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A New Continuous Terrestrial Archive of Environmental Change during the Last Interglacial/Glacial Cycle – The Loess-Palaeosol-Sequences of the Schwalbenberg (Middle Rhine Valley, Germany)

Peter Fischer, Olaf Jöris, Andreas Vött, Kathryn Fitzsimmons, Mathias Vinneband, Ulrich Hambach, Charlotte Prud'homme, Philipp Schulte, Frank Lehmkuhl, Christian Zeeden, and Wolfgang Schirmer (p.fischer@geo.uni-mainz.de)

Over the last interglacial/glacial cycle climate variability and forcing in the northern hemisphere is best documented in high resolution from marine and ice core records. The response of land surface processes to climate over this period, however, remains poorly defined. Understanding landscape response to climate change is nevertheless of critical importance not only because as humans we live on and interact with the land, but also in order to identify potential feedbacks and forcings between land and atmosphere which cannot be ascertained from marine and ice core records. In this context, Loess-Palaeosol-Sequences (LPS) are outstanding terrestrial archives allowing detailed reconstruction of palaeoclimate and palaeoenvironmental changes. However, regarding their complexity, LPS represent polygenetic and multiphase archives over different spatial and temporal scales. Consequently, a solid understanding of geomorphological and pedogenic processes involved in LPS formation, and the interplay with changes in ecological conditions, must be considered before LPS can be correlated with other archives.

Against this background, extensive fieldwork has been carried out at the Schwalbenberg site near Remagen (Middle Rhine valley, Germany) combining geophysical exploration with Direct Push borehole geophysical measurements and sediment coring. We will present a first comprehensive data set for the Schwalbenberg key area based on a transect from up- to downslope. The integration of grain size, organic carbon and weathering indices from long sediment cores (up to 30 m) and profile sections contribute to a better understanding of processes involved in the Schwalbenberg LPS formation. These data combined with age constraints based on radiocarbon and luminescence dating lead to a first robust chronostratigraphic model of the Last Interglacial/Glacial Cycle suggesting the Schwalbenberg LPS to be a terrestrial archive of palaeoclimate variations in phase with northern hemispheric ice and marine records.