Solar timing of Dansgaard-Oeschger events in a coupled climate system model and in a simple conceptual model

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Various climate archives show a quasi-periodicity of about 1470 years during the last ice-age, which manifests itself in the prominent Dansgaard-Oeschger (DO) warming events. Due to the high regularity of this climate cycle, external forcing has been suggested as a trigger of the DO events.

The coupled climate system model CLIMBER-2 is able to reproduce many features of the observed DO events when forced by two sinusoidal freshwater cycles with frequencies chosen according to two well-known solar cycles, the 87-year Gleissberg cycle and the 210-year DeVries cycle. Due to the model dynamics (i.e. the threshold character and the inertia of the thermohaline circulation) the combined effect of these two cycles results in a robust 1470-year timescale of the model response for glacial conditions.

Here we show how a very simple conceptual model, which incorporates only the threshold character and the inertia of the THC, can be used to clarify the dynamics and the response of CLIMBER-2.