

Interactive comment on “Excursions to C₄ vegetation recorded in the Upper Pleistocene loess of Surduk (Northern Serbia): an organic isotope geochemistry study” by C. Hatté et al.

C. Hatté et al.

christine.hatte@lsce.ipsl.fr

Received and published: 4 April 2013

see attached doc

Please also note the supplement to this comment:

<http://www.clim-past-discuss.net/9/C344/2013/cpd-9-C344-2013-supplement.pdf>

Interactive comment on Clim. Past Discuss., 9, 187, 2013.

C344

1 Excursions to C₄ vegetation recorded in the Upper Pleistocene loess
2 of Surduk (Northern Serbia): an organic isotope geochemistry study.
3
4
5 Hatté Christine [1], Gauthier Caroline [1], Rousseau Denis-Didier [2,3], Antoine Pierre
6 [4], Fuchs Markus [5], Lagroix France [6], Marković Slobodan R. [7], Moine Olivier [4],
7 Sima Adriana [2]
8 [1] Laboratoire des Sciences du Climat et de l'Environnement, CEA-CNRS-UVSQ, F-91198
9 Gif-sur-Yvette, France
10 [2] Laboratoire de Météorologie Dynamique, UMR CNRS-ENS 8539, F-75231 Paris,
11 France
12 [3] Lamont-Doherty Earth Observatory of Columbia University, NY Palisades, USA
13 [4] Laboratoire de Géographie Physique, CNRS-Unité Paris 1, F-92195 Meudon, France
14 [5] Department of Geography, Justus-Liebig-University Gießen, D-35390 Gießen,
15 Germany
16 [6] Institut de Physique du Globe de Paris, Sorbonne Paris Cité, Unité Paris Diderot, UMR
17 7154 CNRS, F-75005 Paris, France
18 [7] Chair of Physical Geography, University of Novi Sad, Novi Sad, Serbia
19
20
21 Abstract:
22 Loess sequences have been intensively studied to characterize past glacial climates of
23 the 40°S° North and South latitude zones. Combining different approaches of
24 sedimentology, magnetism, geochemistry, geochronology and malacology allows the
25 general pattern of the climatic and environment of the last interglacial-glacial cycle in
26 Eurasia and America to be characterized. Previous studies performed in Europe have
27 highlighted the predominance (if not the sole occurrence) of C₃ vegetation. The
28 presence of C₃ plants suggests a regular distribution of precipitation along the year.
29 Therefore, even if the mean annual precipitation remained very low during the most
30 extensive glacial times, free water was available for more than 2 months per year.
31 Contrarily, the δ¹³C record of Surduk (Serbia) clearly shows the occurrence and
32 dominance of C₄ plants during at least 4 episodes of the last glacial times at [28.0–26.1],
33 [21.4–20.0], [15.9–14.4] and [9.8–8.1] (in kyr cal. BP). The C₄ plant development
34 is interpreted as a specific atmospheric circulation pattern that induces short and dry
35 summer conditions. As possible explanation, we propose that during “C₄ episodes”, the
36 Mediterranean Sea would have been under the combined influence of the following: a
37 strong meridional circulation unfavorable to water evaporation that reduced the
38 Mediterranean precipitation on the Balkans; and is a high positive North Atlantic
39 Western Russian (NAWR)-like atmospheric pattern that favored northerlies over
40 westerlies and reduced Atlantic precipitation over the Balkans. This configuration would
41 imply very dry summers that did not allow C₃ plants to grow, thus supporting C₄
42 development. The intra “C₄ episode” periods would have occurred under less drastic
43 oceanic and atmospheric patterns that made the influence of westerlies on the Balkans
44 possible.

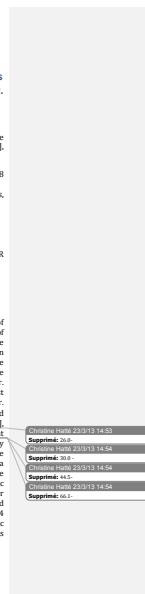


Fig. 1.