

Interactive comment on “Exploring a link between the Middle Eocene Climatic Optimum and Neotethys continental arc flare-up” by Annique van der Boon et al.

Anonymous Referee #2

Received and published: 13 May 2020

Detailed comments on the manuscript of “Exploring a link between the Middle Eocene Climatic Optimum and Neotethys continental arc flare-up” have been made as follows.

This paper presents new data, idea and explanation about a link between the Middle Eocene Climatic Optimum and Neotethys continental arc flare-up. It is sure that this interpretation in this paper presented will therefore be of considerable helpful for anyone working in this field. I fully support publication of this work, and the comments that I have listed below are chiefly intended to help the authors make their manuscript as clear and accessible to potential readers as possible.

I suggest that the author may consider adding a new section of “Geological back-

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ground”. The authors may briefly review all previous studies and ideas partly concerning with the relation between petrogenesis and tectonic evolution history based on clearly and strongly geological evidence because conflicting data and hypotheses concerning about geological history and petrogenesis in the studied area have been presented in previous studies. I think that if there is the description about the geological outline, which is also ok although it seems a little simple. Importantly, magmatism (including volcanism) with different characteristics in geochemical composition, mantle source regions and geodynamic setting would have full differences in eruptive column heights for volcanism only, volatile (including CO₂) degassing rates and fluxes, and amounts of outgassing gases from magmatic activities, which are importantly controlling parameters on climate changes related to magmatism (including volcanism). If calculated and/or analysed results of the parameters (including the eruptive column heights for volcanism only, volatile (including CO₂) degassing rates and fluxes, and amounts of outgassing gases from magmatic activities) cannot be well determined by the magmatic (including volcanic) bodies themselves based on the melt inclusion sample analysis in the lab (Including EMP, Raman, SIMES, etc.), instead of comparison with those released from other volcanic activities (e.g. the Deccan traps in this paper), the final results and even conclusions of which would possibly need to be reevaluated, because it is not easy to develop a link in these parameters (including the eruptive column heights for volcanism only, volatile (including CO₂) degassing rates and fluxes, and amounts of outgassing gases from magmatic activities) between magmatism (including volcanism) with different characteristics in geochemical composition, mantle source regions and geodynamic setting.

I suggest that the author may further explain the petrologic reason, rationale and geochemical basis of the comparisons in magmatic CO₂ outgassing rate (or amount) between the Deccan traps and magmatic activities in this paper (see details in about Line 140), which may be thought to be a potentially estimated method of the magmatic CO₂ outgassing rate (or amount).

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Additionally, it should really be pointed out here that magmatism concerned with in this paper belongs to HKCA volcanism, which is related to oceanic plate subduction. But, many previous studies (including a recent study published in *Geology*-2019) indicate that this kind of HKCA volcanism may act as a key driver of the late Paleozoic ice age (Soreghan, G.S., Soreghan, M.J., and Heavens, N.G., 2019, Explosive volcanism as a key driver of the late Paleozoic ice age: *Geology*). Thus, magmatism with similar geodynamic setting may have total different the magmatic CO₂ outgassing rate (or amount), which are very comment situations. However, the Deccan traps and magmatic activities in this paper have totally different geodynamic settings, thus i hope the author may further explain the reason of the comparisons in magmatic CO₂ outgassing rate (or amount) between the Deccan traps and magmatic activities in this paper (see details in about Line 140). Whether or not are the results from the comparisons in this paper better than those in previous studies (Including EMP, Raman, SIMES, etc.)?

Interactive comment on *Clim. Past Discuss.*, <https://doi.org/10.5194/cp-2020-48>, 2020.