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The timing of sea level highstands over the last 600,000 years, with a special focus on the Last Interglacial

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U-series dating of reef-building coral sea level indicators has been used to support the idea that the timing of the Penultimate Deglaciation (Termination II) and the Last Interglacial sea level highstand is anomalous with respect to northern hemisphere forcing and that Milankovitch-based orbital tuning is not a universally applicable dating approach. However, U-series coral ages are subject to artifacts caused by open-system processes affecting the isotopes used for dating. New high-precision U-Th ages from Western Australia clearly demonstrate that these corals are significantly impacted by such age artifacts and that current screening criteria are not adequate to reject these spurious ages. As a result, Western Australian coral ages are biased by artifacts that make the Last Interglacial appear older and longer than it truly was. Exploiting recent technical advances in mass spectrometry, we reduce the age error associated with isotope ratio measurements to approximately 100 years for Last Interglacial corals. At these levels of analytical precision, it is clear that the understanding of open-system effects is by far the most significant obstacle to be overcome in reconstructing an accurate history of sea level for the Last Interglacial. We suggest a simple and effective approach for quantifying and reducing the age errors associated with open-system effects by measuring discrete sub-samples of individual corals. A compilation of the currently available U-series coral data for the last 600,000 years strongly supports the traditional Milankovitch view of a northern hemisphere ice-sheet control and the utility of orbital tuning techniques.