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Pleistocene glacial variability as a chaotic response to obliquity forcing

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Abstract. The mid-Pleistocene Transition from 40 ky to ~100 ky glacial cycles is generally characterized as a singular transition attributable to scouring of continental regolith or a long-term decrease in atmospheric CO₂ concentrations. Here an alternative hypothesis is suggested, that Pleistocene glacial variability is chaotic and that transitions from 40 ky to ~100 ky modes of variability occur spontaneously. This alternate view is consistent with the presence of ~80 ky glacial cycles during the early Pleistocene and the lack of evidence for a change in climate forcing during the mid-Pleistocene. A simple model illustrates this chaotic scenario. When forced at a 40 ky period the model chaotically transitions between small 40 ky glacial cycles and larger 80 and 120 ky cycles which, on average, give the ~100 ky variability.

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