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# Loess-palaeosol sequences along the Rhône Graben (SE France): the potentially missing link between loess archives in central Europe and the Mediterranean region?

Nora Pfaffner (1), Daniela Sauer (1), Annette Kadereit (2), Sophie Cornu (3), Barbara von der Lühe (1), Pascal Bertran (4), Mathieu Bosq (4), and Sebastian Kreutzer (5)

(1) Department of Physical Geography, University of Goettingen, Goettingen, Germany , (2) Heidelberg Luminescence Laboratory, University of Heidelberg, Heidelberg, Germany , (3) CNRS, Collège de France, IRD, INRA, CEREGE, Aix-Marseille Université, Aix en Provence, France , (4) Institut National de Recherches Archéologiques Préventives (INRAP), PACEA, Université de Bordeaux, Pessac, France , (5) IRAMAT-CRP2A, UMR 5060 CNRS - Université Bordeaux Montaigne, Pessac, France

The Rhône Graben in south-eastern France stretches from 45°5' N at the confluence of the Saône River southward to 43°2' N at the Rhône delta on the Mediterranean coast. At present, the climatic conditions along this north-to-south transect represent a gradient from a humid-temperate to a Mediterranean climate. Mean annual temperature (MAT) increases from 12.2 °C to 13.7 °C, and the ratio of mean monthly maximum to mean monthly minimum precipitation MMPmax/MMPmin increases from 1.89 to 4.04, thus reflecting a progressive shift towards a typical Mediterranean precipitation pattern.
The aims of our study are (i) to reconstruct, how this climatic and environmental gradient changed over the Late Quaternary, based on a series of loess-palaeosol sequences along that transect, and (ii) to correlate these sequences with loess-palaeosol sequences in central Europe.
At the current stage of the work, we have studied seven loess-palaeosol sequences along the Rhône Graben and established a preliminary stratigraphy, which will be supported by optically stimulated luminescence (OSL) dating (in progress).

The seven sequences from North to South:
(1) Profile Les Sautons at 45°5.6' N, 4 km NNE of Tournon-sur-Rhône (MAT = 12.2 °C, MAP = 810 mm, MMPmax/MMPmin = 1.89);
(2) Profile Les Chaux at 45°5.1' N, 3.5 km NE of Tournon-sur-Rhône;
(3) Profile Garenne at 44°42.6' N, 18 km NNW of Montélimar (MAT = 12.9 °C, MAP = 840 mm, MMPmax/MMPmin = 2.81);
(4) Profile St. Julien at 44°17.4' N, 33 km SSW of Montélimar;
three sections around Collias, 27 km West of Avignon (MAP = 698 mm, MAT = 13.7 °C, MMPmax/MMPmin = 4.04), including (5) Profile Collias-North (43°57.4 'N), (6) Profile Collias D112-South (43°57.2' N), and (7) Profile Collias-Wood (43°57.2' N).

Based on a multi-proxy analysis of these sequences, we reconstruct the changing palaeoenvironmental conditions through time at each site. Finally, a synthesis of the individual reconstructions will elucidate the changes of the environmental gradient over the Late Quaternary. The next step will extend the transect northwards over the next years. With respect to the correlation of the profiles studied so far, the most crucial stratigraphic unit is a brown palaeosol horizon, marked by large, vertically oriented calcium carbonate rhizoliths at its base in most of the profiles. In the South, the rhizoliths are usually ca. 5-20 cm wide and 20-50 cm long, tending to be smaller in the North. In some profiles, the brown palaeosol horizon shows tree-root channels that are filled with sediment, appearing as brown tongues penetrating down into an underlying lighter coloured C horizon, instead of the rhizoliths. Based on the position of the brown palaeosol horizon, we assume that it formed during MIS 3. It appears to be a marker horizon that is suitable for correlating the palaeosol-loess sequences along the transect. However, its chronostratigraphic position still needs to be determined by luminescence dating.