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Development of coral fluorescent protein monitoring system

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The purpose of this presentation is to expose an outline of the technique of "coral fluorescent protein monitoring system". We discuss the method of acquisition of fluorescent images and the prospects for future studies.

Fluorescent proteins are very common in reef corals. For example, fluorescent proteins such as Midoriishi-Cyan (MiCy) producing blue-green fluorescence and Azami-Green (AG) producing green fluorescence were identified in *Galaxea fascicularis* and *Acropora* sp. A correlation between bleaching resistance in corals and the concentration of fluorescent proteins in their tissue was found after the large-scale bleaching event which struck the Great Barrier Reef in 1998.

Therefore, coral fluorescence proteins play an important role in protecting coral zooxanthellae against excessive sunlight. Coral bleaching occurs when zooxanthellae (symbiotic algae) leave their coral host. The result of this loss is the whitening of coral colonies. Therefore, fluctuations in the concentration of fluorescent proteins in corals may be used as an index of coral activity. The response of coral activity to environmental changes in coral reef regions may be evaluated by carrying out simultaneous measurements of coral fluorescence and environmental parameters. A tool that can be used to capture fluctuations in coral fluorescence in the field is fluorescence photography. Generally night diving is necessary to carry out fluorescence photography and prolonged dives are required to record time-dependent changes. This method is risky because it involves extended night dives. We developed a technique that can be used during daytime. The new tool consists of a digital camera equipped with a fluorescent filter and a blue-cut filter combined with a black-out curtain system. With this method we have successfully taken pictures of coral fluorescence during daytime. Our future plan is to combine this new technique with time-lapse photography in order to capture temporal fluctuations in coral activity. Y. Furushima would like to thank Japan Society for the Promotion of Science (JSPS), Grant-in-Aid for Scientific Research (C), No.21580238, for their partial support for this research.

Keywords: fluorescent protein, coral, fluorescent image, monitoring system, coral bleaching, Sekisei lagoon