

Unravelling Palaeohydrology

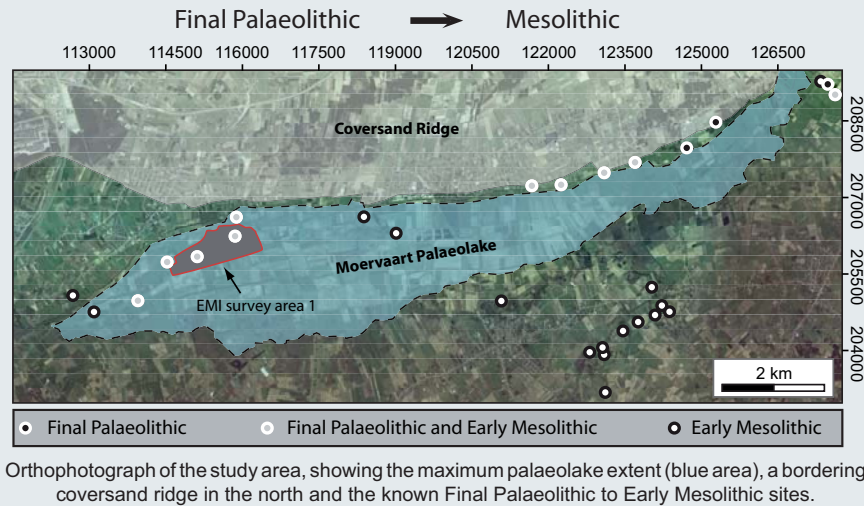
Revealing Prehistoric Landscapes with a Multi-Receiver EMI survey

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Research aim

Reconstruct prehistoric environments of a Late Glacial Palaeolake
Understand changing settlement patterns:



EMI survey

Multi-receiver EMI = basis palaeoenvironmental study

➔ mobile survey:
fine resolution (0.25 m x 2 m) + large areas (1 ha/hr)

➔ multi-coil EMI instrument:
mapping from multiple soil volumes

DualEM-21S:

coil separations: 1 m and 2 m

2 x perpendicular (PRP) coil pair

2 x horizontal coplanar (HCP) coil pair

Transmitter



Receivers



apparent electrical conductivity (ECa) depth response:

PRP: 0.5 m and 1.0 m

HCP: 1.5 m and 3.2 m

Results: multi-phased river system (EMI survey area 1)

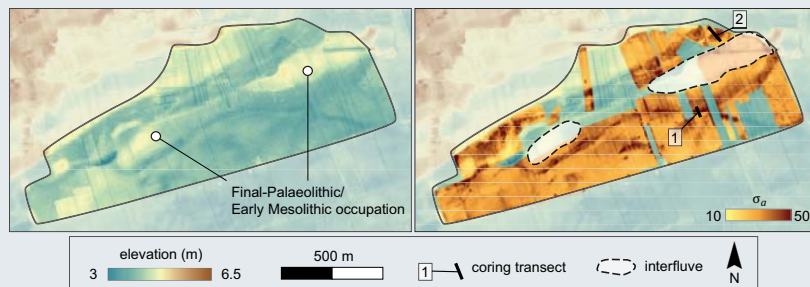
Palaeotopographical mapping

Detecting palaeoriver systems with multiple ECa measurements

Lithological coring for depth model calibration ➔

Digital Elevation Model

ECa (0 - 1.5 m)



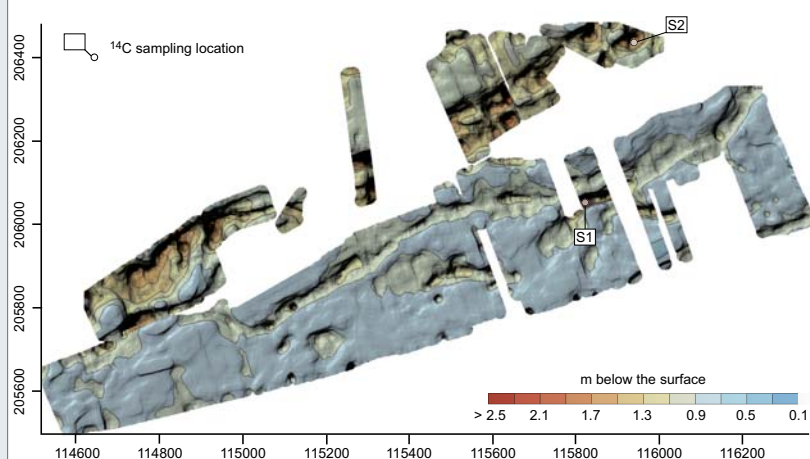
EMI-based depth model

Two river types:

shallow and anastomosing (south) deep and straight (north)

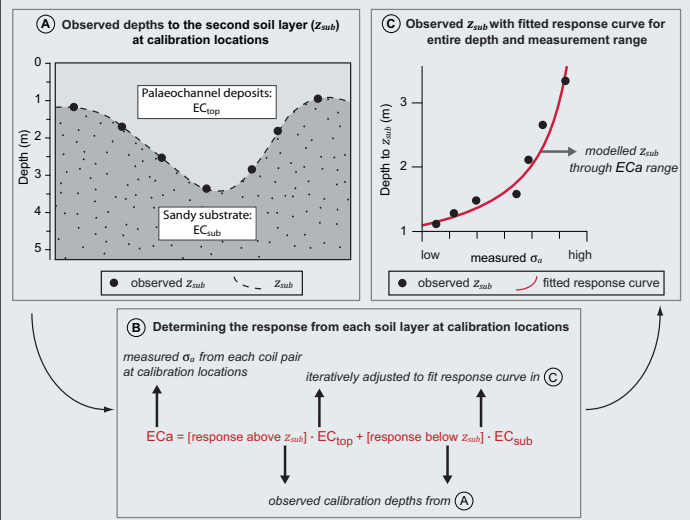
Flow direction:

west ➔ east

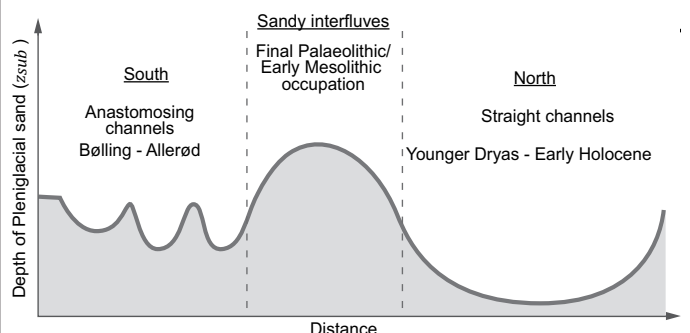


Depth model calibration

Establish model parameters: theoretical EC for palaeochannel deposits (EC_{top}) and sandy substrate (EC_{sub})



Interpretation (EMI, coring, ¹⁴C dating)



More details:

De Smedt, P. et al. 2013. A multidisciplinary approach to reconstructing Late Glacial and Early Holocene landscapes. Journal of Archaeological Science, 40, 1260-1267