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喜界島サンゴ骨格を用いた過去４２３年間の海洋環境復元

A 423-year-long paleoceanography recorded in Porites coral in Kikai Island, Southern Japan

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The East Asian Monsoon (EAM) is an integral part of the global climatic system and especially monsoon-associated precipitaion has a great effect on the industrial, agricultural production and human life in populous regions of the East Asia. To understand the dynamics of EAM it is critical to reconstruct variations in the past activities in seasonal resolution. Therefore hermatypic corals, which are widespread in tropical and subtropical oceans, are suitable since they have clear annual density bands.

In June 2009, we obtained a long modern coral core from a coral reef in Kikai Island. The island is located on the eastern boundary of the East China Sea in the northwestern Pacific. Thus its present climate is mainly affected by the EAM. The coral core KAR09-C2H2 is approximately 440 cm long and dates back to 423 years (1587-2009 A.D.) on X-ray images. The purpose of this study is to reconstruct continuous 423-year record of sea surface temperature and other parameters based on coral paleo-climate proxies including trace elements, such as Sr, U, and Ba. We analyzed the skeletal elements by using laser ablation inductively coupled plasma mass spectorometry (LA-ICP-MS). It is a very powerful tool to handle long-term record since it requires a relatively brief experimental time compared with the analysis by using isotope dilution or thermal ionazation ICP-MS, which we generally use in analyzing the elements in corals. We will show the initial results using the LA-ICP-MS for analyzing coral proxy records to reconstruct long -term variations in the EAM for the Little Ice Age (LIA), in particular.

The Little Ice Age (LIA) is the time when the Europe and other regions neighboring the North Atlantic in colder condition from the 16 to mid-19 centuries. It is reported that this was characterized by the most extensive period of mountain glacier expansion in the recent past. However, outside of the North Atlantic region, the large-scale signature of the LIA becomes less clear and direct indications of climate variability are rarely available. Further, our knowledge on the EAM behavior during the LIA is limited in the western Pacific. Thus, new information, including our coral proxy records, is highly required to reconstruct the global-scale climate variations in LIA and to provide a truly global-scale picture of climate change.

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