The model has been tuned to the late Pleistocene variability. Why not to the early Pleistocene?

Mikhail Verbitsky

Community comment on "Evolution of the climate in the next million years: A reduced-complexity model for glacial cycles and impact of anthropogenic CO₂ emissions" 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