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Variability in internal architecture of channel belts in the Rhine-Meuse delta, Netherlands

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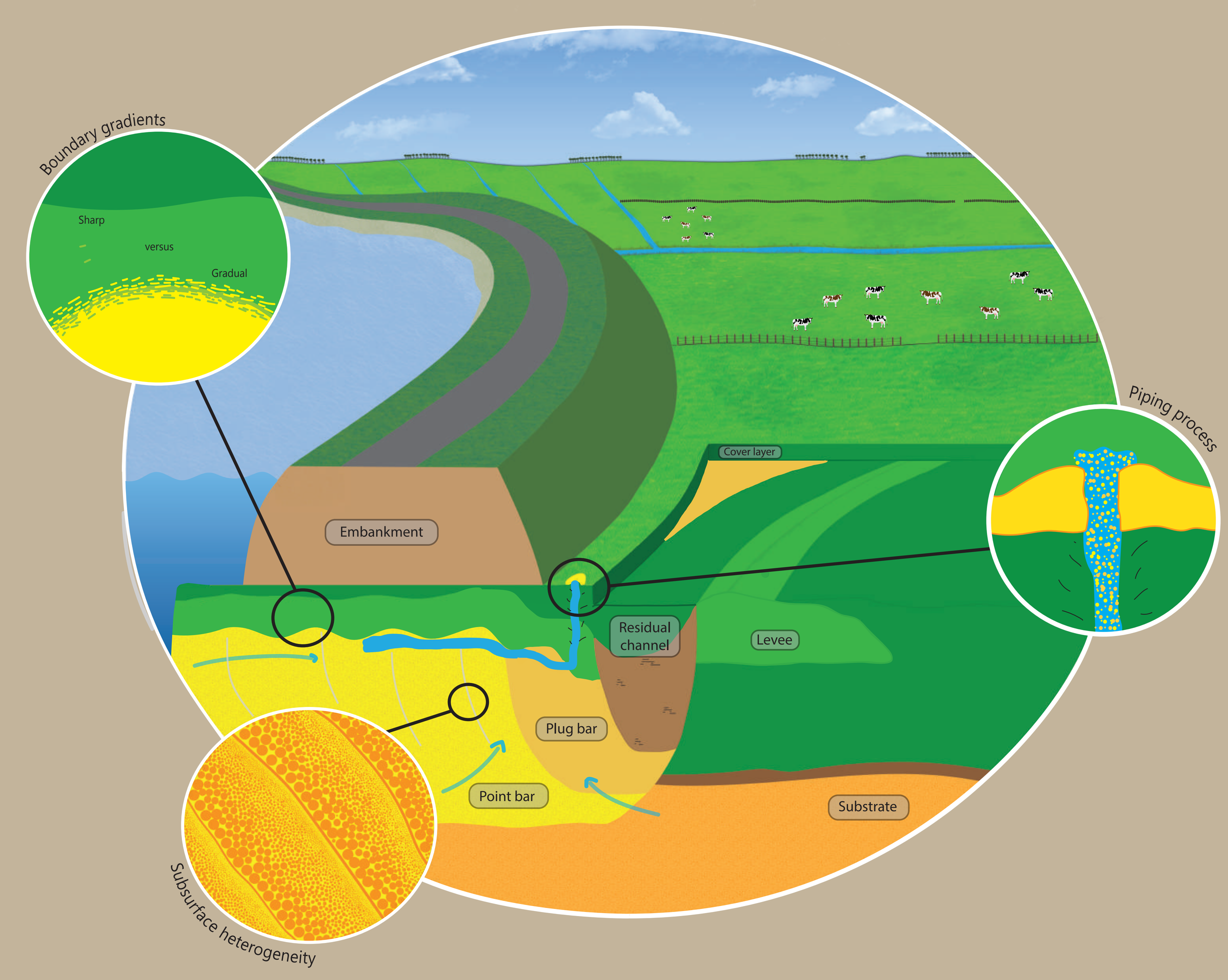
Project Aim:

To **incorporate** the **various nested scales of heterogeneity,** within and between fluvial deposits, into the piping modelling. The focus lies on making a (three-dimensional) reconstruction of the **channel belt internal architectural elements** and surrounding overbank deposits throughout the Rhine–Meuse delta.

