STORE MOSSE 2.0

THE STORY IN THE DUST GEOCHEMISTRY

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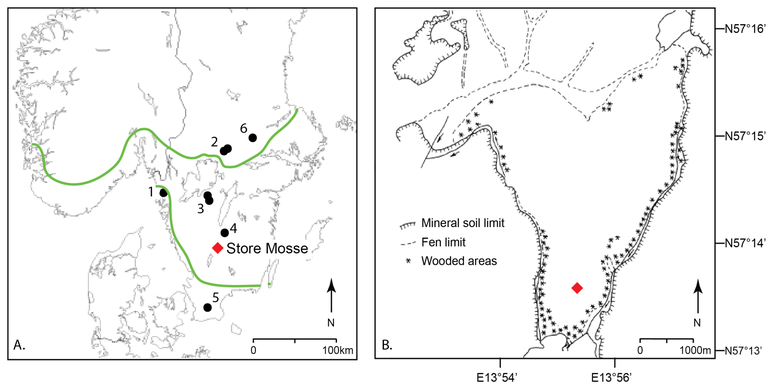
PROJECT AIM: To reconstruct for the first time mineral dust deposition in southern Sweden during the Holocene and to validate the use of peatlands as archives of atmospheric mineral dust deposition.

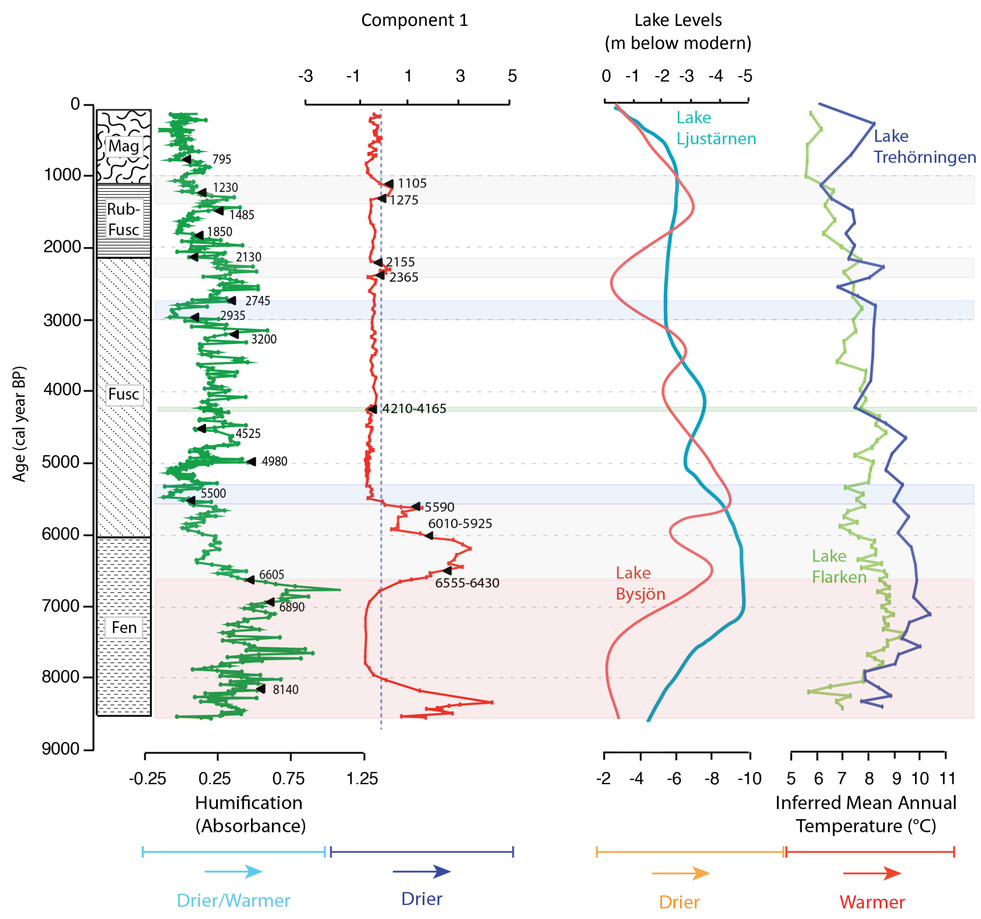


WHERE, WHEN and HOW: Store Mosse is the largest mire complex in the boreo-nemoral region (marked by green lines on map A, left) of southern Sweden covering 77 km^2. A sequence representing the last 8500 years was collected from the main bog complex (◆ in map B, left) in November 2008. The sequence was analysed at high-resolution for ash content, bulk density, absorbance (humification) and elemental chemistry. CLAM modeling of ten ^{14}C dates was used to build the age model.

