Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

APE34-06 Room:103 Time:May 20 15:30-15:45

Last deglacial paleoceanography in equatorial Pacific reconstructed from boron isotopes of Tahitian fossil corals

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Antarctic ice cores have revealed close relations between surface temperature and atmospheric pCO_(2) in the past in accord with glacial and interglacial cycles for the last 800 kyrs. The deep ocean is thought as responsible for approximately 80-100 ppm changes in its magnitude since it is the largest carbon reservoir on surface of the Earth. Several attempts have been made to identify exact locations of those carbon pools and routes during the orbital and millennial scale climate change in the ocean though the outcomes are still inconclusive. Pacific ocean is the one of the main candidates for this path of CO_(2) purge during the deglaciation because there is the largest CO_(2) source in the world ocean at present in the equatorial Pacific, and Tahiti locates in the margin of the equatorial upwelling (cold tongue) region as is sensitive to its past changes. In this study, we measured boron isotopes to reconstruct paleo pH on Tahitian fossil corals ((i)Porites(/i) spp.) recovered during the Integrated Ocean Drilling Program (IODP) expedition 310 (Tahiti Sea level). U-series dated corals precisely can provide the timing of changes as is able to compare the record directly with ice core pCO_(2). Local marine radiocarbon reservoir ages are also calculated using previously published datasets in the region. The result shows large pH depletions in surface of equatorial Pacific associated with much older water intrusions during the last deglatiation, in particular during HS1 and YD. This is consistent with previous pH reconstructions using boron isotopes of marine carbonates in Marquesas Island (coral) and off Papua New Guinea (planktonic foraminifera). Thus low pH and radiocarbon depleted surface water distribution during the millennial scale climate event was persisted not only in Tahiti but other surface equatorial Pacific. This suggests close relations Pacific oceanography with global climate via ocean circulation as is recorded as either stronger upwelling or subsurface water chemical characteristic changes in wider region of equatorial Pacific has been occurred associated with HS1 and YD.

Keywords: boron isotope, porites spp., Integrated Ocean Drilllng Program, Tahiti, equatorial Pacific, the last deglaciation