

**SIGNALS IN ANTARCTICA OF PAST GLOBAL CHANGES – THE LAST 10,000 YEARS**

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We studied the natural climate variability of Antarctica over the last 10000 years, with a particular focus on the Antarctic Peninsula (AP) and surrounding regions, to address four questions: (1) Does 20<sup>th</sup> century warming fall within the natural range of climate variability in the Holocene, or is un-natural climate forcing involved? (2) Has the recent warming of the AP and associated ice shelf break-up happened before in the recent geological past? (3) What information can our understanding of earlier climate perturbations provide on the likely consequences of continued warming on Antarctic ice shelf stability? (4) What can our understanding of earlier climate perturbations contribute to predicting the rates and magnitude of current and future climate and environmental change? Our research combined high resolution palaeoenvironmental data from lake sediments, marine sediments, and ice cores and has given the following answers, in brief: (1) In the AP region the early Holocene (9-7ka) and the mid-Holocene (4-2 ka) both included periods that were warmer than present. If IPCC models are correct we predict that these earlier maxima are likely to be exceeded within the next few decades. (2) Both ice shelves studied, one currently collapsed (Prince Gustaf channel / northern Larsen) and one extant (George VI Ice Shelf) have broken up previously during the Holocene. (3) As these ice shelves have broken up during earlier periods of distinct Holocene warmth, we expect that ice shelves will continue to retreat in the AP region as long as the temperature continues to increase. (4) Our new lake and marine sediment records clearly show the magnitude and impacts (on biota, moisture balance, ocean circulation etc..) of past natural climate change and enable us to better predict how future change might affect terrestrial and oceanic environments in Antarctica. With the drilling of a high-resolution 950 m ice core record from Berkner Island now complete we will be able to further constrain the atmospheric parameters that have, and will, contribute to such changes in the coming decades. This presentation will give an overview of the project and how it has advanced our understanding of Holocene climate variability.