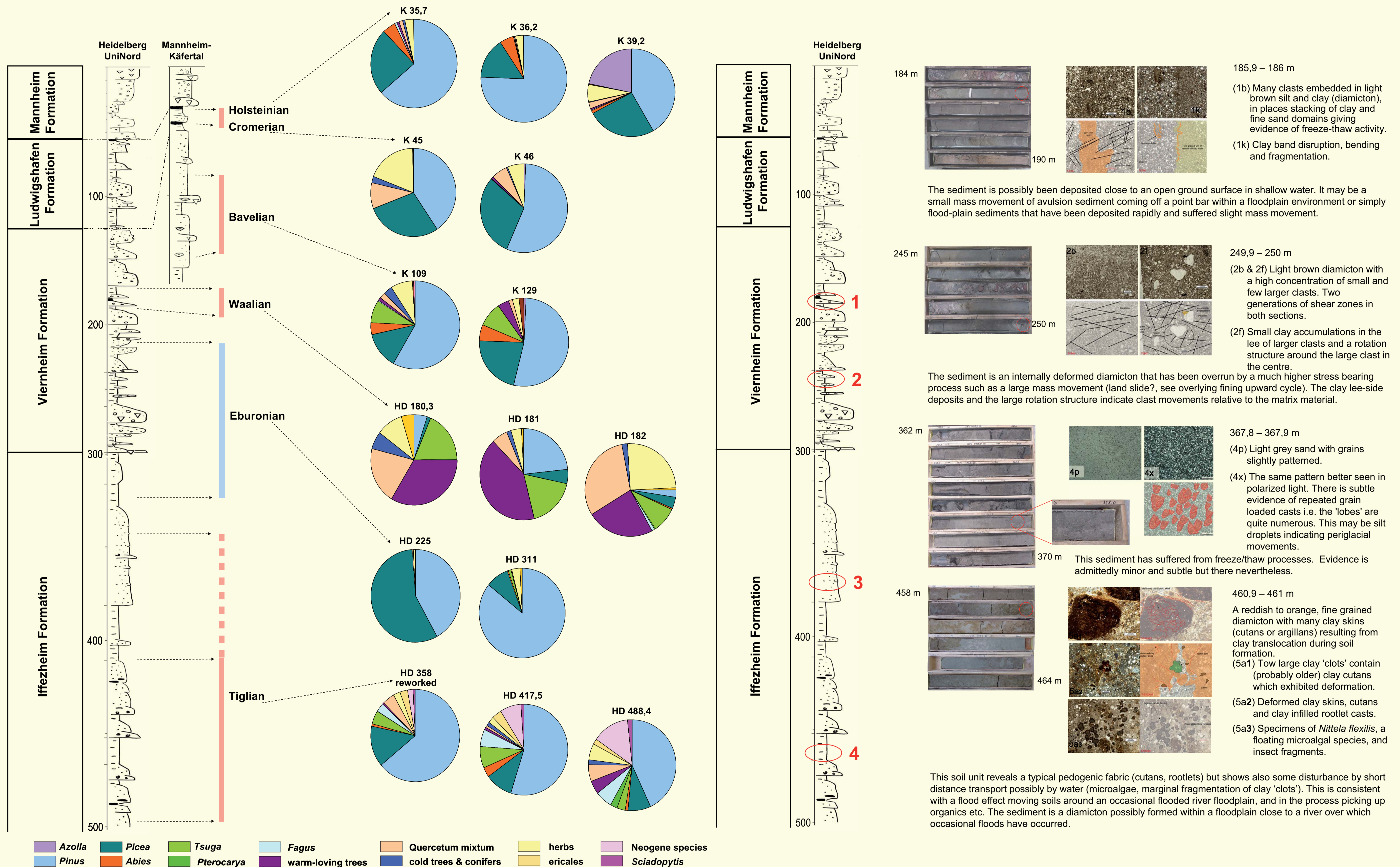


The Heidelberg Basin Drilling Project – Sedimentology and Stratigraphy of the Quaternary succession –

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Within the context of the Heidelberg Basin Drilling Project (GABRIEL et al. 2008), a highly resolved sediment succession was explored by deep drillings. The two successions of **Heidelberg UniNord** and **Mannheim Käfertal** can easily be correlated using sequence stratigraphical patterns. Together they represent one of the most-complete continental successions of the NW-European Quaternary in stratigraphical superposition. Here some new results supported from pollen analysis and micromorphology are presented. They are used to reconsider some of the climate transitions within the Pleistocene.

