The response of global terrestrial vegetation to orbital forcing and CO_2 during MIS 11 and MIS 13

Qianqian SU [1], Qiuzhen YIN [2], Anqi LYU [3], Zhipeng WU [4]

1. Georges Lemaître Centre for Earth and Climate Research, Earth and Life Institute, Université Catholique de Louvain, Louvain-La-Neuve, Belgium (qianqian.su@uclouvain.be)
2. Georges Lemaître Centre for Earth and Climate Research, Earth and Life Institute, Université Catholique de Louvain, Louvain-La-Neuve, Belgium (qiuzhen.yin@uclouvain.be)
3. Georges Lemaître Centre for Earth and Climate Research, Earth and Life Institute, Université Catholique de Louvain, Louvain-La-Neuve, Belgium (anqi.lyu@uclouvain.be)
4. Georges Lemaître Centre for Earth and Climate Research, Earth and Life Institute, Université Catholique de Louvain, Louvain-La-Neuve, Belgium (zhipeng.wu@uclouvain.be)

Despite significant progress in paleoclimate reconstructions and modelling of different aspects of the past interglacial cycles, the mechanisms which transform the impact of solar insolation variations into long-term and global-scale terrestrial vegetation changes are still not fully understood.

Here using the Earth system model of intermediate complexity LOVECLIM, we performed simulations of the coevolution of climate and vegetation during MIS 11 and MIS 13 setting the orbital forcing alone or both orbital forcing and GHGs as external forcings.

Through simple and multilinear regression analysis, the results indicate the response of climate variables and vegetation cover to orbital forcing mainly controlled by precession during MIS 13 while by obliquity during MIS 11. On the other hand, the CO_2 contribution show more important role during MIS 13. GHGs largely enhanced the impact of orbital forcing especially eccentricity during MIS 13 while reverse the effect phase of eccentricity during MIS 11. The effect of CO_2 on climate variables and vegetation cover is of similar size to that of precession on these variables.