

THE EARLY CRETACEOUS CLIMATE OF SPITSBERGEN, SVALBARD

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During the Early Cretaceous, Spitsbergen was located at a palaeolatitude of ~60°N. Abundant fossil wood derived from conifer forests, dinosaur trackways, enigmatic deposits such as glendonite horizons and rare outsized clasts, and stable isotope data from the Early Cretaceous formations of Spitsbergen suggest that the climate at that time was much more dynamic than the traditional view of “invariant greenhouse” conditions on Earth. The purpose of this study is to test the veracity of using such sedimentary features as climate indicators, and to evaluate the climatic character of Arctic Svalbard during the Early Cretaceous. To these ends, the sedimentological and sequence stratigraphic context of glendonites and outsized clasts within the Rurikfjellet, Helvetiafjellet and Carolinefjellet formations will be documented. This will be achieved through high-resolution conventional sedimentary logging (bed-scale) of the Early Cretaceous succession at multiple locations, documentation of glendonites, outsized clasts, together with sampling (every < 0.5 m) for stable isotope analysis, in order to constrain and elucidate the nature of environmental and possible climatic variations during this time.

Stable isotope results from the Valanginian-to-Barremian – aged part of the succession (the upper Rurikfjellet and Helvetiafjellet formations) will be used to both improve the resolution of dating of the succession (carbon-isotope stratigraphy), and to shed light on how global perturbations in the carbon cycle, particularly during the Valanginian and Aptian, may have been expressed in the northern high latitudes. These data will improve our understanding of the global climatic and sequence stratigraphic context in which these rocks were deposited.