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Comparison of ice-sheets impact on atmospheric circulation in PMIP3 models

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The presence of continental-scale ice sheets during past ice ages affected the climatic system. With an altitude of several thousand meters and a cold reflective surface, ice sheets influenced the atmospheric circulation through induced changes in planetary waves. Subsequently, temperatures and precipitations were modified all over the Northern Hemisphere. These changes had an important impact on the evolution of ice sheets themselves.
Previous studies using General Circulation Models (GCM) forced by Last Glacial Maximum (LGM) conditions have shown that the topography of ice sheets exerted a key role on the pattern of planetary waves (Kageyama and Valdes 2001, Pausata et al., 2011). The aim of this study is to compare the response of eight climatic models to the presence of ice sheets in different contexts, such as the LGM, the pre-industrial period and the Pliocene. To do this, we used the climatic outputs from numerical experiments carried out within the framework of the PMIP3 project. The analysis is made in terms of geopotential height, surface air temperature and snowfall. This approach allows a better understanding of the relationship between ice sheets and planetary waves. Moreover, such an inter-comparison study is a mean to quantify the dispersion between climatic fields simulated by different models and to investigate to which extent the simulated interactions between ice sheets and atmospheric circulation are dependent upon models.