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Climate of the Past Discussions

Interactive comment on "North Atlantic abrupt climatic events of the Last Glacial period recorded in Ukrainian loess deposits" *by* D.-D. Rousseau et al.

Anonymous Referee #2

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Review of "North Atlantic abrupt climatic events of the Last Glacial period recorded in Ukrainian loess deposits."

This is a very nice paper, discussing the possibility that abrupt climate change in the North Atlantic influenced conditions in the Ukrain. It should be published with a few minor revisions.

1. Inclusion of model simulation (figure 8) p.1975 line 15: "North Atlantic events extending their impact as far as the east of Europe is supported by general circulation model simulations of the impact of North Atlantic abrupt climate changes in Europe (Fig. 8), showing predominant western winds over the entire conti- nent for three types

of glacial climate conditions; a Greenland interstadial, a Greenland stadials and a Heinrich event." "The numerical simulations by Sima et al. (2009) also suggest a correlation be- tween West- and East-European sequences, reflecting the impact of the North Atlantic nmillennial timescale climate changes over the continent." I do not understand how these simulations support the conclusions. The winds are westerly, that is true, but how does this mean that the impact of North Atlantic abrupt climate changes in Europe extend a certain distance? I would think you would need to differences two simulations to show that there is a significant response to abrupt climate change in the north Atlantic in this region? For your study, it would appear that you would want to look at changes in temperature and precipitation, and how far east they extend in the different simulations. I like the idea of including evidences from simulations, but I do not find the way they are included now to be very effective.

2. size in the cores is a reflector only of winds "Considering all the material as windblown, the increasing fraction of coarser material upwards might be interpreted as reflecting a gradual intensification of the wind dynamics, with a possible increase in the frequency of strong wind episodes." "The variations with time (depth) of the loess grain-size composition are mainly re- lated to a combination of changes in the wind and precipitation regimes, from local to much larger spatial scales (Duce, 1995)." A switch to coarser grain materials could also be due to a shift in the source material or location, or due to weaker winds in the source regions, decreasing the kinetic energy picking up and breaking apart the materials, and thus increasing the size of the entrained material. While it maybe more likely that a switch to coarse material means higher winds, there are alternative explanations, and these should also be mentioned, perhaps in the discussion or results section, just to be clear what can definitely be concluded, and what assumptions you are making.

Details:

"This grain-size gradient is related to the relative position of the corre- sponding dust sources: the English Channel and Southern North Sea basins, exposed to deflation

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due to sea level lowering in glacial times." How do we know the sources? Is this from geochemical data?

"The sand fraction remains low and does not show any particular variations. " I can't find the sand fraction on this figure (I think you can reconstruct this as the remaining percentages from the total, but of course, this isn't so easy to do in one's head): I assume this is 'not shown?' so maybe you should say that?

"The sand fraction reproduces this pattern inversely, but at much lower values." Again, the sand fraction is not shown.

In the top 1 m, the sand fraction increases at the expense of the fine and silts." Again, not shown.

"With respect to the four analyzed size fractions, the embryonic soils identified in the stratigraphy are characterized by a decrease in coarse silt and sand, and an increase 5 in the fine silt components (Fig. 4)." I cannot see this in the coarse silt or fine silt (and of course, not in the sand, since that is not shown). Maybe you want to show a statistical relationship or someway to pull this out easier?

"Geochemical analyses of eolian deposits in Southern Ukraine, correlated with the presence of sand units south of Stayky (Buggle et al., 2009), have been interpreted as indicating a predominant northern wind direction." I like your discussion later, where you call the deposition direction the 'effective direction' instead of assuming that mean wind speeds are equivalent to the deposition direction downwind.

"The coarse material (coarse silts and sand) comes from sources relatively close to the site, while the fine material (clays and fine silts) has probably been brought also from more distant areas, via the high-altitude atmospheric transport (Duce, 1995; Pye,1995)." What you consider fine silts here, are actually considered coarse aerosols (>2um) and don't have a very long lifetime in the atmosphere, so they would also tend to have a 'local' source and not be carried too far. However, it depends a bit on what

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we would consider far: 100-1000km could be done.

“Taking into account the available dates and the stratigraphic similarities, a correlation between the two sequences can be proposed.” Can you discuss how much we should trust this temporal correlation, given the uncertainties in the dating of the two cores?

Interactive comment on Clim. Past Discuss., 6, 1959, 2010.