Late glacial to Early Holocene deflation events and aeolian deposition on a raised ice-contact delta at Veinge, SW Sweden

Helena Alexanderson[a], Per Möller[a], Mayank Jain[b], Mads F. Knudsen[c], Nicolaj Krog Larsen[c,d], Zoran M. Perić[a], Anne Sofie Søndergaard[e], Warren Thompson[b]

[a]Department of Geology, Lund University, Lund, Sweden; helena.alexanderson@geol.lu.se; [b]Department of Physics, Technical University of Denmark, Roskilde, Denmark; [c]Department of Geoscience, Aarhus University, Aarhus, Denmark; [d]Globe Institute, University of Copenhagen, Copenhagen, Denmark; [e]Laboratory of Ion Beam Physics, ETH Zürich, Zürich, Switzerland

Wind-abraded cobbles (ventifacts) and aeolian sand are known from the sandy-gravelly coastal areas of south-western Sweden, especially in association with raised deltas. Ventifacts are recorded on at least two different stratigraphic levels, on top of glaciofluvial sediment and/or on top of littoral deposits, while aeolian sand usually forms a surficial cover. The formation of ventifacts has usually been coupled to abrasion due to katabatic winds from the retreating ice sheet or with periglacial climate during the Younger Dryas stadial (12.8-11.6 ka). However, there are very few absolute ages, and the timing of wind deflation has recently been challenged and proposed to be much older (110-70 ka).

To determine the timing of these deflation events, we have applied a combination of dating methods to ventifacts and associated sediments on top of an ice-contact delta at Veinge, south-western Sweden. Quartz and feldspar luminescence dating as well as portable luminescence profiling has been used for the over- and underlying sediments, while rock surface luminescence burial dating and paired ^{14}C-^{10}Be cosmogenic nuclide dating were done on ventifacts. The results show that a first deflation event occurred c. 16.5 ka, just after deglaciation and prior to a regional transgression that peaked around 15.7 ka. At 12.4-11.4 ka, during and just after the Younger Dryas stadial, a new set of ventifacts formed on the surface of the exposed littoral sands and gravels. Some wind abrasion also occurred in the early Holocene, but at c. 8.5 ka the surface was covered by aeolian sand, up to 2.5 m thick.

The combination of dating methods allowed us to extract more information about the timing and duration of these wind abrasion/transport events than we would have if only a single method had been used, and it is also possible to infer some environmental conditions. For example, both glaciofluvial and littoral deposits show evidence of incomplete bleaching of the luminescence signal. This suggests short subaerial transport and brief reworking by waves, respectively, though bleaching conditions improved during shore regression. Rock surface burial luminescence profiles reveal that some ventifacts were repeatedly exposed, but that later event(s) were shorter in duration as indicated by quartz-feldspar age comparisons.