

Regional Coral Monitoring and Viability by Boat-based Observation

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There are concerns about coral decline all over the world due to global climate changes or tropical land developments, etc. To establish the current status of coral distribution, a large-area, high-efficiency coral monitoring method is required. In this study, a new coral monitoring technique is developed based on a boat observation. It can cover the survey line of more than 100 m length easily, which is difficult by the diving investigation. This technique is applied by properties of fluorescent proteins innate in hermatypic corals. It is called a boat-based fluorescent imaging LIDAR (LIght Detection And Ranging) technique, which shoot UV (Ultra Violet) pulsed laser from the boat to the seafloor, and take a frame by a gated ICCD camera in synchronization with laser. It makes possible to get only a weak coral fluorescent image by UV excitation and suppressed the sunlight background effect, since the pulse width of the laser is only less than 10 ns, and the exposure time of the gated ICCD camera is only around 100 ns. Most of live hermatypic corals have fluorescent proteins, and they show blue to green fluorescence by UV excitation. In contrast, after death of the hermatypic corals, fluorescent proteins are degraded, and algae attached dead coral skeleton wouldn't show blue to green fluorescent light. Therefore, in this observation technique, existence of corals can be judged by the image, and the viability of corals can be judged by the contrast of fluorescent image. This coral observation technique can ensure the long survey line along with the boat track, by simultaneous observation with DGPS position observation, SONAR depth observation and video observation, etc. We have succeeded in observing coral distribution including viability determination along with more than 1 km boat track of a glass-bottom-boat in Taketomi-island, Okinawa, Japan.

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