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U-Th ages of multiple-phases of speleothem growth in the Bahamas and middle - late Pleistocene sea-level change

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U-Th ages of phases of calcite growth in a submerged flowstone and a stalagmite sequence from Sagittarius Cave, Grand Bahama, serve as important constraints on the timing of sea-level change for the middle and late Pleistocene. We have adopted a combination of both conventional and laser ablation MC-ICPMS U-Th dating using a ThermoFinnigan Neptune to achieve high precision and high spatial sampling resolution. We determine age estimates and investigate potential diagenetic effects as close as possible to the end of growth phases. Age durations of continuous phases provide maximum constraints on sea-level elevation because calcite deposition could only have occurred when the cave passages were air-filled. Elevation constraints are good because the Bahamas have remained tectonically stable for the period of growth. Growth hiatuses can be attributed to submergence during high sea stands or cessation of drip during periods of aridity, lack of soil cover or fissure blockage. Ages for initiation of growth after two major growth hiatuses in the Sagittarius sequence which were likely to have been caused by major high sea-stand events are 302 $\pm$ 6 ka and 191 $\pm$ 4 ka, and constrain the timing of the marine isotope stage boundaries 9/8, 7/6, respectively (quoted errors 95% confidence level). Numerous minor hiatuses occur in marine isotope stage 8, indicating that deposition was sensitive to climate or sea-level change at this time. Initial $^{234}U/^{238}U$ activities are similar to modern sea water values for early stage 8 growth phase, while significantly less than this prior to stage 8. This suggests that particularly high sea levels and deposition of new carbonate material occurred during marine isotope stage 9. Comparison of this record is also made with

other sea-level data from the Bahamas archipelago and elsewhere.