Theoretical framework



The internal build-up of channel belts is diverse, comprising a range of elements and sedimentological structures. Within this project we want to summarize and quantify the spatial differences in internal composition of channel belts and their surrounding overbank deposits. Hereto we distinguish five different **architectural elements** based on the genesis of these deposits (during periods that the river was active and abandoning, respectively).

1) **cross-bedded sand deposits (e.g. scrolls bar and chute bar elements)**

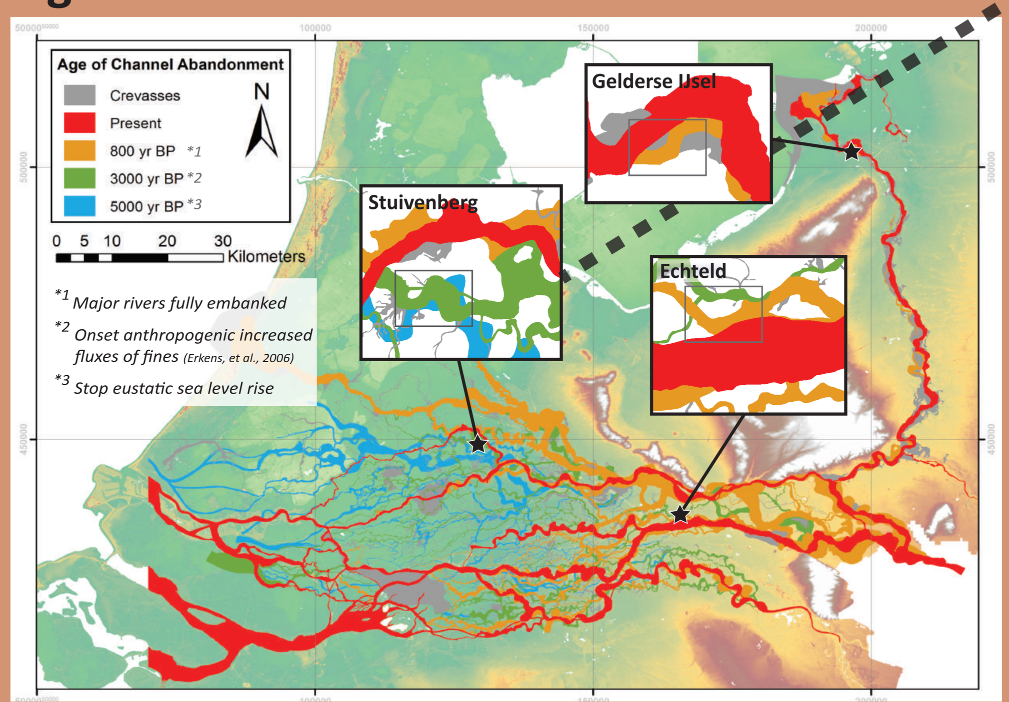
2) **vertically aggraded sandy deposits (e.g. plug-bars)**

3) **fine-grained subaqueous deposits (e.g. oxbow fills, residual channel fills)**

