On the Transport Process of Coral Eggs and Larvae in Coral Reef Region (Sekisei Lagoon in Okinawa Prefecture, JAPAN) Using Basic Numerical Model

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Abstract: Coral reefs are tending toward extinction in the world because of coral bleaching, discharge of mud and sand from inland areas, nutrientloads, damage by predators such as starfish, and characteristics of the topography. The coral bleaching event of 1998 was especially strong world wide and was caused by high water temperatures. In Japan's Okinawa Prefecture 80% of all corals were killed. However, in Sekisei lagoon, the largest coral reef region in Japan at 400km2 (20km long and 20km wide) the effect was weaker, with about 30% coral mortality. Therefore, Sekisei lagoon can be considered a source of coral supply to Okinawa Island. However, it is not clear how coral eggs and larvae are transported from coral reef regions, such as Sekisei lagoon, to offshore. It is also not clear how coral eggs and larvae released to the offshore waters are transported to other coral reef regions.

In this study, we carried out the necessary marine environment observations (e.g. physical environment data) to make a basic numerical model to determine the transport process of coral eggs and larvae, from Sekisei lagoon. We also used the basic numerical model for diffusion analysis of the coral egg or larvae.

Where spawning occurred in the center of Sekisei lagoon the model showed that most of the coral eggs or larvae were dispersed to the southwestward for 24 hours. The model also indicated that the possibility of coral larvae from the north part of Sekisei lagoon supplying Okinawa Island was low. However, if the eggs and larvae transported from the south part of Sekisei lagoon were able to reach the offshore Kuroshio Current it seemed to possible that they could supply the Okinawa Island with new corals.

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