Transient simulations of the last deglaciation in the framework of the PalMod project as contributions to PMIP4

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Abstract

The last deglaciation (21.9 ky BP), which marked the transition between the last glacial and present interglacial period, was punctuated by a series of rapid (centennial and decadal) climate changes. Numerical climate models are useful for investigating mechanisms that underpin these events, especially now that – due to availability of increased computational power – some of the complex models can be run over the period of multiple millennia. In phase 1 of the Palmod project, we aim to perform transient simulations of the last deglaciation in order to quantify contributions of different climatic factors using complementary models and coupling strategies, including a setup in which the climate models are fully coupled to land-ice sheet models. In a 2nd phase also the full interaction with biogeochemical cycles is envisaged. Within PalMod continuous time series of the three greenhouse gases CO₂, CH₄, and N₂O have now been constructed, based on a state-of-the-art compilation of available ice core data, which have been carefully selected, partially corrected and spline-smoothed to an equidistant time step of 1 year. The full data sets, including uncertainty estimates, are covering the last 156 ky and are supported by instrumental measurements until the year 2016 CE. These data might be used for the deglaciation and other PMIP4-relevant experiments covering parts of the last 150 ky. We suggest that other PMIP participants use the same GHG data sets to force their models, which might then facilitate the intercomparisons. This GHG data compilation is documented here:


References: Enting et al., JGR, 92, 10977-10994, 1987; Enting et al., Tellus 58B, 305-309, 2006; Bruno and Joo, GEC, 11, 111-124, 1997; Hansen et al., JGR-A, 110, D18104, 2005; Köhler et al., GCB, 12, 1291-1295, 2014; MacFarling-Meure et al., GRL, 33, L14810, 2006. Additional references are found in the text for details.