



## Primary production, respiration, and calcification of a coral reef mesocosm under increased CO<sub>2</sub> partial pressure

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**ABSTRACT:** The effect of increased CO<sub>2</sub> partial pressure (pCO<sub>2</sub>) on the community metabolism (primary production, respiration, and calcification) of a coral community was investigated over periods ranging from 9 to 30 d. The community was set up in an open-top mesocosm within which pCO<sub>2</sub> was manipulated (411, 647, and 918 μatm). The effect of increased pCO<sub>2</sub> on the rate of calcification of the sand area of the mesocosm was also investigated. The net community primary production (NCP) did not change significantly with respect to pCO<sub>2</sub> and was  $5.1 \pm 0.9$  mmol O<sub>2</sub> m<sup>-2</sup> h<sup>-1</sup>. Dark respiration (R) increased slightly during the experiment at high pCO<sub>2</sub>, but this did not affect significantly the NCP:R ratio ( $1.0 \pm 0.2$ ). The rate of calcification exhibited the trend previously reported; it decreased as a function of increasing pCO<sub>2</sub> and decreasing aragonite saturation state. This re-emphasizes the predictions that reef calcification is likely to decrease during the next century. The dissolution process of calcareous sand does not seem to be affected by open seawater carbonate chemistry; rather, it seems to be controlled by the biogeochemistry of sediment pore water.

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