

Daily and seasonal variations of the partial pressure of CO₂ in seawater on a coral reef in Shiraho, Ishigaki Island, Japan

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The partial pressure of CO₂ in seawater (PCO₂) was monitored at Shiraho reef (Ishigaki Island, Japan) during Sep., 1998 - Sep., 1999. The large diurnal variation (200-600 ppm) was induced by the community metabolisms on the coral reef. The day-to-day variations of PCO₂ (maximum 60 ppm) was attributable to changes in the rate of daily community photosynthesis, which was controlled by the variations of daily irradiance. Seasonal variability of PCO₂ (150 ppm) was explained by seasonal changes in sea surface temperature (SST). We could model PCO₂ variations on Shiraho reef by physical (SST, salinity, residence time of seawater and water depth) and biogeochemical (community metabolisms controlled by SST and daily irradiance) parameters in good accordance with observed PCO₂.