



## **The high resolution multiproxy record from the loess sequence of Surduk (Serbia). Prevalence of a particular atmospheric circulation southward of the Alpine glacier during the last climatic cycle?**

D. D. Rousseau (1, 2), **P. Antoine** (3), C. Hatte (4, 5), M. Fuchs (6), C. Gauthier (4), S. Kunesch (3), M. Jovanovic (7), T. Gaudenyi (7), S. Markovic (7), O. Moine (6), J. Rossignol (1)

(1) Universite Montpellier II, Institut des Sciences de l'Evolution, case 61, place Eugene Bataillon, 34095 Montpellier cedex 05 France, (2) Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY 10964, USA, (3) Laboratoire de Geographie physique, UMR CNRS 8591, 1 place Aristide Briand, 92195 meudon cedex, France, (4) Laboratoire des Sciences du Climat et de l'Environnement, UMR CNRS CEA 1572, avenue de la terrasse, 91198 Gif-sur-Yvette, France, (5) NSF Arizona AMS laboratory, Phycis Building, PO box 210081, Tucson, AZ 85721-0081, USA, (6) Universität Bayreuth, Lehrstuhl für Geomorphologie, Universitätsstr. 30, D-95440 Bayreuth, Germany, (7) Quaternary Research Center, Trg Dositeja Obradovica 3, 21000 Novi Sad, Serbia and Montenegro.  
([denis@dstu.univ-montp2.fr](mailto:denis@dstu.univ-montp2.fr) / Fax: +33 467042032 / Phone: +33 467144652

Since the last decade, multidisciplinary investigations of European loess sequences along a W-E transect between 45° and 50° N yielded a precise sketch showing the sharp alternation of non-dusty (soils and soil complexes) and dusty (loess) intervals. The observed pattern has been interpreted as related to changes in the atmospheric circulation triggered by the climatic changes prevailing over North Atlantic Ocean. However, loess sequences located southward of the main loess belt, southward of the Alpine glacier, appear to present a different pattern. Here we present new results from the multidisciplinary high-resolution investigation (5cm/18m) of the Surduk loess sequence, located in the right bank of the Danube in Serbia. First the pedostratigraphical analysis indicates two main loess units overlying the last interglacial-early Glacial soil complex, separated by the well-individualized Surduk humic soil, dated at about 32 kys BP (AMS and IRSL). The upper loess unit does not show any occurrence of tun-

dra gley horizons compare to those evidenced in the sequences previously investigated northward, indicating then drier environments. The lower loess unit shows sub-units but again no occurrence of any particular soil. The combination of grain size,  $\delta^{13}\text{C}$  and Total Organic Carbon (TOC) analyses do show on the contrary that environmental changes strongly affected the sequence during the last climatic cycle despite an apparent regular sedimentation rate. Based on the available dates, the basal part of the lower unit corresponding to marine isotope stage (MIS) 4 shows more homogenous conditions corresponding to dry (TOC,  $\delta^{13}\text{C}$ , clay%) and windy (grain size) environment. The top part of this first unit shows a change in the environmental conditions associated to the beginning of MIS 3.  $\delta^{13}\text{C}$  values similar to those observed in the Surduk humic soil indicate the occurrence of at least two temperate soils characterized by high TOC, low values of coarse fraction. These two soils, weakly expressed brownish horizons, show higher values for the clay, TOC than the well expressed Surduk soil. A moisture trend, towards very dry conditions characterizing the last glacial maximum, is punctuated by at least two wetter intervals. Generally then, our results show a very good correlation between the main proxies investigated, and especially between TOC, clay% and  $\delta^{13}\text{C}$ . Contrary to what has been described previously in the northward European loess sequences, the driest conditions, occurring in Surduk after the LGM, do not correspond to the windiest interval which seem to be the same however than those described in the northward loess sequences. Therefore, the results from the last climatic cycle in the Surduk loess sequence shows a particular pattern which can be related to the location of the area investigated, southward of the Alpine glacier and protected by the Carpathians or to a slightly different atmospheric circulation. Moreover the occurrence of coarse sand beds originating from the Danube plain during the Lower Pleniglacial, while the Upper Pleniglacial faces is represented by typical homogeneous loess, indicates a probable change in the main wind direction between the two periods. These scenarios are discussed.