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Lateral variations in a tidally influenced Carnian to Early Norian transect in central Svalbard

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In Central Spitsbergen, 78 degrees north, at Deltaneset, a north facing beach cliff makes the study of lateral changes of facies possible. The cliff is one km long, up to eight m high and consists of sandstones and mudstones of Carnian to early Norian age. They belong to the Isfjorden Member of the De Geerdalen Formation and are equivalent to the Snadd Formation in the Barents Sea. These formations are interesting due to potential storage of CO_2 and a northward expanding petroleum exploration. Younger strata are continually exposed from east to west due to a dip towards southwest. The vertical succession is undisturbed.

Regional studies have shown that the formation is deposited in a westwards prograding deltaic Carnian coastline. Individual units resolved from seismic analysis exhibit a lateral continuity on a scale of kilometers to tens of kilometers. However, studies show that the sedimentary rocks were deposited in a marginal marine environment, which start out in an offshore environment, pass through a wide variety of coastal sub-environments and end up in an alluvial setting with several palaeosols. This study focuses on the marginal area where frequent fluctuations of sea level is evident, due to the recording of recurrent cycles of marine incursions capped by paleosols. It is likely that the preservation of the paleosol is made possible due to transgressions that periodically initiated an onset of a more aggradational depositional style, before the regional prograding pattern catches up and culminates in another prolonged sub aerial exposure. In addition, characteristics such as abundant mud drapes, cyclic mudstone intervals in sandstone and current reversals suggest that the palaeoenvironment was tidally influenced. A tidally influenced coastal environment is prone to be more complicated in terms of sedimentary heterogeneities than a plain wave or river-dominated environment. These variations are in general beyond seismic resolution.