



Climatic impacts of an expanded Antarctic ice sheet at the Eocene-Oligocene boundary.

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Multiple lines of evidence point to an expansion of the Antarctic ice sheet at the Eocene-Oligocene boundary, ~34 million years ago. A decrease in atmospheric carbon dioxide is currently considered to be the most likely cause of this expansion; however, changes in palaeogeography and continental configuration may have played a role. Recently, two high-profile modelling studies have focussed on the oceanic and climatic effects of an increased Antarctic ice sheet (Knorr and Lohmann, *Nature Geoscience*, 2014; Goldner et al, *Nature*, 2014). These two studies were apparently inconsistent, in that they produced very different SST responses to an expanded ice sheet. These were, however, under different continental configurations and with different models, and so more detailed study is warranted. Here, we carry out a suite of model simulations with the UK Met Office model, HadCM3L, consisting of two different palaeogeographies (Chattian and Rupelian), both with and without an Antarctic ice sheet. The results show a very strong dependence on the underlying palaeogeography, with an SST response of opposite sign for the two palaeogeographies. We show the results and discuss the mechanisms behind the changes seen.