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Alexanderson, Helena; Bernhardson, Martin; Henriksen, Mona; Kalinska-Nartisa, Edyta

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*Total number of authors:*

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LUND UNIVERSITY

PO Box 117  
221 00 Lund  
+46 46-222 00 00



# A sedimentary model for transverse inland dunes in central Scandinavia



H. Alexanderson<sup>1</sup>,



M. Bernhardson<sup>1</sup>,



M. Henriksen<sup>2</sup> &



E. Kalińska-Nartiša<sup>1,3</sup>

<sup>1</sup>Lund University, Lund, Sweden; <sup>2</sup>Norwegian University of Life Sciences, Ås, Norway; <sup>3</sup>University of Tartu, Tartu, Estonia

## Sedimentary model

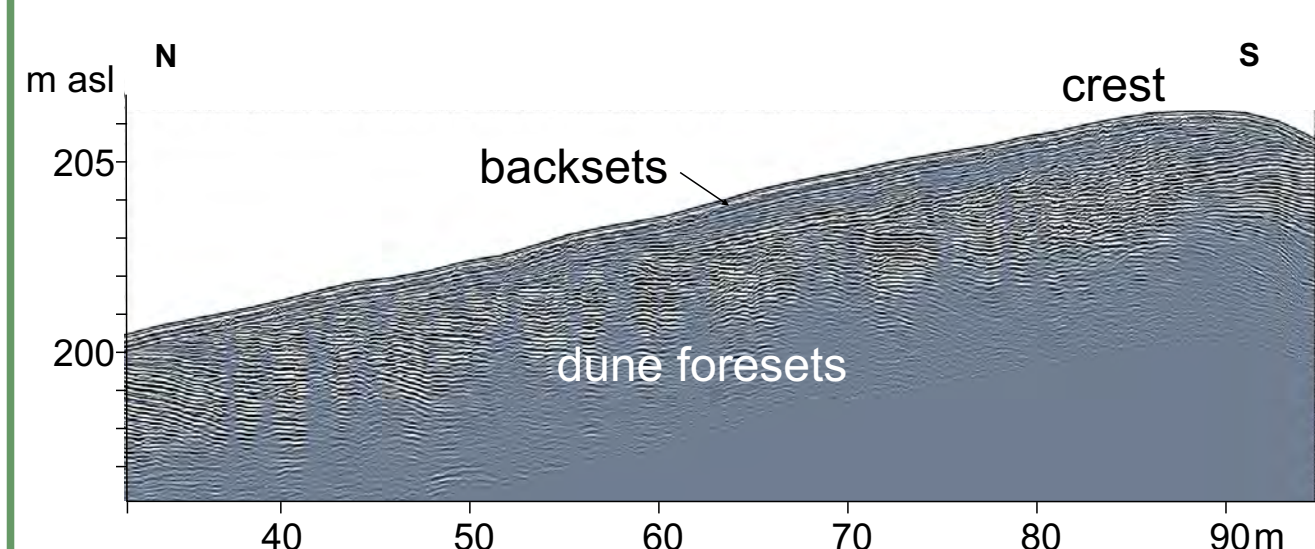
Based on geophysical and sedimentological investigations of dunes in central Sweden and south-eastern Norway, we present a sedimentary model for Scandinavian transverse, curvi-linear inland dunes. As the model is work-in-progress, we appreciate constructive comments – please use the post-its if none of us is here!

### Backsets

Facies: gently dipping or subhorizontal planar laminated sand  
Process: mainly wind ripple migration



