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Modelling the extreme Greenhouse climate of the PETM

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The Paleocene-Eocene Thermal Maximum (PETM), which occurred ca. 55 Myr ago, is characterised by a global 5-8 degree warming. Paleodata indicate that polar temperatures were mild, while the tropics were somewhat warmer than today resulting in a weak equator-to-pole temperature gradient. The processes giving rise to high-latitude warmth are not yet well understood. We have carried out idealised experiments for the PETM with EC-Earth - a new climate model based on the ECMWF (European Center for Medium range Weather Forecasting) atmospheric model with 1 degree spatial resolution and 40 levels in the vertical including 9 stratospheric levels. We have chosen the atmospheric concentration of carbon dioxide such that the net heat flux at the top of the atmosphere and at the surface are both close to zero, given the prescribed 'PETM-like' SSTs. This is achieved with 1400 ppm. First results will be shown and different mechanism by wich the atmosphere maintains the low meridional temperature gradient will be discussed.