



Investigating Late Cretaceous Ice sheets

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The Cretaceous period has traditionally been reconstructed as being warm and ice-free, yet recent investigation of sea-level change that occurred during this period suggests a possible glacial origin. The most plausible cause being the growth and decay of moderate sized ice-sheets. This project aims to investigate this hypothesis, by exploring the form of possible Antarctic ice-sheets during the Maastrichtian. We use a palaeoclimatic proxy database to provide both boundary conditions and evaluation data for a suite of HadCM3I GCM predicted climates. These climates are then used to drive an ice-sheet model. Offline coupling of the ice sheet and climate models is used to incorporate additional feedbacks and to explore the compatibility between ice sheet and climate.

Here results are presented from the terrestrial and surface ocean data/model comparison and the subsequent ice-sheet model sensitivity experiments. Whilst at times demonstrating a good agreement between proxy and the predicted climate envelope, well known model-data discrepancies particularly in the high latitudes are observed. The magnitudes of derived ice-sheet envelopes are significantly less than those predicted from sea-level reconstructions, for example, $2 \times$ pre-industrial CO_2 levels with a favourable orbit lead to an upper limit of between $3\text{--}4 \times 10^6 \text{ km}^3$ of ice. We conclude by discussing the implications of the limitations and findings of this study.