacies of the core. In each reef unit, coral-algal bindstone accumulated on the top of loose reef sediments. The top unit is the post-glacial reef. The other four units are the Pleistocene reefs. The thickness of the post-glacial reef is around 8m where the coral-algal bindstone forms the uppermost 3.3m.

The post-glacial reef structure is also observed at a lagoon slope of the northeastern Male Reef from an exposure of reef interior down to 25m deep where a reef failure happened. The exposure composed of the post-glacial reef. The rigid reef structure is observed at the upper 2m of the lagoon-slope. The antecedent atoll-rim topography of the post-glacial reef is shallower at the rim and deeper beside the lagoon in the North Male Atoll.

AMS datings of the coral/algal samples show the development of the atoll-rim reef after 8,000 cal yBP. The upward reef growth in the early to middle Holocene is the same pace with the sea-level rise at the seaward edge and lagoon-ward edge which reached to the sea-level in the middle Holocene. The typical faro topography formed in this stage. The additional upward reef growth observed from drilling core at the seaward edge indicates the middle Holocene sea-level highstand in Maldives. Faro lagoon is buried by loose reef sediments after the middle Holocene.

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