Geophysical Research Abstracts
Vol. 21, EGU2019-18714, 2019
EGU General Assembly 2019

Paleoclimate constraints on critical climate thresholds

Andrey Ganopolski
Potsdam Institute for Climate Impact Research (PIK)

The last 2.7 million years of Earth history were characterized by a significant increase in climate sensitivity to orbital forcing and enhanced climate variability at the time scales from hundreds years to hundred thousand years. Explaining such high climate variability requires a strongly nonlinear response of the climate system to external forcing and the existence of internal instabilities associated with at least several tippling elements in the Earth system. Since climate conditions during the entire Quaternary were colder than those are expected in future, the instabilities and nonlinear transitions derived from the paleoclimate records are not directly applicable to the future "hothouse" world. However, paleoclimate data in conjunction with modeling results do provide useful constraints on the stability of the key tipping elements of the climate system, such as the Atlantic meridional overturning circulation, and Greenland and West Antarctic ice sheets.