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A record of sedimentation of the Late Ordovician Soom Shale Member (Cedarberg Formation) from new borehole data in the Cedarberg region of South Africa

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The Late Ordovician glaciation – deglaciation is recorded in the South African Table Mountain Group (Cape Supergroup) by the Pakhuis and Cedarberg Formations, respectively. The Cedarberg Formation, consisting of Soom Shale and Disa Siltstone Members, forms an upward coarsening cycle of sedimentation in a shallow marine setting and is overlain by the dominantly fluvial sandstones of the Goudini Formation. The Soom Shale Member is particularly significant as it represents the only Ordovician Konservat-Lagerstätte in southwestern Gondwana. A preliminary investigation of the sedimentary rocks revealed an unusual facies comprising coarse quartz grains that occur in clusters and aggregates within organic matter (Figure 1) and intercalated within distal, laminated turbidites. This microfabric was tentatively linked to glacially derived loess which was either blown across seasonal sea ice or directly into the sea. To obtain new data on this unique facies, we drilled a 40 m stratigraphic core through the lower Cedarberg and upper Pakhuis Formations on Holfontein farm (~25 km south of Clanwilliam). A detailed (mm-scale) sedimentological log, petrographic thin sections and Scanning Electron Microscope analysis were employed to quantify and interpret the sedimentary facies. Our preliminary results show that the unique laminated facies is well-developed throughout the Soom Shale and persists, albeit less prolifically, into the Disa Siltstone Member. To explain the origin of this unique facies, in this study we explore hypotheses, including: 1) loess-derived quartz fertilizing marine algal blooms and 2) an algal mat bound seafloor trapping quartz grains.

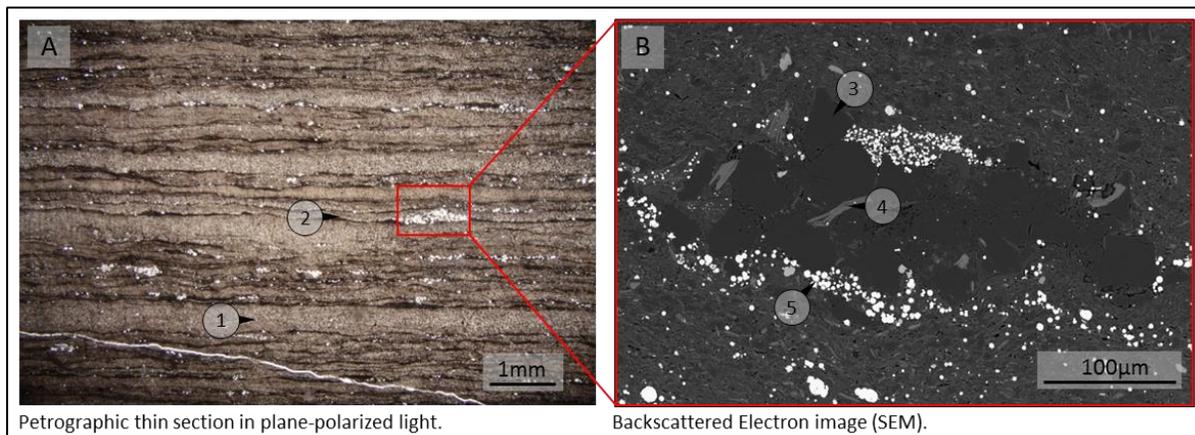


Figure 1. Photomicrographs of distal, laminated (1) turbidites showing the unusual clusters (2) of coarse quartz grains (3), occasional mica laths (4) and framboidal pyrite (5) that occur in aggregates within organic matter. Framboidal pyrite is ubiquitous within the Soom Shale but is especially concentrated within the distal, laminated turbidites and is intimately associated with the clusters.

