Earth System Dynamics Discussions

Earth Syst. Dynam. Discuss., community comment CC1
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The model has been tuned to the late Pleistocene variability. Why not to the early Pleistocene?

Mikhail Verbitsky

Community comment on "Reduced-complexity model for the impact of anthropogenic CO_2 emissions on future glacial cycles" by Stefanie Talento and Andrey Ganopolski, Earth Syst. Dynam. Discuss., https://doi.org/10.5194/esd-2021-2-CC1, 2021

It is well recognized that the ice-age history is the history of large ice sheets' mass balance that in turn is an outcome of a delicate interplay between astronomical forcing and climate system positive and negative feedbacks. The changing balance between positive and negative feedbacks over the Pleistocene defines mid-Pleistocene transition (MPT) from about 40 kyr lower-amplitude variability of the early Pleistocene to longer-period (~100 kyr) and higher-amplitude variability of the late Pleistocene.

In the current study, the authors employ a reduced complexity model; therefore, naturally, the explicit calculations of all feedbacks involved are not expected. Instead, the authors have tuned their model to the late Pleistocene variability with a hope that the best choice of their tuning parameters now adequately represent the balance between positive and negative feedbacks and the model may be taken for the future predictions with a great deal of credibility.

This approach may be questionable. It is not unlikely that the landscape of future positive and negative feedbacks (especially for increased CO2 concentration) will be more analogous to the early Pleistocene climate and a renaissance of ice-ages (if any) may be rather of the early-Pleistocene type with a dominant period of 40 kyr and smaller amplitudes – not 100-kyr variability as this study suggests. Or it may be "MPT of the future" when glaciation variability (period and amplitude) may change in concert with the CO2 level.

Mikhail Verbitsky