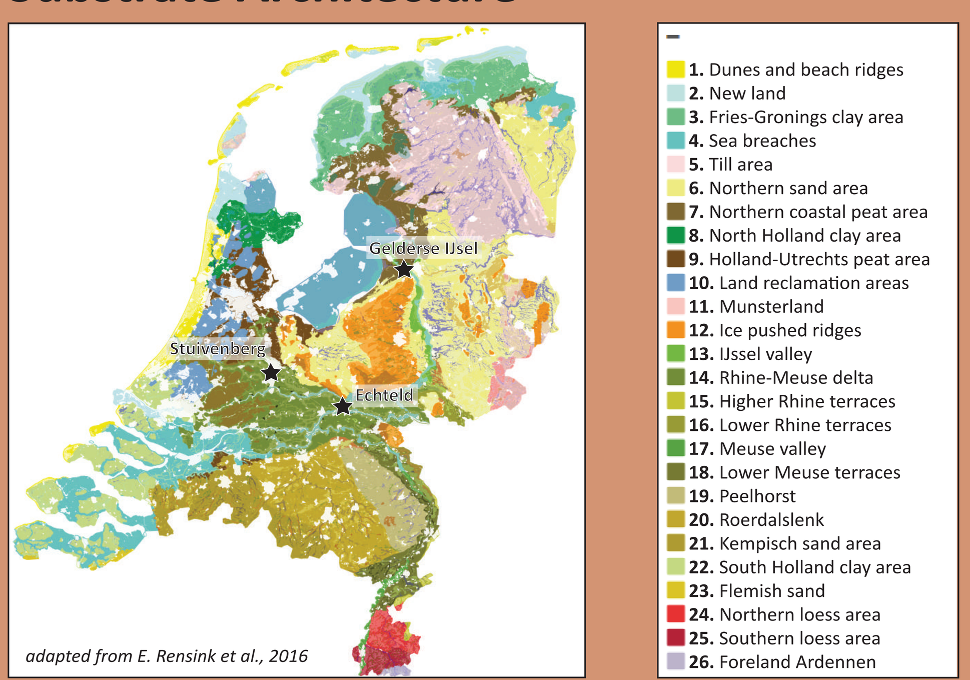
4,5) **non-channel deposits associated to Element 1 and Element 2 (e.g. levee elements from active channel and channel abandonment stages)**