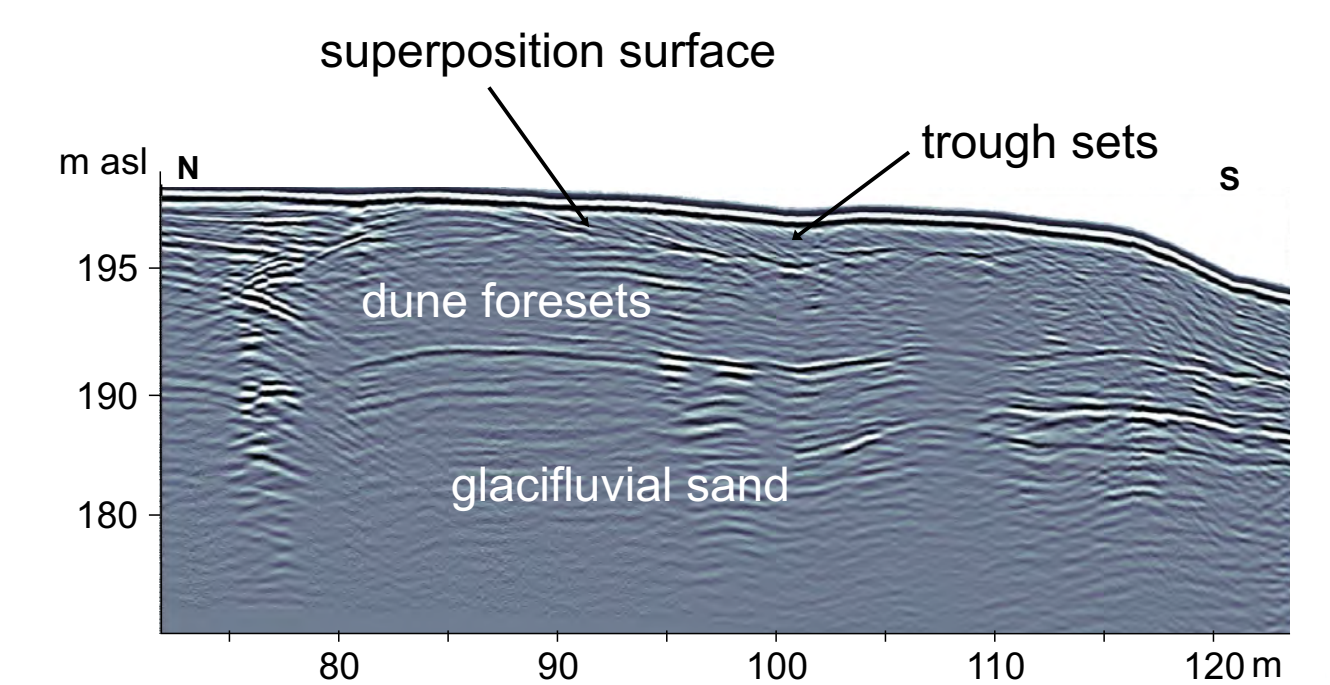
Vertical section in dune at Skattungbeden.



Windward side of a dune at Bonäsbeden. 500 MHz GPR profile.

### Trough sets

Facies: cross-bedded sand in troughs at dune crest  
Process: minor dunes migrating on top of a larger dune, following erosion



