Geophysical Research Abstracts, Vol. 8, 10277, 2006
SRef-ID: 1607-7962/gra/EGU06-A-10277

Reconstructing the Western Pacific Warm Pool hydrography during times of perturbed themohaline circulation

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We use fossil long-lived giant reef dwelling bivalves, *Tridacna* sp., from the Huon Peninsula in Papua New Guinea to investigate past climates. The Huon Peninsula is located in the heart of the Western Pacific Warm pool (WPWP), an area which plays a key role in the dynamics of El Niño Southern Oscillation. This region experiences exceptional tectonic uplift rates of up to 4 m/1000 years. We focus on a series of subaerially exposed reefs formed during the last glacial period when abrupt climatic events caused near shut down of North Atlantic Deep Water formation and rises in sea level of between 10 and 30m: the Heinrich Events. These rises in sea level created accommodation space for coral and reef dwellers to grow. These reefs have been extensively dated and have been shown to be coeval with Heinrich Events which offers unprecedented opportunities to investigate the climate of the WPWP during times of perturbed thermohaline circulation.

We collected 34 fossil *Tridacna* sp. well-preserved which were found in their growth position and measured the δ^{18}O composition. Aragonite δ^{18}O reflects both water temperature and δ^{18}Ow which in turn reflects changes in global sea level and local evaporation/precipitation balance at the time of deposition. X-Ray diffraction measurements and scanning electron microscope imagery were first used to test for any diagenesis. The samples were also dated using radiocarbon method and are of glacial (60 to 30,000 years BP) and Holocene age (8 to 6,000 years BP) age. Powdered samples were obtained by milling across the growth bands and thus represent the average conditions during the lifespan of each specimen. We extracted the sea level component

and the residual δ^{18}O show that the specimen found in the reefs which were formed during Heinrich Events 4, 5 and 6 show progressively more negative δ^{18}O values with decreases of 0.2 to 0.4 per mille between the bse and the top of the reef. Studies of modern climate show that temperature and precipitation increase and decrease together on seasonal and inter-annual timescales in this area, thus, our results suggest that the WPWP was became warmer (maximum 1-2˚C) and/or wetter during periods of perturbed thermohaline circulation.