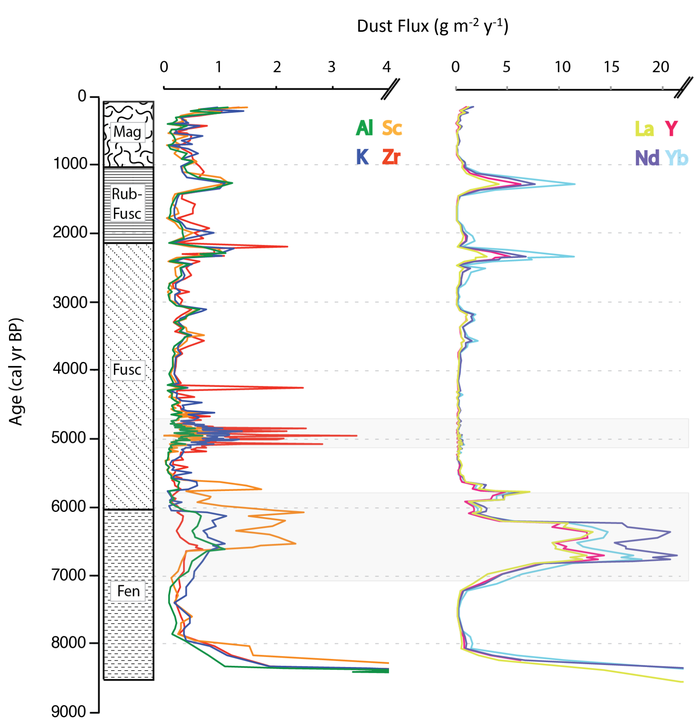
GENERAL CLIMATE PICTURE: A PCA of the elemental, bulk density and humification data extracted all the conservative lithogenic elements to the first component. Component 1 explains 58% of the variance in the data and is interpreted to represent atmospheric mineral dust deposition.

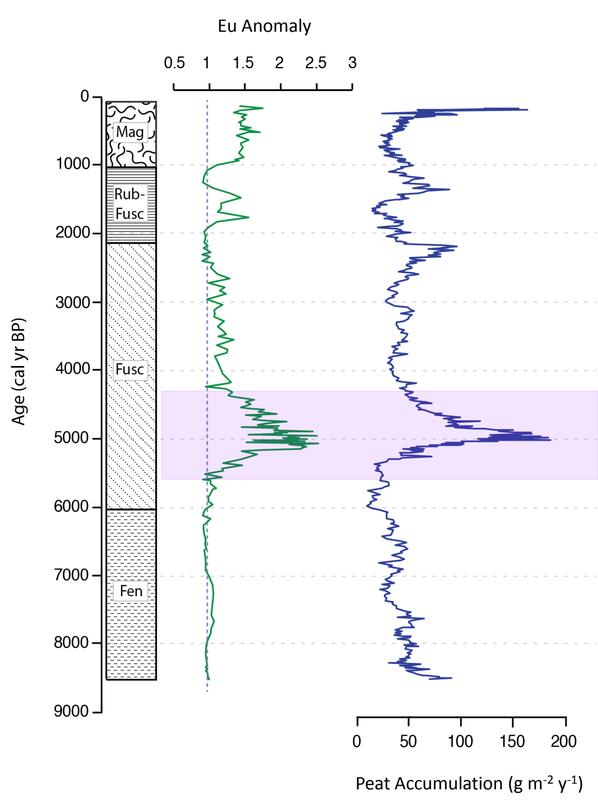
Changes in Component 1 factor scores over time and humification, which is used as a proxy of effective precipitation, are shown (right). Changepoint modeling was used to identify the timing of statistically significant changes (black arrows).

Comparison with regionally relevant lake level records from Lake Ljustjärnen (2 on map A, above)(Almquist-Jacobson, 1995) and Lake Bysjön (5)(Digerfeldt, 1988) and temperature records from Lake Trehörningen (1)(Antonsson and Seppä, 2007) and Lake Flarken (3)(Seppä et al., 2005) shows good general agreement in the timing of wetter/drier and warmer/colder conditions. Several globally recognized events are captured. (See Kylander et al., 2013, QSR for full publication.)



THE NEXT STEP: Now that the paleoclimatic framework is established, the next step in building the dust record is to quantify dust deposition rates and to source trace the archived dusts. Two decisions must be made when calculating dust deposition rates: (i) which element is most representative of "dust" and (ii) what is a reasonable average value for that element in the dust. Dust deposition rates vary widely depending on which element is used (below, left). Individual elemental fluxes vary but which one is most correct and representative?





A POSSIBLE FERTILIZATION EVENT? There is a parallel change in Eu anomaly signatures and peat accumulation rates (above, right). The Eu anomaly signals a change in the kind (more negative = less weathered) or source of deposited dusts. We suggest that this is possibly a fertilization event which could see an increase in nutrient input to this nutrient-poor system and possible burial of 0.5 Gt carbon at Store Mosse during 1000 years.