Delta boundary conditions

Age of Channel Abandonment



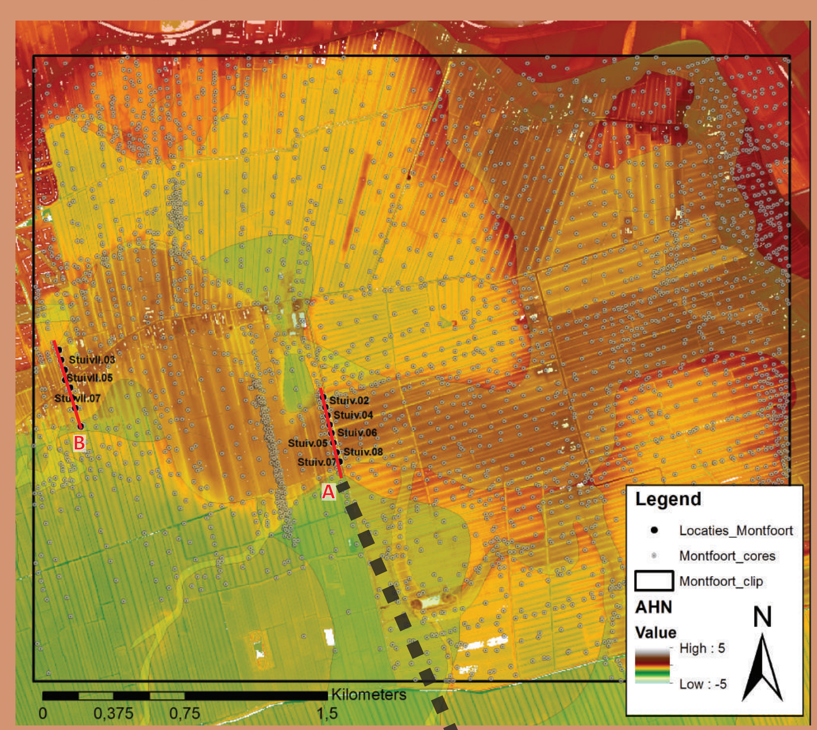
Substrate Architecture



adapted from E. Rensink et al., 2016

Example Case study: Stuivenberg

Core locations



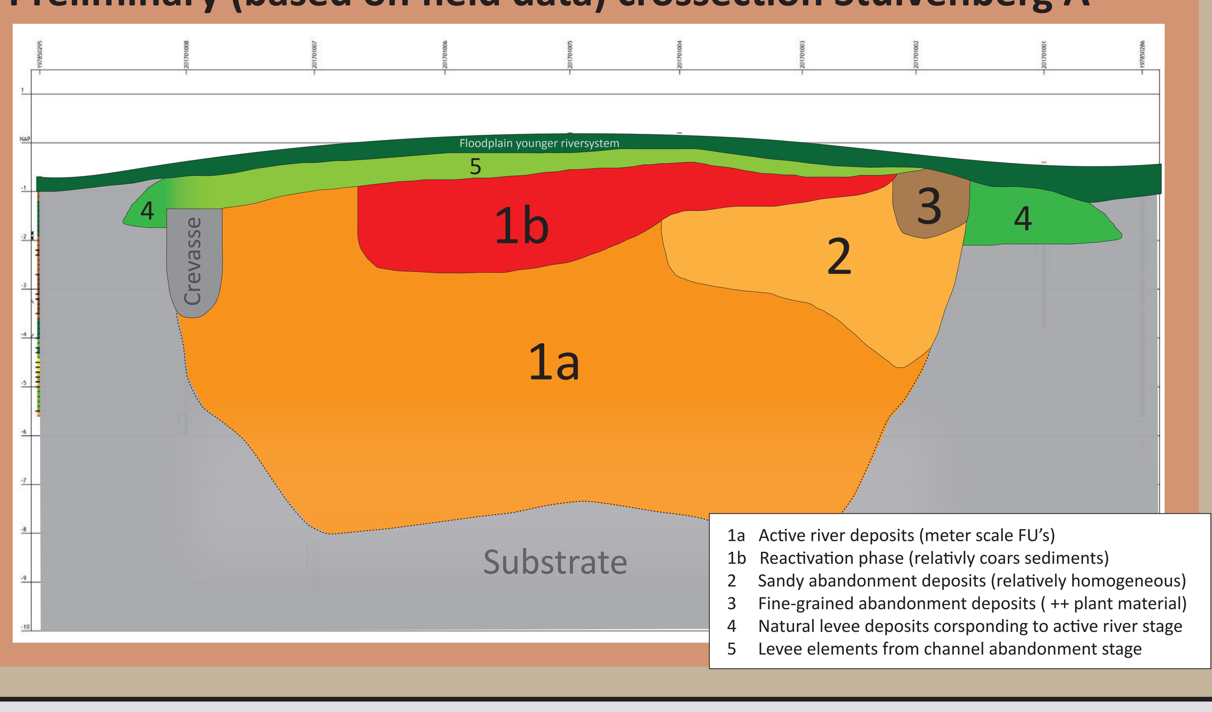
High resolution transects were cored at each pilot site. Clayey material was cored using an edelman corer while sandy material was retrieved using a Van der Staay suction corer.

Samples were analysed in the field* and sampled for sedimentary analysis.

photos T.G.Winkels

*Toelichting Bodemkaart Veengebieden provincie Utrecht, schaal 1:25.000. E. Stouthamer et al., 2008.

Preliminary (based on field data) crossection Stuivenberg A



Next Step: Sedimentary Lab analysis

Grain size distributions (<1400 µm) and **gravel percentages (**>1400 µm) are determind for each crossection, roughly 300 samples for each crossection.

Grain size distributions (V%) are measured using the **HELOS KR laser diffraction particle sizer.** Gravel percentages (W%) are measurd by **handsieving** all samples.

Sedimentary lab analyses will contribute to better quantification of the internal composition of channel belts and thus identify individual architectural elements.

Furthermore, it allows us to investigate which subsurface parameters play a key role in the formation of large subsurface 'pipes' (parallel project W.J. Dirkx, Utrecht University)

Conclusion and followups

Detailed study of paleo channels belts using fielddata reveals that it is possible to identify sub elements within a otherwise homogeneous classified sandy body. In the next phase laboratory datasets will be added to quantify individual architectural elements which will help us to better **determine hydraulic properties** of these elements and investigate the effects of lithological variations on the **groundwater flow patterns.**

References:

E. Rensink, H.J.T. Weerts, M. Kosian, H. Feiken & B.I. Smit (2016). Archeologische Landschappenkaart van Nederland, Versie 2.6, Rijksdienst voor het Cultu reel Erfgoed, Amersfoort.
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