

Thanks to reviewer2 for pointing key issues in this paper. We have tried to reply his main comments as follows in blue.

While the DO cycles were widely recognized in globally distributed archives, the nature of abrupt climate changes remains controversial before the last climate cycle. This paper presents a good review on DO-like events of the penultimate climate cycle. New investigations of European loess records from MIS 6 reveal the occurrence of alternating loess intervals and paleosols, similar to those from the last climatic cycle and to those in lake, marine and speleothem records. Based on statistical similarity between these millennial-scale oscillations, the authors argue that the abrupt cause and global imprints were persistent during at least the last two climate cycles. This topic is suitable for the scope of the CP, but current version can be improved if the following concerns can be fully incorporated in a revised version.

1. Title: "The loess point of view" can be removed from the title, since this paper includes a broad review of DO-like events in different records.

Well Reviewer2's point is correct and could be adopted, however if we refer to our reply about point 5, this proposal remains questionable because we raise the issue based on our investigation on loess deposits.

2. Add a new map showing the locations of loess, speleothem, lake, and marine records mentioned in this paper, rather as separated maps in each figure.

This is already the case on Fig. 1 A and B but we will improve Fig. 1A by adding the name of the records to their precise location indicated by the red spots. However, they are all on a Google Maps plotted in supplementary figure 1.

3. Fig.1 and related text: As a review of European loess records, the authors emphasized the similarity of DO-like events during the last two climatic cycles. But this similarity can not be verified from a single loess record shown in Fig.1. **It's very necessary to add additional loess records with clear DO events of the last climatic cycle in Fig.1 to confirm the similar expression of millennial events during last two glaciations.**

We agree with Reviewer2 that relying on one single record would be highly questionable. However, in the introduction of the study we recalled the correlations between paleosols, tundra gleys and incipient units we have made in European loess sequences at 50°N with the DO events determined in Greenland ice cores, based on precise dating of these pedogenic units. The similarity of the paleosol-loess succession at the base of Harletz high resolution MIS6 record with the LCC records in European loess sequences, allows us to infer that the warm events be considered as interstadials, therefore DO-like events. Furthermore, the pedogenic processes as expressed by the upper intervals inferred by the magnetism, grain-size and spectrocolor measurements lead us to include them among the identified interstadials. As the neighbor records in the Danube area, Fig. 1B, do show only one event expressed by a paleosol (supplement Fig.2) we have decided to expand further our investigation into steps, first within the Mediterranean Basin, which shows a complex paleoclimate history, and secondly to more global records, including N European loess records.

While several weak paleosol layers can be identified in the outcrop, some layers in early MIS 6 can be easily judged by abrupt proxy changes, **but others in late MIS 6 is not evident.**

We agree with reviewer2 that this could be questionable, but magnetism measurements show a clear pedogenic effect as indicated by a normalized isothermal remanent magnetization proxy and bulk coercivity of remanence occurring simultaneously to the variations, even slight in other proxy records like grains-size and spectrocolorimetry.

Please clarify how many DO-like events can be robustly confirmed from the loess proxies, which is the key for further comparison with other records.

As requested by reviewer1, we added in the figure 2 an extract of the MIS6 stratigraphy of Harletz (see Fig. 1C) showing the various identified DO-like events, interstadials, as ISp deduced from direct paleosol observations (4 ISp are identified) and as ISm deduced from reliable proxy measurements (6 ISm are identified)

4. Fig.2 and related text: A regional synthesis of high-resolution records from adjacent lakes and ODP sites can confirm the presence of DO-like events in the MIS 6. Two concerns need to be clarified: (1) why the Soreq d18O record is different from those of lake and marine records (e.g., the precession cycles and DO-like events);

The representation of the Soreq $\delta^{18}O$ record is presented inversely than the classical way with low values to the left characterizing increased rainfall amount above the cave situated in central Israel. Bar-Matthews et al 2003 describing this speleothem record and another one in northern Israel concluded that they recorded the proxy signal of global and regional Eastern Mediterranean climate over the last 250 kyrs. The age model of Soreq is based on ^{230}Th -U dating while the marine, partly, and continental cores are orbital tuned.

As already stated by Martrat et al. (2007) for the last four climate cycles in the western Mediterranean and the Iberian margin, the observed variations in sea surface temperature, expressed by UK'37, show a nonlinear response to external triggers of climate that are obliquity and precession. However, some interstadials are synchronous to Mediterranean sapropels, which are a direct response to orbital forcings. Rohling et al. (2015) presented an updated review of the present and past Mediterranean climate and oceanography with a clear differentiation between the western and eastern basins providing explanations why Soreq $\delta^{18}\text{O}$ differs from the other records.

and (2) **How to correlate the DO-like events of S1-9 and I1-12 to those in the Harletz loess sequence.**

We will replot Fig. 2 to show Soreq record the classical way to ease the reading with Ionina and ODP977 and the evaluation of the potential synchronous events, but still keeping the original time scales. Doing so, this highlights the uncertainties in the different age models used in the different records. Moreover, as requested by Reviewer1 we added Harletz stratigraphy to a revised version of the figure to support our interpretation.

5. Fig.3 and related text: A global synthesis of abrupt events in the MIS 6 is presented in Fig.3. It seems to me **that the magnitudes and timing of these abrupt events are quite different.**

Yes, we agree with reviewer2's comment, but we wanted to present the raw evidences.

I would suggest employing a unified strategy to synchronize and numbering these DO-like events, rather than just putting these records together.

We agree with reviewer2's comment, but synchronization is the topic for an upcoming paper in preparation as well as deciphering/homogenizing the various numberings presently prevailing in several records.

Then, the similarity and discrepancies among these records can be properly addressed, which permits a better understanding of the abrupt cause and global nature of these DO-like events.

In this figure, we have pointed the DO-like events as determined by Barker et al when reconstructing the Greenland $\delta^{18}\text{O}$ variation for the eight last climate cycle based on the bipolar seasaw mechanisms applied to the EPICA Dome C record. We also plotted the Chinese composite speleothem record for MIS6 in which interstadials have been proposed and numbered, just showing that there is still some significant work to perform before proposing a reliable frame and record. The marine records are there to show also the complexity of the record of interstadials in the Northern Atlantic Ocean during MIS6 while there was quite some homogeneity for the last climate cycle. Some numbering has been proposed for ODP984 and 977/MD01-2443 that we have reported.

Having this in hand, we prefer to refer our study to a loess point of view, see reviewer2's comment#1, as we remain on just evidencing the reliability of the abrupt changes in our loess records although expecting further synchronization in the upcoming months.