Climate of the Past Discussions

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Comment on cp-2021-143

Anonymous Referee #3

Referee comment on "Impact of terrestrial biosphere on the atmospheric CO_2 concentration across Termination V" by Gabriel Hes et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2021-143-RC3, 2021

Hes et al. present new palynological data from the Iberian Margin (IODP Site U1386) spanning Termination V (TV; i.e., MIS 12/11 transition) and evaluate the effect of terrestrial biosphere on the atmospheric CO_2 concentrations using model simulations in which they include other available, globally distributed pollen records from this interval. This is an important dataset that fills in a critical gap in the palynological records off Iberia, and hence it merits publication. On the other hand, however, there are important methodological caveats related to set up of the study that preclude publication of the manuscript in its current form. As it currently stands, I find the interpretation of the results premature, and hence, I refrain from commenting on it before the points below are addressed by the authors in a revised version.

Study interval

The focus of the manuscript is on TV, which according to the authors it spans the period between 433 and 404 kyr BP (line 39). This is wrong (e.g., see the duration of glacial terminations in the Chinese speleothem record by Cheng et al., 2016). What the authors consider as TV actually spans almost the entire MIS 11c interglacial. If the authors decide to consider the entire period 433-404 kyrs, then they should also include several other palynological records that span MIS 11c, and re-run the model simulations. Please also note that there is at least one more model study that focuses on terrestrial biome simulations for MIS 11–12 (Kleinen et al. 2011), which the authors should consider and elaborate on in a revised manuscript.

Pollen records database

In contrast to the authors' argument (line 174), there exist many more pollen records that span TV and aren't included in this work. For instance, Ioannina (Tzedakis 1994), Heqing

(Xiao et al. 2010, An et al. 2011), Lake Baikal (Prokopenko et al. 2010), Lake Biwa (Tarasov et al. 2011), Praclaux (de Beaulieu et al. 2001) and Valles Caldera (Fawcett et al. 2011) among others. In addition, higher temporal resolution data exist for some of the pollen records included in this manuscript (e.g. Lake Ohrid – Kousis et al. 2018, Koutsodendris et al. 2019, and Tenaghi Philippon – Ardenghi et al. 2019); these should be also included in the analysis. Moreover, the study by Dupont et al. (2011) included in Table 1 doesn't span MIS11/12; do the authors refer to Dupont et al. (2019)?

Lithology and pollen concentration

The authors explain that the study samples are taken from a core interval that comprises a 'unique contourite' affected by the Mediterranean Outflow Water (MOW) (lines 91-92). The question that arises is to what extent the changes in the MOW strength influence the transport and deposition of pollen grains at the study location. To convincingly show that the palynological results aren't affected by ocean dynamics, the pollen sums and concentrations should be directly compared with the grain size and XRF data from Site U1386 that record the MOW variability. Only then it will be possible to conclude that even pollen sums of 100 grains can provide reliable insights on terrestrial vegetation at the study site.

Pollen groups

Please explain in a more concise way which pollen taxa are included in each group (lines 140-143 are very confusing). Is it correct that *Betula* is included in two groups, i.e., Mediterranean and Pioneer forests? Please explain. Also, shouldn't *Populus* and *Salix* be included in the Pioneer Forest group? Which taxa are included in the Ubiquist group?

Other comments:

- Please carefully check and correct the spelling of the pollen taxa names (several taxa e.g., *Helianthemum, Hippophaë,* and Cupressaceae are misspelled many times in the text).
- Consider the latest, higher resolution CO_2 data from the EDC ice cores for the interval 330-450 kyr BP (Nehrbass-Ahles et al. 2020).

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