

Reconstruction of physical environment in the tropical western Pacific using coral skeletal ^{14}C

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In the western tropical Pacific, there exist several key subsystems such as ENSO, which affect the global climate changes. Some of the changes are related to upwelling, so it is important to know the time-series changes of the upwelling. Radiocarbon (^{14}C) is a good proxy of the upwelling and we can reconstruct the past changes of upwelling by analyzing skeletal ^{14}C in corals.

In this study, I have reconstructed the annual and seasonal changes of upwelling by using coral skeletal ^{14}C from the Palau Islands in the western tropical Pacific, and have obtained the following results: (1) ^{14}C record exhibited seasonal cycles with higher values during winter than those during summer to autumn. This variation can be attributed to seasonal changes in upwelling of the Mindanao Dome. (2) From the end of 1996 to 1999, during which period the 1997-98 El Niño occurred, the coral skeletal ^{14}C decreased over the magnitude of seasonal variation. During El Niño event, the depth of thermocline became thin in the western Pacific, and the mixing between the surface water and the water under thermocline with low concentration of ^{14}C was activated, which then made the concentration of ^{14}C decrease.

This study shows that coral skeletal ^{14}C records upwelling effectively with time resolution of season to annual and with spatial scale of Mindanao Dome to ENSO.