How carbonate system in coral reef responds to global environmental change?

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Introduction

Coral reef is a typical ecosystem with high organic and inorganic carbon productions in tropical-subtropical marine environments. How the carbonate system in coral reef responds to global environmental changes in present and future has been of a particular concern.

Method

Time-series dynamic observation of carbonate system has been carried out in Sesoko-jima (Okinawa) coral reef through recording parameters (pH, DO, salinity, temperature) in every 15 minutes, and measuring precisely alkalinity, TCO_2 in every three weeks, as well as PCO_2 and air-sea CO_2 flux in every season for 3 years.

Results and Discussion

Time-series observation of carbonate system in coral reef have showed clearly the diurnal, monthly and seasonal variation of organic and inorganic carbon productions, PCO_2 in sea and air-sea CO_2 flux. High air-sea CO_2 exchange rate is obtained (0-5 mmolC/m^2/hour).

Isotopic distribution of $\delta^{13}C$ and $\delta^{14}C$ along the growth year band of carbonate skeletons of subtropical sclerosponge revealed the intensive subduction of anthropogenic carbon dioxide into surface sea water particularly after 1950's.

Dynamic relation of carbonate system in coral reef to global environmental change during several decades will be discussed.

References

Smith S.V.(1973) Limnol.Oceanogr. 18, 106-120.
Kraines S. et al.(1997) Mar. Biol. Prog. Ser. 156. 1-16.
Atkinson MJ(1984) Coral Reefs 3, 13-22.
Gattuso et al.(1997) J.Phyco. 33, 729-738.
Fujimura et al.(2002) Lamer 40 (in press)

Mid-infrared observation of the zodiacal light — Crystalline silicates in interplanetary space

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Mid-Infrared Spectrum of Zodiacal Light

Mid-infrared observations of the zodiacal light, which cannot be done from the ground, complement the study of the zodiacal light in the visual and near-infrared wavelength ranges and provide significant information on the composition and size distribututíon of the dust in the interplanetary space.

The spectrum of the zodiacal light from the dust in the interplanetary space was observed at wavelengths from 4.5 to 11.7 micrometers with the Mid-Infrared Spectrometer (MIRS) on board the Infrared Telescope in Space (IRTS).

Results

The spectrum on the ecliptic plane is well fitted by the three-dimensional DIRBE (Diffuse Infrared Background Experiment) zodiacal dust cloud model spectrum with a possible excess emission feature in 9-11 micrometers. The excess feature has a broad 10-micrometer peak and a small peak at 11.2 micrometers and can be most reasonably accounted for by a combination of submicrometer-sized amorphous (~73%) and crystalline (~27%) silicate particles. The fraction of the crystalline silicate in case of the MIRS spectrum is similar to that of comet Hale-Bopp (~30-38% in weight).

Conclusions

This is the first detection of crystalline silicates in the dust particles in the interplanetary space and indicates that comets may be a major source for the interplanetary dust particles.