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Cancellation of the precessional cycle in $\delta^{18}\text{O}$ records during the Early Pleistocene

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The dominant pacing of glacial–interglacial cycles in deep–ocean $\delta^{18}\text{O}$ records changed substantially during the Mid–Pleistocene Transition. The precessional cycle (23 ky) is absent during the Early Pleistocene, which we show can be explained by cancellation of the hemispherically anti–phased precessional cycle in the Early Pleistocene interior ocean. Such cancellation develops due to mixing of North Atlantic and Southern Ocean $\delta^{18}\text{O}$ signals at depth, and shows characteristic spatial patterns. We explore the cancellation potential for different North Atlantic and Southern Ocean deep–water source $\delta^{18}\text{O}$ values using a tracer transport ocean model. Cancellation of precession occurs for all signal strengths and is widespread for a signal strength typical for the Early Pleistocene. Early Pleistocene precessional power is therefore likely incompletely archived in deep–sea $\delta^{18}\text{O}$ records, concealing the true periodicity of the glacial cycles in the two hemispheres.