

Revisit to stable carbon isotope records in coral annual bands

Osamu Abe[1]

[1] GSES, Nagoya Univ.

In chemical analyses of coral skeletal annual bands, radioactive carbon isotopes, oxygen isotopes, minor to trace metals (e.g., Sr, Mg) and humic compounds have been used actively, and applied studies for paleoenvironmental reconstruction with them are being developed well. For example, the oxygen isotope ratio is controlled by water temperature and water isotope ratio, so it can be available to reconstruct past changes of water temperature and/or salinity.

On the other hand for stable carbon isotope ratios, which can be obtained simultaneously with oxygen isotope measurement, a lot of controlling factors have been proposed such as photosynthetic activity of symbiotic algae, isotope ratio of dissolved inorganic carbon and kinetic isotope effect. Therefore, generalized quantification for environmental proxy seems to be believed as difficult for stable carbon isotopes.

These controlling factors were well demonstrated based on the incubation experiments using aquariums or in situ chamber and high resolution analysis for short-term annual bands, while studies based on the long-term variation are not many.

Recently, we found that long-term records of coral stable carbon isotope ratios collected from two different locations were both consistent well with the isotope record of atmospheric carbon dioxide recovered from Antarctic ice cores.

Now we have a hypothesis that annual average of stable carbon isotope ratios in coral skeletons can be available as proxy for past change of isotope ratios of dissolved inorganic carbon with careful consideration of sampling sites. Here we will validate this hypothesis using long-term records of various locations available from NOAA coral database.