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Deglacial Melt Water Pulse 1B and Younger Dryas revisited with new boreholes from Tahiti

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Reconstructing sea level changes during the last deglaciation provides a way to document and understand the ice dynamics processes that can perturb large continental ice sheets. The resolution of the few sea level records covering the critical time interval between 14,000 and 9000 calendar years before present (cal-yr-BP) is still insufficient to conclude about the sea level changes, which were associated to the Younger Dryas cold event (12,900-11,600 cal-yr-BP) and the so-called meltwater pulse 1-B (MWP-1B) identified in the Barbados coral record (11,400-11,100 cal-yr-BP; Fairbanks, 1989, Nature 342, 637; Bard et al., 1990, Nature 346, 456; Peltier & Fairbanks, 2006, QSR 25, 3322). In this study, we dated by U-Th the shallow-living corals from three new cores drilled onshore in the Tahiti barrier reef. The time window corresponding to MWP-1B is now documented with an improved resolution, but no step can be detected in the sea level rise during that period. By contrast, there is a hint for a small acceleration of the deglaciation at ca. 12,900 cal-yr-BP. The size of this event is ca. 5m, admittedly at the limit of detection, but the comparison with other continuous records from Barbados (Peltier & Fairbanks, 2006) and New Guinea (Edwards et al. 1993, Science 260, 962) suggests that this event really occurred, pointing to the former Laurentide ice sheet as the source of icebergs or meltwater. The new Tahiti sea level record also suggests that the sea level rise was then reduced during the YD before it resumed during the Holocene period. This refined scenario is compatible with the recent proposal of a small Arctic meltwater pulse that could have triggered the YD climatic event (Tarasov & Peltier 2005, Nature 435, 662; 2006, QSR 25, 659), slightly earlier and at a different location than envisioned by Broecker et al. (1989, Nature 341, 318). We hypothesize that the reduced sea level rise observed during the YD was due to the return of glacial conditions that slowed the deglaciation process, and in some cases, even favored glacier readvances as observed for the former Fennoscandian ice sheet (e.g. Mangerud et al. 1979, Boreas 8, 179).