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First continuous high-resolution benthic stable isotope Paleocene record from the central Pacific (ODP Site 1209)

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The late Cretaceous and Paleogene paleoclimate reveals a rather complex history of gradual as well as rapid warming and cooling transitions and events. In particular, the early Paleogene is thought to contain unique and critical records of greenhouse conditions that could provide valuable insights into past as well as future greenhouse worlds. The Zachos et al. (2001) benthic isotope compilation includes data from more than 40 DSDP and ODP sites, from which the Paleocene interval is a combined record of mainly Atlantic Ocean, S Ocean, and Indian Ocean sites. Detailed insight into the Paleocene climate record was hampered until the first continuous and complete records covering the entire early Paleogene have been retrieved from the equatorial Pacific (ODP Leg 198, Shatsky Rise) and the South Atlantic (ODP Leg 208, Walvis Ridge).

Here we present the first complete high-resolution benthic foraminiferal stable isotope record from a single Pacific site (ODP Site 1209) covering the entire Paleocene (magnetic polarity chrons C24r to C30n). The record provides unprecedented insight into the sensitivity of climate system and carbon cycle to orbital and other forcing over the entire Paleocene including detailed characteristics of the early Late Paleocene Biotic event (ELPE), the Chron 27n event and the K/Pg boundary. The pronounced beat of the global carbon cycle in the Paleocene as recorded in the d13C record is related to the long (405 kyr) eccentricity cycle. In addition, we show that the Chron 27n event at 61.7 Ma is characterized by a clear negative excursion in d13C and d18O associated with a decreased in carbonate content. The abrupt warming of 2°C in the deep equatorial Pacific supports the hypothesis that this event may represent an early Paleocene hyperthermal.