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Failure of OSL dating deglacial sediments in Greenland

Svend Funder (1), Kristian K. Kjeldsen (1), Kurt H. Kjær (1), Nicolaj K. Larsen (2), and Andrew Murray (3)

(1) University of Copenhagen, Geological Museum, Copenhagen, Denmark (svf@snm.ku.dk), (2) Department of Geoscience, Aarhus University, Denmark , (3) The Nordic Laboratory for Luminescence Dating, Department of Earth Sciences, Aarhus University, Denmark

In the Early Holocene the margins of the Greenland ice sheet were under rapid retreat and huge amounts of deglacial sandy sediments accumulated in front of the glaciers in fluvial and nearshore marine environments. In southern West Greenland C14-ages indicate peak sedimentation in the period between c. 11.2 and 8.5 kaBP – the time period when most of the present land was cleared of ice. To get a closer look at the duration and dynamics of the sediment-pulses, we dated 26 samples from 5 vertical sections in the thick – up to 35 m - sediment packets by OSL dated (optically stimulated luminescence). The sediments are mostly ripple or plane laminated fine or medium sand, deposited in tidal, marine deltaic, prodeltaic, or terrestrial outwash environments, and often capped by aeolian sand. Maximum ages for the onset of sedimentation at each site is provided by 14C dates of marine shells that lived in the area before it was reached by the prograding sand, or by the local deglaciation history.
The results show that all 24 ages on deglacial sand are too old, with offsets ranging unsystematically from 100,000 to 1500 yrs. Although the sedimentary environments differ from site to site, at each site sedimentation was homogenous without significant breaks or change of sediment type. This indicates that the offset of ages is primarily a result of incomplete bleaching owing to rapid sedimentation and burial. The results show that sedimentation processes are an important aspect of OSL-dating. In order to get a better understanding of the bleaching process we currently use the elevated temperature IRSL signal on feldspars in selected samples.