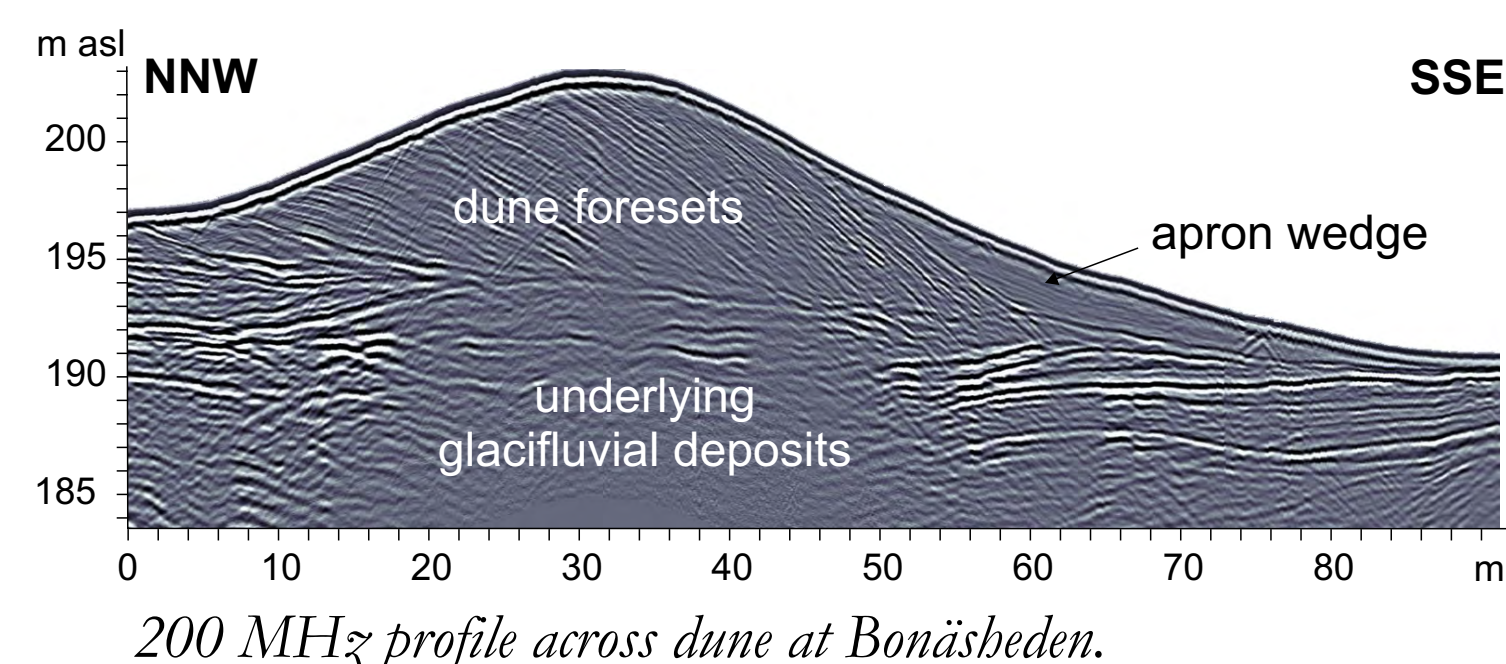
200 MHz GPR profile along the crest of a dune at Bonäsbeden. Dune foresets dip into the image.

### Foresets

Facies: Cross beds of mainly planar laminated sand, distinctly to more vaguely laminated. Dip generally 20-30°, increases distally and with dune height. Few and small erosional surfaces.  
Process: wind-ripple migration, grain fall, minor: bioturbation, grain flow



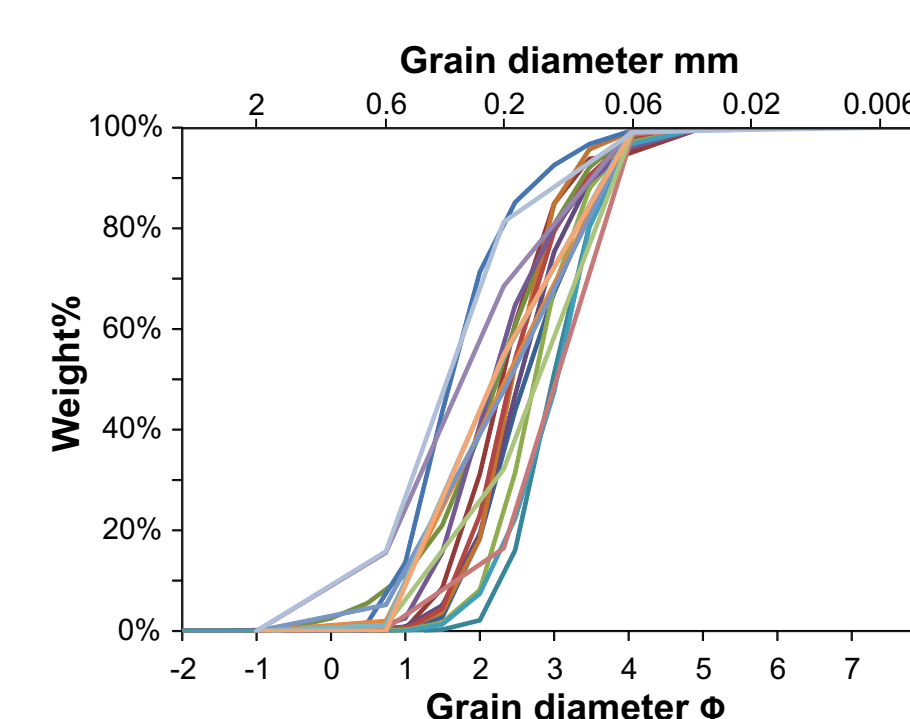
Distinct lamination in foresets at Starmoen.



