



Is the past a good analogue for constraining future climate change?

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Recent studies have shown that it is not possible to reduce the uncertainty range of climate sensitivity (CS) by analysing the model performance of last Century warming or of present day climatology. Alternative approaches of estimating the sensitivity of the Earth system comprise the use of paleo-data, ideally from a period with a radiative forcing and global mean temperature pronouncedly different to modern day climate, such as the Last Glacial Maximum (LGM, 21kyrs B.P.). Yet the forcing of the glacial climate is different to the forcing causing future climate changes. Thus it had been questioned to what extent the past is a good analogue for the future. Purely proxy-data based estimates of CS turn out to be biased in case the sensitivity of the climate system to past and future forcing is pronouncedly different. Model-based studies do account for differences in the feedback behaviour between glacial cooling and 2xCO₂ warming, but currently do not give a consistent picture of the asymmetry in the feedback strengths.

In our study we investigate the degree of asymmetry in the feedback strengths between simulated LGM and doubling of CO₂ climate. Our analysis is based on an ensemble of simulations performed with a model of intermediate complexity (CLIMBER-2), as well as on a set of state-of-the-art GCMs (PMIP-2). We especially discuss implications for using paleo-data to constrain future climate change.