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The importance of the mid Holocene for improving predictions of future climate change.

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Much of the work to date within PMIP has been focussed on two particular paleoclimate epochs, the Last Glacial Maximum (LGM, 21ka BP) and the mid Holocene (6ka BP). The LGM climate was considerably cooler than the present day with large ice sheets and significantly lower atmospheric carbon dioxide concentration. Since the signal-to-noise ratio of the climate changes between LGM and present is relatively large, this epoch has been widely used as a basis for understanding the behaviour of the climate system and thus improving forecasts of future climate change. In contrast the global forcing for the mid Holocene is rather close to that of today (albeit with seasonal and regional differences), and studies demonstrating the usefulness of the period for quantitatively constraining future climate have yet to emerge. As a first step in this area we will present a comparative analysis of doubled CO_2, LGM and the mid Holocene climates using temperature and precipitation results from an ensemble of model runs from MIROC3.2. We find that the potential usefulness of the the mid-Holocene for predicting future changes forced by CO_2 exceeds that of the LGM on select regional to zonal scales, one example being the precipitation in the monsoon region. Although correlations with proposed future climate change experiments remain relatively weak, compared to that for global temperature change for LGM and future, the fact is that changes in the precipitation in the monsoon region are of high importance, and if the mid-Holocene is the most powerful paleoclimate epoch for this region, further steps should be taken to improve the simulation of mid-Holocene monsoon regions.