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Permian-Triassic palynofacies and chemostratigraphy in a core recovered from central Spitsbergen.

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The Late Permian biotic crisis is one of the most severe extinction events in the history of the Earth, affecting both terrestrial and marine environments. A large igneous province (LIP) in Siberia is thought to be linked with this global event; however, correlation between the volcanic event and the biotic crisis is difficult and requires well dated and high resolution Permian-Triassic boundary successions from the Arctic region. The Svalbard end-Permian drilling project is aimed at improved correlation of the Permian-Triassic sections in Svalbard with the Siberian Traps. The core was collected from Deltadalen, in central Spitsbergen, with additional samples collected from an outcrop close to the drilling site. As part of this collaborative project, carbon isotope geochemistry, palynofacies and palynomorphs were studied in order to learn more about the biostratigraphy and to understand changes in the source(s) of organic matter. Objectives were to reconstruct the paleo-environment; to correlate the core with other sites on Svalbard, and with global records; and to identify and characterize the Late Permian extinction event in the core. A carbon isotope shift is an important global stratigraphic marker in the latest Permian and occurs near the base of the Vikinghøgda Formation in the Deltadalen core, where bulk rock values change from -24.5 to -32.7‰Ṗalynomorph preservation was generally poor in both core and outcrop samples which prevented detailed examination of species and limited their usefulness for biostratigraphy. Still, palynofacies were useful for correlative purposes. AOM (amorphous organic matter) in the core increases at the lithological change from sandstones to siltstones, and is indicative of anoxic conditions. Similar high levels of AOM in the outcrop samples can be correlated with the core. Palynological analyses show that the spore/pollen ratio starts to increase before the negative shift in the isotope curve. Such an increase in spore-producing vegetation is thought to be an indicator of environmental stress and a high spore/pollen ratio has been recognized in many Late-Permian successions worldwide. However, changes in lithology across the interval encompassing the biotic crisis have influenced palynomorph preservation which makes it difficult to recognize the start of the extinction in the core. A decrease in spore/pollen ratio and increase in palynomorph abundance directly after the δ13C shift indicates that conditions on land are improving and the biotic crisis has ended. . The combined stratigraphical and palaeo-environmental data from this study provide a framework for ongoing research on the core, which includes geochronological and geochemical work aimed at improved dating of the extinction event and testing the link with the Siberian Traps.