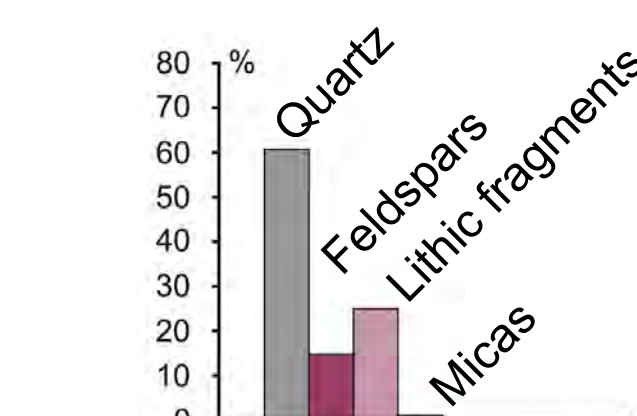
200 MHz GPR profile across dune at Bonäsbeden.

### The sediment

Grain size: fine-medium sand,  $M_G=194 \mu\text{m}$ ,  $M_Z=2.29 \phi$   
Composition: quartz 50-80 %, significant feldspar and lithic fragments  
Grain roundness: subangular dominates  
Grain surface texture: conchoidal features and steps common  
Process: Short aeolian transport with limited reworking of source material



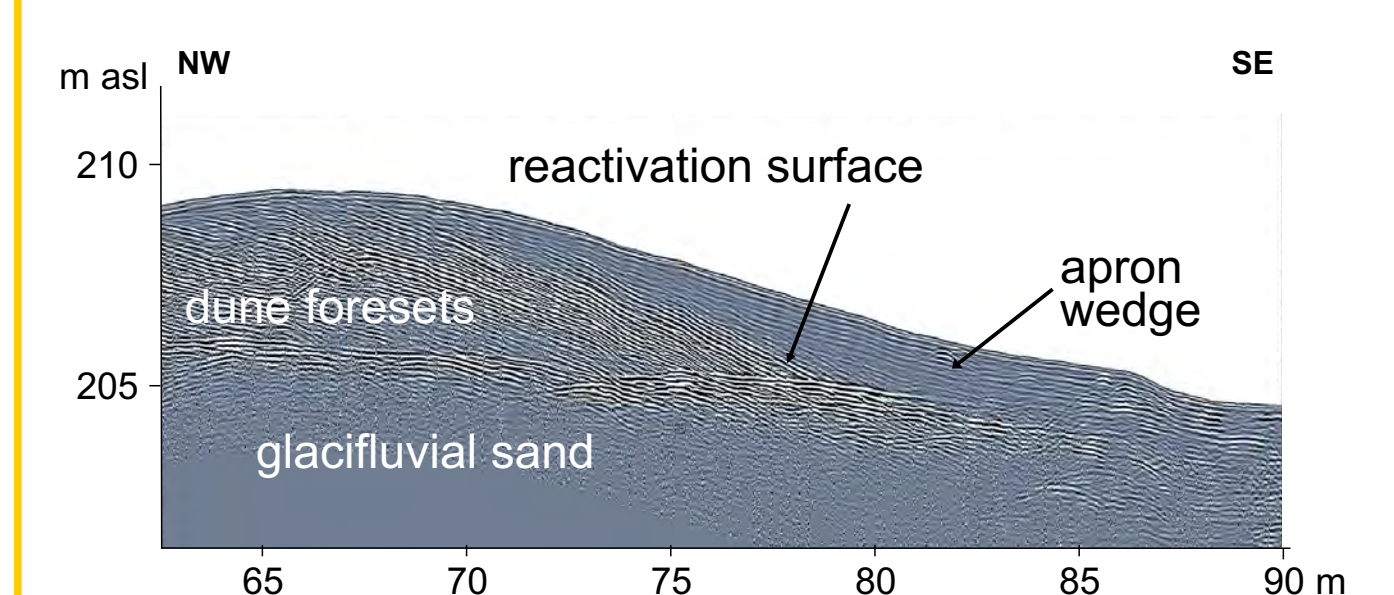
Grain-size distributions for aeolian dune sand in the study area. Data from this study and Hörner (1927).



