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Interactive comment on “Mafic granulite xenoliths in the Chilka Lake suite, Eastern Ghats Belt, India: evidence of deep-subduction of residual oceanic crust” by S. Bhattacharya et al.

Anonymous Referee #1

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Mafic granulite xenoliths in the Chilka Lake suite, Eastern Ghats Belt, India: Evidence of deep-subduction of residual oceanic crust

Author(s): S. Bhattacharya et al

This manuscript presents new chemical and isotopic data on mafic granulites occurring in a granulite terrain in India. Although the data may be important to reconstruct the history of this high-grade terrain, I find the manuscript quite confusing, many points are contrasting, and overall the conclusion seems to me a large over interpretation of poorly constrained inferences. Therefore I cannot recommend this manuscript for publication. In the following I will evidence the main specific points of my criticism:

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Since the introduction, the authors state that crustal xenoliths are generally brought to the surface by fast erupting igneous products, whereas the (poorly) described rocks are blocks of questionable origin within charnockitic bodies. Acknowledging that xenoliths of the country rock are also common in granitoid intrusions, I argue that the discussed mafic rocks may be either relics of dismembered pre-granulite igneous rocks, or mafic enclaves or dykes derived from later mafic intrusions, as common in granitic plutons, or both.

Pag, 1380, Abstract, line 1. Most granulites are crustal rocks, which cannot show signatures of a mantle origin.. Immediately after, biotite-rich mafic granulites were likely affected by later metasomatic fluids, which blur their original chemistry. Likely the OIB signature is an artifact of such process.

Pag. 1382, lines 15 to 20, it is stated that the hornblende mafic xenoliths are arc-basalts, of a poorly constrained age of 2.5 Ga, and then they re-melted. On this base I understand that they are restites older than granulite facies event.

Pag. 1383, line 3: The Rb-Sr whole rock systematic cannot be used in these rocks for gochronology. Overall, at the end of the chapter, there is no clear indication of the age of the mafic inclusions.

Line 25: I do not understand: these blocks are discordant to what, if the charnockite is massive? It should be constrained by field evidences if they are inclusions of older rocks or enclaves of later intruded dykes.

Pag 1385, in few lines, the Chilka Lake mafic granulites are described as tholeiite, although very high in normative olivine. Then it is inferred some heterogeneity in the source (it's unclear if this refers to the mantle source of the basalt from which these rocks crystallized). Immediately after, at pag 1386, the rocks are interpreted as "resulting from variable extraction of partial melts".. i.e. they are restites, whereas, after few lines, they are considered "akin to primary melt compositions". I truly do not understand what they are....

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Pag. 1386, lines from 15 to 20. This is a real mess... it is inferred that charnockite derives from melting of the xenoliths? or, more likely, that there is some interaction between charnockite and xenoliths? this would result in a strong chemical perturbation of both components. Whatever the case, these mafic rocks underwent some unclear process of reciprocal contamination which blur their original composition, and their chemistry cannot be used to infer their mantle source if these effects are not restored.

Pag. 1387, line 10: I do not see such strong positive Nb anomaly, at less in Fig. 6

Pag 1388, line 4: similar REE patterns are common in continental igneous rocks, not necessarily OIB.

Pag 1388, lines 13 to 17. The age of these rocks is not constrained at all, and computing their isotopic ratio at an inferred residence time is highly questionable.

Pag. 1389, lines 1 – 5. Enclaves are in general considered as derived from later intrusions, xenoliths are older rocks. It is unclear what these rocks are.

Pag. 1392, Concluding remarks. The real age of these rocks is not constrained at all, at least on the base of the presented data. Before making any serious conclusion, the nature, origin and evolution of the discussed rocks must be constrained on a rigorous base, otherwise any speculation is misleading.

Interactive comment on Solid Earth Discuss., 4, 1379, 2012.

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