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喜界島サンゴ骨格を用いた過去432年間の海洋環境復

A 432-year-long paleoceanographic record in Porites coral in Kikai Island, Southern Japan

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In June 2009, we obtained a long modern core from a coral reef in Kikai Island, Japan. The island is located on the eastern boundary of the East China Sea in the northwestern Pacific. The coral core is approximately 440 cm long and dates back to 432 years (1578-2009 A.D.) including the Little Ice Age (LIA).

The LIA was a time when Europe and other regions neighboring the North Atlantic experienced colder conditions between the 16th to mid-19th centuries. It is reported that this was characterized by the most extensive period of mountain glacier expansion in the recent past. However, owing to the sparseness of the available proxy data during the LIA, there is still no consensus concerning its spatial pattern, timing and cause. In particular, there is a lack of records in the Pacific during the LIA. Thus our 432-year-long coral record from Kikai Island is a useful tool to understand the global-scale picture of climate change during the LIA.

Here we show a continuous 432-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 using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). This is a very powerful tool to handle long-term records since it requires a relatively brief experimental time compared with analysis using isotope dilution or thermal ionization ICP-MS. Based on these results, we discuss the paleoceanographic conditions in the northwestern Pacific during the LIA.

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