Composition of 0.5-0.8 mm grains from a dune at Starmoen.

### Apron wedge

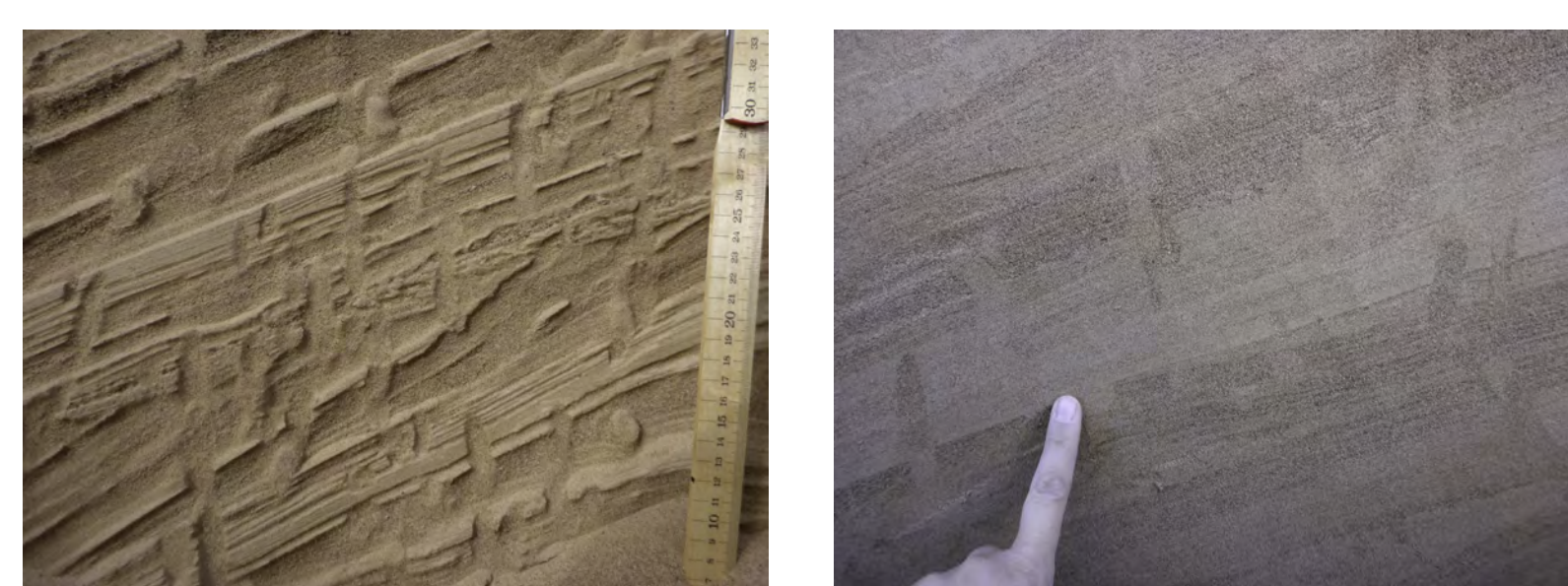
Facies: wedge-shaped massive or partly stratified sand  
Process: reworking/reactivation leading to draping of the lower part of the lee side



