

Calcification rate of a coral reef measured by biological, chemical and geological methods

Hajime Kayanne[1]

[1] Earth & Planetary Sci., Univ. Tokyo

Suppression of calcification in coral reefs and other marine organisms is predicted by acidification in the course of the increase in CO₂. Calcification rates have been measured by three different methods: biologically by growth rate and coverage of corals, chemically change in seawater alkalinity, and geologically by weight accumulation rate of coral reef cores. However, these three methods have never been compared at one site and by the same unit. Here I measured calcification rates by corals and other organisms on a barrier reef flat off west coast of Palau Islands.

Calcification rate measured by biological method was 29 molCaCO₃/y/m² before the bleaching event in 1998, and 6.8 molCaCO₃/y/m² after the bleaching. The rate by chemical method was 47 molCaCO₃/y/m² before, and 27 molCaCO₃/y/m² after the bleaching. On the other hand, the calcification rate by geological method was 100 molCaCO₃/y/m² from 8000 to 2400 years B.P. when the reef caught up with sea level, and 3.6 molCaCO₃/y/m² since 2400 years B.P. The rate measured by chemical method was largest as it includes the calcification not only by corals but also by Halimeda, calcareous red algae and foraminifera. The rate by geological method was smallest as it includes loss out from the barrier reef flat to the out ocean and the lagoon.

The calcification rate was reduced after the bleaching event. The rate of the calcification by chemical method after the bleaching (27 molCaCO₃/y/m²) was much more smaller than the rate by geological method during catch-up phase (100 molCaCO₃/y/m²), which implies that coral reef after the bleaching condition does not have a potential to catch up with the rising sea level.