

Biodiversity of upper mesophotic coral community in Okinawa.

Frederic Sinniger^{1*}, Marc Humblet², Saki Harii³

¹Submarine Resources Research Project, JAMSTEC, ²Department of Earth and Planetary Sciences, Nagoya University, ³Tropical Biosphere Research Center, University of the Ryukyus

Mesophotic coral ecosystems (MCEs) are usually found at depth ranging from 30 to over 100 m depth. Mesophotic coral communities are often composed of both eurybathic tolerant species and species adapted to specific condition of the mesophotic zone. The taxonomic composition of such communities is still poorly known, yet important to conduct accurate paleoenvironmental interpretations of fossil reef deposits, especially in studies aiming to reconstruct past sea-level changes. Moreover, from a biological perspective, the Deep Reef Refugia Hypothesis (DRRH) states that mesophotic coral ecosystems, due to their more stable environmental conditions, may act as refugia for shallow water species to survive extreme climatic events and re-colonise shallower reefs in the future.

Recent global environmental changes affected seriously shallow coral reefs around Okinawa. The combination of major bleaching events and several typhoons lead to changes in coral communities with some species apparently extinct from several locations. Around Sesoko Island in the northern part of Okinawa, several corals species disappeared since 1999 and were not recorded since then (van Woesik et al. 2011). *Seriatopora hystrix* was one of those species.

During the recent survey of a mesophotic coral ecosystem located between Sesoko Island and Motobu Peninsula, high coral diversity and dense communities were found between 35 and 55 m depth including abundant populations of *S. hystrix* between 39 and 47 m. In order to estimate the coral biodiversity as well as the relationships between shallow and mesophotic corals, several genetic markers, both nuclear and mitochondrial, were sequenced for the samples collected. Symbiotic dinoflagellates were also identified. Here we will present the results of the molecular analyses showing the important coral diversity in this location. Our results also show intraspecific diversity within the population of *S. hystrix*. The genotypes of those deep populations correspond to genotypes previously observed from shallower reefs as well as to new genotypes. Such results suggest an absence of vertical structuring in Okinawan *S. hystrix* populations and support the (DRRH). In the future, and if shallow environmental conditions become suitable again for this species, deep populations of *S. hystrix* might be of critical importance for the re-colonisation of shallow coral reefs.

Reference: van Woesik R, Sakai K, Ganase A, Loya Y (2011) Revisiting the winners and the losers a decade after coral bleaching. *Mar Ecol Prog Ser* 434: 67-76

This research was supported by the Sasakawa Scientific Research Grant from the Japan Science Society (24-748) to FS and a Mitsubishi Grant to SH.

Keywords: Mesophotic, Deep Reef Refugia Hypothesis, Seriatopora