Pliocene CO2 concentration estimated from Southern Ocean SST

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Prediction of temperature change by the climate model depends on climate sensitivity, which is the temperature change associated with doubling of CO_2 concentration. The constraint on climate sensitivity is the key part in the IPCC and thus is critical for the future climate prediction. However, despite considerable efforts for constraint on climate sensitivity, the climate sensitivity still remains uncertainty. Furthermore, recent paleoclimate studies revealed that climate sensitivity depends on climate state. This highlights the necessity to know the climate sensitivity in the warmer than the present climate for the future prediction. The Pliocene Warm Period (3-4.5 million years ago) is often regarded as the best analogue of climate in the near future and thus is ideal to investigate climate sensitivity in the warm climate state. In this study, we reconstruct CO_2 concentration based on the new empirical approach (average SST in mid latitude of Southern Ocean) to estimate climate sensitivity in the Pliocene Warm Period.

Keywords: Climate sensitivity, Pliocene, carbon dioxide concentration