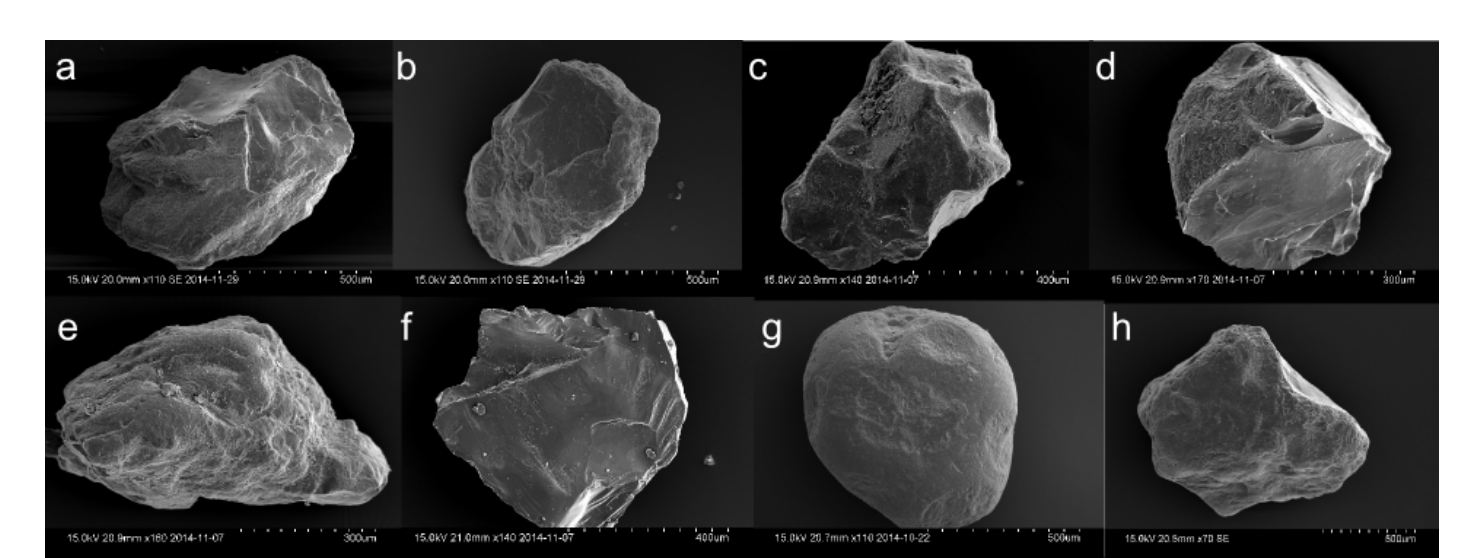
500 MHz GPR profile across a dune lee side at Starmoen.

### Strange structures

What are these more or less vertical, finger-sized secondary structures that cut across laminations in some dunes? Were they formed by a biological or physical process? **Your suggestions are welcome!**



Vertical sections in a dune at Skattungbeden.



SEM-images of aeolian grains (0.5-0.8 mm) from the Starmoen dune field.

