



Mid-Holocene and Last Glacial Maximum climate simulations with the IPSL model: new features with the IPSLCM-5A version

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The climates of the Mid-Holocene (MH), 6,000 years ago, and of the Last Glacial Maximum (LGM), 21,000 years ago, have extensively been simulated, in particular in the framework of the PMIP (Palaeoclimate Modelling Intercomparison Project). These periods benefit from an extensive documentation from paleo-records which can be used for evaluating model results for climates different from the present one. Here, we present new simulations of the Mid-Holocene and the Last Glacial Maximum climates obtained with the IPSL_CM5A model and compare them to our previous results obtained with the IPSL_CM4 model. We show that differences in the simulated pre-industrial climate have an impact on the simulated MH and LGM climatic anomalies. In addition, IPSL_CM5 includes an interactive representation of the plant phenology which has an impact on the LGM climate over the Amazon and on the African monsoon in the MH simulation. The differences between the model results are analysed in terms of short wave radiative forcing with a simplified perturbation method. It is found that the sensitivity computed from the LGM climate is lower than that computed from 2xCO₂ simulations, confirming previous studies based on different models. Finally, the benefits of including an interactive ocean biogeochemistry are illustrated through the easier comparisons to paleo-data, directly or via a model of foraminifer distribution. The latter shows that the LGM distribution of foraminifera is not only sensitive to sea-surface temperature, therefore opening for new interpretation of this widely used data.