Lithology
In the northern Upper Rhine Graben the lithostratigraphic column starts with quite coarse gravels of the Mannheim Formation reaching almost 60 metres in the central Heidelberg Basin. Below follows the fineclastic Ludwigshafen Formation. Down to 300 meters at UniNord, the Viernheim Formation consists in its upper part of uniform bedload clastics and deeper down of a variable interbedding of gutter and floodplane deposits shed by the alpine Rhine. The lowermost unit, the Iffezheim Formation, is composed of sand and pedogenic clay of local provenance.

Pollen and micromorphological analyses attest the presence of several climate transitions of the Pleistocene, making it one of the most-complete continental successions of the NW-European Quaternary.

Palynology
More than 90 samples have been processed from the Heidelberg UniNord core, and additionally 64 samples from Mannheim Käfertal. We found an almost complete succession of the Quaternary climate stages in the pollen assemblages.
Palynological evidence within the Ludwigshafen Formation comprises the **Holsteinian**, characterized by mainly *Abies* (fir), some *Fagus* (beech), *Pterocarya* and *Azolla*, and the **Cromerian** with a *Pinus-Picea-QM* (pine-spruce-QM) flora. The **Bavelian** is documented in the upper part of the Viernheim Formation at Mannheim Käfertal with common *Abies* and *Tsuga* (hemlock fir) within a QM flora accompanied by phases with increased NAP and *Pinus*. In the lower part of the Viernheim Formation in both sections, the **Waalian** (HAHNE et al. 2009) is indicated by warmth-loving species (QM and others) together with *Tsuga*. From around 220 m down into the Iffezheim Formation conifers predominate indicating the **Eburonian** cold phase. Below about 340 m depth at Heidelberg UniNord, typical warm assemblages document the **Tiglian** with *Fagus* & early Pleistocene taxa, especially *Sciadopitys*. Further, Tertiary taxa increase in number down to the final drilling depth of 500 m, but other than before expected, no true Tertiary pollen spectrum, not even a spectrum indicating the Pretiglian was found. This certifies that the Iffezheim Formation (sediments of local carbonate free) the Pleistocene at



Micromorphology
The sediment package was studied both, macro- and microscopically (MENZIES 2009) providing evidence of fluvial, lacustrine and mass movement processes. Some samples indicate periglacial processes as silt droplets within fine grained sands which suggest frozen ground conditions. These are often accompanied by pollen spectra dominated by pine and NAP.

The Tiglian part of the succession shows periglacial sediment structures at its base and top but not in its middle parts. That is that the Tiglian appears not as a series of warm and cold phases but rather as a constant warm period with warm-cold-alternations at its beginning and end.

References
GABRIEL, G., ELLWANGER, D., HOSELMANN, C. & WEIDENFELLER, M. (eds.) (2008): The Heidelberg Basin Drilling Project. – E & G Quaternary Science Journal, Special Issue 57, 3-4; Hannover.
HAHNE, J., ELLWANGER, D. & STRIETZKE, R. (2008): Evidence for a Waalian thermomere pollen record from the research borehole Heidelberg UniNord, Upper Rhine Graben, Baden-Württemberg. – E & G Quaternary Science Journal, 57, 3-4, 403-410; Hannover.
MENZIES, J. (2009): Heidelberg UniNord Micromorphology Samples - Preliminary Sample Descriptions & Interpretations. Brock University, Int. Report, pp. 15; St. Catharines.

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