## Inland dunes in Sweden and Norway

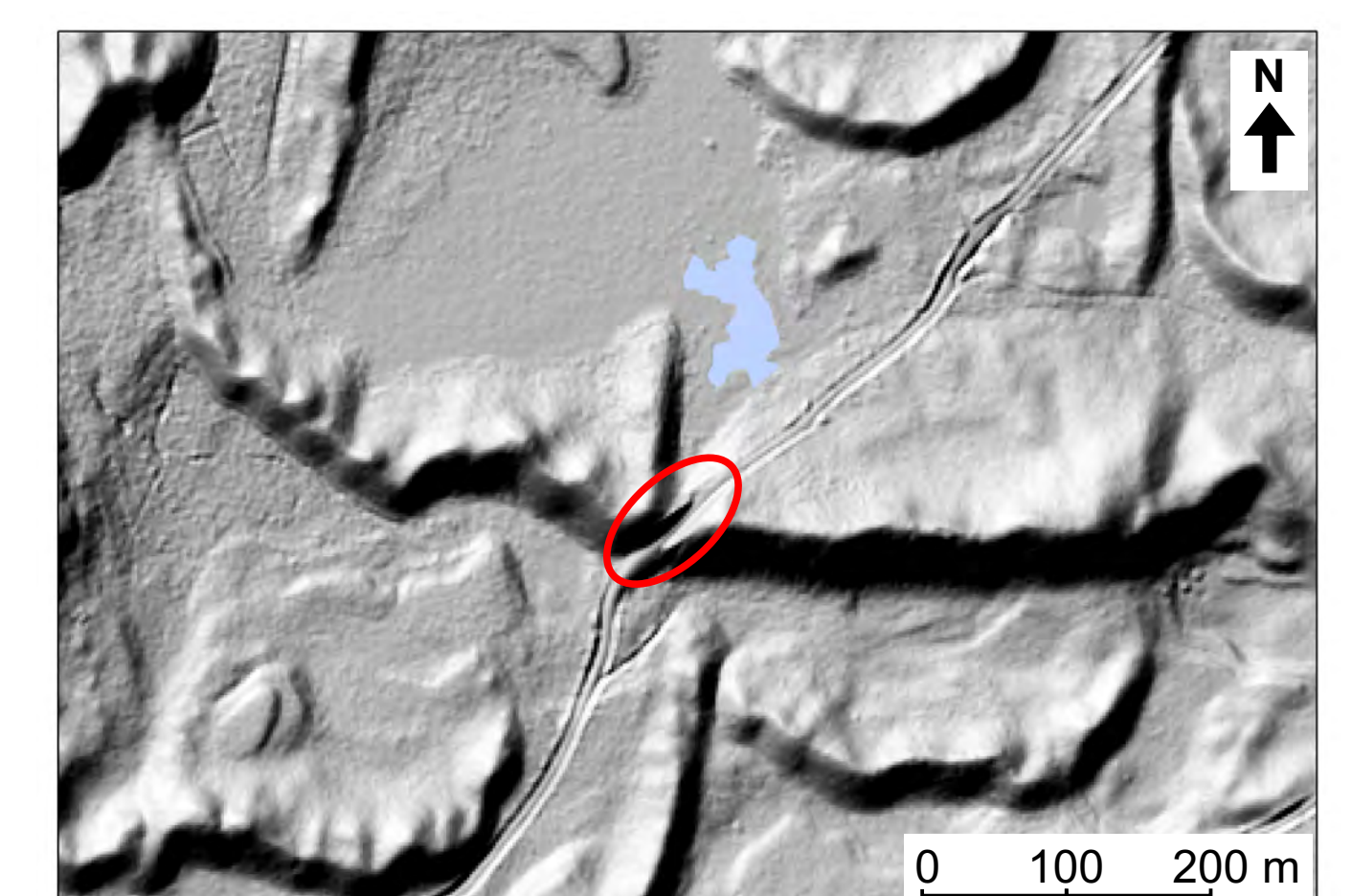


Most inland dunes in this area formed during the early Holocene (11-9 ka). They were initiated just after deglaciation, and were active for up to a few thousand years (Alexanderson & Fabel 2015, Alexanderson & Henriksen 2015, Alexanderson & Bernhardson 2016). N-NW winds first dominated dune formation, but later W winds became more important (Bernhardson & Alexanderson 2017, 2018). The dunes have largely been stable since the mid-Holocene and are today forested.

Left. Black patches represent mapped aeolian deposits (dunes, sheet sand etc) in Sweden and Norway (SGU 2013, NGU 2013). Four of the largest dune fields are marked: Elverum with the Starmoen dune field in Norway, and in Sweden Bonäsbeden and Skattungbeden in the Siljan area and Brattforsbeden further south.



Road cut through the Orsa 3 dune in the Skattungbeden dune field. The dune is here c. 6 m high.



LiDAR-based hillshade model of part of the Skattungbeden dune field with the Orsa 3 dune and the road cut shown in the photo on the left. © Lanmäteriet.

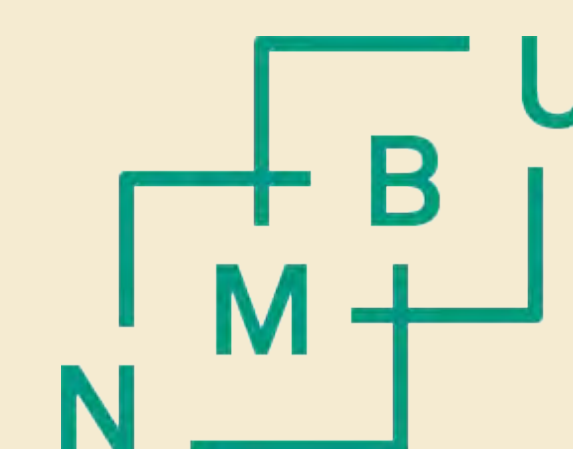
See also poster by Bernhardson & Alexanderson!



Visit project website at ResearchGate

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