

Palaeoceanographic reconstruction based on Tahiti fossil coral records during the last deglaciation

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Reconstructing spatial and temporal variations of palaeoceanographic changes in tropical Pacific provide clues for understanding the oceanic roles of climate systems. Last deglacial period is unique because ice volumes were reduced globally in rapid manner for the period of 10,000 years and hence the boundary conditions of global climate systems had been modified dramatically. One of the important ongoing debates for palaeoceanography during the last deglaciation is the status of tropical Pacific whether the ocean was El Nino or La Nina like conditions given that this region is crucial to investigate ocean-atmosphere interaction. Yet paleoceanographic data for this region are still insufficient to answer the problems and no coral records extend back beyond the 14,000 years ago had been existed. Integrated Ocean Drilling Program (IODP) Expedition 310 has been conducted, therefore, to establish the paleoceanography during the course of postglacial sea-level rise for Tahiti in the South Pacific. Coral reefs were drilled by research vessel for the first time during the expedition and large numbers of Porites corals had been recovered. As fossil Porites coral is ideal to assess past marine environments, we selected only Porites specimens from plenty of coral samples and then conducted X-ray diffraction analyses and age determinations using radiocarbon measured by the accelerator mass spectrometry. Total 30 pristine Porites specimens, yielding 15,000 to 9,000 years ago were obtained and we also measured trace elements in corals including Ba/Ca, U/Ca ratios and Cd contents as proxies for upwelling and sea surface temperature (SST). Temporal variations found in trace elements in coral specimens have suggested that enhanced coastal upwelling has occurred in the south Pacific during the period between 12,700 and 9,800 years ago compared to those around 15,000 years ago. This finding is consistent with previous reports based on deep sea sediments and supports the idea that south Pacific has been characterized as La Nina-like condition during this period.