

Modelling climate-cryosphere interactions from the past to the future
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In this project we aim to investigate climate-cryosphere interactions in the past and future. To this end will conduct long-term (centennial to multi-millennial) perturbed-parameter ensemble simulations, both with a stand-alone ice-sheet model and with a coupled climate - ice-sheet model. The focus will be on key periods of the Cenozoic (as the Miocene and Pliocene, which are often considered as potentially analogous to a future greenhouse world), the last glacial cycle as well as on the long-term future. Our main tools will be the Yelmo ice-sheet model and the fast Earth System model CLIMBER-X. Since the focus is on climate-cryosphere interactions we will develop a new module to represent these based on deep learning that will be incorporated into the ice-sheet and coupled climate models. By calibrating the results of the simulations for the past we will obtain paleoconstrained future projections, both on the centennial timescales relevant for the IPCC and longer (millennial) timescales. This work takes place within the Horizon Europe P2F project (Towards fully paleo-informed future climate projections).