



## High-resolution stratigraphic analyses of Permian-Triassic core material recovered in central Spitsbergen

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The Siberian Traps voluminous igneous activity is considered a likely trigger for the Permian-Triassic global extinction event. However, documented evidence of the Siberian Traps environmental effects decreases away from the centre of volcanic activity in north-central Russia. Previous research on the Permian-Triassic boundary (PTB) mostly relies on field observations, and resolution has thus depended on outcrop quality. This study reports on two 90 m cored sedimentary successions intersecting the PTB in Deltadalen, Svalbard, providing high-quality material to a comprehensive documentation of the stratigraphic interval. Sequence stratigraphic concepts are utilised to help constrain the Permian-Triassic basin development models in Svalbard and the high-Arctic region. The cored sections are calibrated with outcrop data from near the drill site. One core has been systematically described and scanned using 500- $\mu\text{m}$  and 200- $\mu\text{m}$  resolution XRF, hyperspectral imagery and microfocus CT (latter only on selected core sections). The base of both cores represents the upper  $\sim 15$  m of the Permian Kapp Starostin Formation, which is dominated by green glauconitic sandstones with spiculitic cherts, and exhibit various degrees of bioturbation. The Kapp Starostin Formation is in turn sharply overlain by  $\sim 2$  m of heavily reworked sand- and mudstones, extensively bioturbated, representing the base of the lower Triassic Vikinghøgda Formation. These bioturbated units are conformably overlain by  $\sim 9$  m of ash-bearing laminated black shale where signs of biological activity both on micro- and macro-scale are limited, and is thus interpreted to have recorded the Permian-Triassic extinction interval. Descriptive sedimentology and sequence stratigraphic concepts reveal the onset of relative sea level rise at the Vikinghøgda Formation base. The disappearance of bioturbation and extensive presence of pyrite in the overlying laminated black shale of the Vikinghøgda Formation suggest near anoxic conditions. The maximum flooding surface is recorded 6 m above the base of the Vikinghøgda Formation, in the middle of the laminated black shale and indicates that the lower ash-layers are tied to igneous activity at a time of relatively high sea level. The remaining succession above the laminated black shale is an overall aggradational interval of interbedded clay- and siltstones of the Vikinghøgda Formation, marking the return of biological activity at its base. The Vikinghøgda Formation includes 18 preserved zircon-bearing ash-layers, providing an opportunity for accurate U/Pb dating. Detailed cyclostratigraphic analyses of the laminated black shale suggest a sedimentation rate of approximately 0.5 cm/kyr, and provides thus, together with the U/Pb zircon ages, a great tool for high-resolution documentation of the PTB interval.