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Citation	琉球大学21世紀プログラム「サンゴ礁島嶼系の生物多様性の総合解析」平成17年度成果発表会
Issue Date	2006-03-06
URL	http://hdl.handle.net/20.500.12000/791
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**Effects of flickering light on the photosynthesis of the coral
*Acropora digitifera***

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Many shallow-inhabiting corals are frequently exposed to highly variable light conditions. Under a fine weather condition, surface waves can cause considerable heterogeneity in the subsurface light (appears as a glittering pattern) by focusing the solar irradiance, especially in the top few meters of the water. The focusing effect of surface wave eventually enhances subsurface light intensity over 9000 $\mu\text{mol photons m}^{-2}\text{s}^{-1}$ with a sub-second time scale. Recent studies have shown a strong relationship between excessive PAR (photosynthetically active radiation)-induced photoinhibition of symbiotic algae and subsequent coral bleaching.

In this study, the effects of short-term (1~10 sec) fragmentation of light supply (a combination of a strong light and background weaker light) were examined in terms of symbiotic algal photosynthesis. Although light-fragmentation did not induce significant difference at sub-saturating PAR intensity ($80 \mu\text{mol photons m}^{-2}\text{s}^{-1}$) of the symbiotic algae, at super-saturating PAR intensity ($500 \mu\text{mol photons m}^{-2} \cdot \text{sec}^{-1}$), light fragmentation caused significantly less dynamic photoinhibition compared with continuous application in the shallow-inhabiting reef-building coral *Acropora digitifera*. Furthermore, light fragmentation effectively reduced dynamic photoinhibition under high water-temperature conditions. We suggest that high frequency in weak/strong light fluctuation in the shallow reef area (especially at calm lagoon and tide pools) poses significant effects on photosynthesis in coral-algae symbiosis, especially during high sea surface temperature conditions.

Keywords: Coral, Photoinhibition, Light flicker, wave-focusing