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# High-resolution climate and vegetation simulations of the Mid-Pliocene period: a model-data comparison

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Reconstructions of Mid-Pliocene climate (around 3 Ma) based on palynological estimates as well as several previous climate modelling attempts show evidence for significantly warmer temperatures than today and different continental moisture levels in Europe and the Mediterranean region. This epoch is therefore particularly well suited for studying the strong feedbacks between climate and vegetation in a global warming context. So far, thanks to biome modelling development, new accurate potential vegetation cover has been generated and compared with pollen records. However it is also of great interest to investigate the models' sensitivity to the simulated vegetation changes. For this purpose, we have performed high-resolution simulations of the Mid-Pliocene climate using the LMDz atmospheric general simulation model (AGCM) with a stretched grid over Europe, that gives the opportunity to enhance our comparison between model results and local pollen data. In the mean time, new pollen records analysis have provided a detailed quantification of the main climatic parameters of the Mid-Pliocene. In a first step, we applied PRISM (Pliocene Research, Interpretation, and Synoptic Mapping) boundary conditions that we adjusted to fit the high resolution, together with modern terrestrial vegetation. Second, we simulated the vegetation for this period by forcing the Dynamic Global Vegetation Model ORCHIDEE with the climatic outputs from the AGCM. We then supplied this simulated terrestrial vegetation coverage as boundary conditions in a last GCM run. The temperature results show an expected greatest consistency, with both model and data indicating increases up to

4°C in Europe whereas tendencies to higher annual precipitation than today in western Europe depicted by pollen data are not reproduced by the model. However simulation of both the annual temperature cycle and continental moisture are improved by including a realistic vegetation estimates.