High-resolution Sampling and Photogrammetry of the Permian-Triassic Boundary Within the Festningen Profile, Svalbard

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The Permian period ended with a mass extinction event about 252 million years ago. A likely trigger of the mass extinction was the eruption of large volumes of magma which had moved through the Tunguska Basin in Siberia. The renowned Festningen section in the outer part of Isfjorden, western Spitsbergen, offers a c. 7 km long nearly continuous stratigraphic section of Lower Carboniferous to Cenozoic strata, where the end-Permian extinction interval is well-exposed. Tectonic deformation associated with the Paleogene West Spitsbergen fold-and-thrust-belt tilted the strata to near-vertical, allowing easy access along the shoreline. The section is a regionally important stratigraphic reference profile and is a key locality for geologists visiting Svalbard. The main objective of our fieldwork in September 2020 was to collect closely spaced mudstone (0.25 to 1 m interval) and ash layer (6 layers of 0.5 to 1.5 cm thickness) samples across the Festningen Permian-Triassic boundary for chemostratigraphic and geochronological assessments. Carbon isotope data reveal a well-defined negative deltaC13 excursion in the lower part of the Vardebukta Fm. Zircons are present in most of the ash layer samples and these will be dated at the University of Oslo TIMS U-Pb Isotope Geology Laboratory. In this contribution, we will also present a new digital outcrop model of the P-Tr boundary section acquired using a UAV (Mavic 2 Pro, 20MP Hasselblad camera). During acquisition, the maximum drone speed was set to 1 meter/second (i.e., “tripod mode”), and photographs were taken automatically at set time intervals (e.g., 1 photo every 5 seconds = meters). The digital outcrop model offers a pixel resolution of 7.27 mm/pixel. The Festningen model will be available online through the Svalbox.no geoscience data platform.