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Last Ice Age Millennial Scale Climate Changes Recorded in Huon Peninsula Corals

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Uranium series and radiocarbon ages were determined in corals from the uplifted terraces of Huon Peninsula (HP), Papua New Guinea, to provide a calibration for the radiocarbon time-scale beyond 30,000 years. Improved analytical procedures, and quantitative criteria for sample selection, helped identify diagenetically altered samples. All the samples used in the present study were subjected to a number of tests including microscopic petrological investigation, XRD measurements, stable carbon and oxygen isotope analyses, checks of total U and ^{232}Th content, and d ^{234}U(T) analysis. All of the samples included in the study passed these criteria. The base-line of the radiocarbon calibration curve follows the trend of increasing divergence from calendar ages, as established in previous studies. Superimposed on this trend, four well defined peaks of excess atmospheric radiocarbon (>120% relative to current levels) were found. They are correlated with the timing of specific reef growth at HP and appear to be synchronous with Heinrich events (HE) and concentrations of ice-rafted debris found in North Atlantic deep-sea sediments. The timing and magnitude of the atmospheric radiocarbon pulses is as follows: The peak at 32 cal. ka matches H3 (120% above ambient levels); the peak at 37.5 cal. ka matches with a sharp cold stadial at this time that is not marked as a Heinrich event but appears to belong to the same class (220%); the peak at 42 cal. ka is synchronous with H4 (180%); and the peak at 52 cal. ka matches H5 (700%). The time sequence of events appear to be as follows: An initial sea-level high is followed by a large increase in atmospheric radiocarbon as the sea-level subsides. Over 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.