

Understanding the warm climates from past interglacials to the future

Qiuzhen YIN

*Georges Lemaître Center for Earth and Climate Research, Earth and Life Institute,
Université catholique de Louvain, Louvain la Neuve, Belgium*

Given the predicted future warming and that we presently live in an interglacial (the Holocene), past interglacials are of particular interest to understand better the climate processes characterizing the warm climate conditions. In my study, the climate response to insolation and CO₂ during the interglacials of the past 800,000 years are investigated by using climate models.

My simulations show that the relative contributions of insolation and CO₂ to the intensity and duration of each interglacial vary from one interglacial to another. They also show that CO₂ plays a dominant role on the variations of the global annual mean temperature and of the climate in the Southern high latitudes, whereas, insolation plays a dominant role on the variations of monsoon precipitation, vegetation and the climate in the Northern high latitudes.

Compared to the projected future climate, the past interglacials are cooler during boreal winter, but are warmer over the continents during boreal summer due to their much higher summer insolation. This suggests that the sensitivity of climate to the latitudinal and seasonal distribution of insolation must be kept in mind for the climatic projection at the century-millennium time scales.

My results underline the diversity of the warm climates of the last million years and therefore the potential but also the difficulty to find exact analogues for our interglacial and its future. They show that the best analogue to the Holocene and its future depends critically upon the criteria used to select such an analogue.