

The different response of the climate system to astronomical parameters, GHG and ice sheets during past interglacials

Zhipeng Wu, Qiuzhen Yin, Zhengtang Guo, André Berger

The response of the climate system to astronomical parameters, greenhouse gases (GHG) and ice sheets is an important scientific issue, but the regional difference need to be better understood, including the forcing mechanisms, internal processes and feedbacks. Based on the numerical simulations during past interglacials using the model LOVECLIM, we investigate the different response of the sea ice and sea surface temperature (SST) to astronomical parameters, GHG and ice sheets at different regions. Our results show that the Arctic sea ice variation is primarily controlled by local summer insolation, while the Southern Ocean sea ice variation is more influenced by the CO₂ concentration but the effect of local summer insolation can't be ignored. In terms of the astronomical parameters, precession plays a dominant role on the Arctic sea ice, while obliquity plays a dominant role on the Southern Ocean sea ice. As far as the SST is concerned, it shows a strong precessional signal at low latitudes in both hemispheres. For the SST in the mid and high latitudes, obliquity plays a dominant role in the SH whereas precession is more important in the NH. The internal processes and feedbacks will be given in detail in the presentation. In addition, the different response of the sea ice and SST to GHG and ice sheets based on the transient simulations will be investigated in the future study.

Affiliations:

- Zhipeng Wu (Université catholique de Louvain)
- Qiuzhen Yin (Université catholique de Louvain)
- Zhengtang Guo (Key Laboratory of Cenozoic Geology and Environment, Institute of Geology and Geophysics, Chinese Academy of Sciences)
- André Berger