Stabilities of Last Glacial Cliamate System: its mechanism recorded as sea-level changes and atmospheric radiocarbon fluctuations

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Uranium series and radiocarbon ages were measured in corals from the uplifted coral terraces of Huon Peninsula (HP), Papua New Guinea, to provide a calibration for the radiocarbon time-scale beyond 30,000 years BP (before present). Four well defined peaks of excess atmospheric radiocarbon were found ranging in magnitude from 100% to 700%, relative to current levels. They are related to episodes of sea-level rise and reef growth at HP. These peaks appear to be synchronous with Heinrich events and concentrations of ice-rafted debris found in North Atlantic deep sea cores.

Uranium series and radiocarbon ages were measured in corals from the uplifted coral terraces of Huon Peninsula (HP), Papua New Guinea, to provide a calibration for the radiocarbon time-scale beyond 30,000 years BP (before present). Improved analytical procedures, and quantitative criteria for sample selection, helped discriminate diagenetically altered samples. The base-line of the calibration curve follows the trend of increasing divergence from calendar ages, as established by previous studies. Superimposed on this trend, four well defined peaks of excess atmospheric radiocarbon were found ranging in magnitude from 100% to 700%, relative to current levels. They are related to episodes of sea-level rise and reef growth at HP. These peaks appear to be synchronous with Heinrich events and concentrations of ice-rafted debris found in North Atlantic deep sea cores. Relative timing of sea-level rise and atmospheric radiocarbon excess imply the following sequence of events: An initial sea-level high is followed by a large increase in atmospheric radiocarbon as the sea-level subsides. Over about 1800 years the atmospheric radiocarbon drops to below present ambient levels. This cycle bears a close resemblance to ice-calving episodes of Dansgaard-Oeschger and Bond cycles and the slow-down or complete interruption of the North Atlantic thermohaline circulation. The increases in the atmospheric radiocarbon levels are attributed to the cessation of the North Atlantic circulation.