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Interactive comment on "The preserved plume of the Caribbean Large Igneous Plateau revealed by 3D data-integrative models" *by* Ángela María Gómez-García et al.

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Review by R. Ernst of Gómez-García et al. "The preserved plume of the Caribbean Large Igneous Plateau revealed by 3D data-integrative models"

GENERAL COMMENTS:

This is a very exciting manuscript that provides a robust geophysical study and identifies some major lithospheric gravity anomalies that are interpreted to locate two lithospheric fossil plume conduits beneath the Colombian and the Venezuelan basins that locate the head of the former mantle plume inferred responsible for the Caribbean LIP.

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Discussion paper

There is a wealth of modelling detail, and the paper is extremely written, illustrated and referenced. This also provides a careful consideration of the reconstruction constraints to test whether the Caribbean plume could be linked with the present day Galapagos hotspot, and notes some problems with this linkage based on the most recent reconstructions.

This is an important contribution that should be accepted with only minor corrections.

You focus on the link with the Galapagos hotspot, but I recall the story by Kerr and Tarney (2005 Geology, v. 33; no. 4; p. 269–272; doi: 10.1130/G21109.1), where it was inferred that two plume generated two LIPs that were tectonically amalgamated to form the Caribbean LIP, and that the contributions of the two plumes/LIPs were distinguished on the basis of composition. Could you include a comment on two plume idea of Kerr and Tarney (2005)

One minor suggestion regarding nomenclature: I am considering suggesting that we modify the nomenclature of acronyms for LIPs by introducing a dash between the name the LIP acronym. So the Caribbean LIP would be C-LIP. The rationale is this revised nomenclature is that it would allow us to distinguish different type of LIPs from name of the LIP. Most importantly, we could distinguish silicic LIP (SLIP) with less confusion—e.g. the Whitsunday SLIP would be W-SLIP rather than WSLIP. One could even take this further to distinguish ocean LIP (oceanic plateau) as an OLIP and so the Ontong Java LIP could be OJ-OLIP. Continental LIPs could be also be distinguished as CLIP, and so the Parana-Eteneka LIP could be PE-CLIP. Anyway, for now I wondering about you using C-LIP instead of CLIP for Caribbean LIP.

Detailed comments:

Lines 35: “Although about 12 different oceanic plateaus have been recognised worldwide, they represent one of the least well-known Earth’s magmatic processes (Kerr, 2014).” Could you also mention that the older record of oceanic is preserved in orogenic belts since oceanic plateaus are preserved as fragments in orogenic belts during

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closure of oceans. (e.g. Dilek, Y. & Ernst, R. (2008). Links between ophiolites and Large Igneous Provinces (LIPs) in Earth history: Introduction. Lithos, 100: 1–13)

Line 58: “Indeed, strong geochemical evidence suggests that the CLIP corresponds to melting of the plume head of the Galápagos hotspot (Geldmacher et al., 2003; Thompson et al., 2004)” As mentioned above could you address the Kerr and Tarney (2005) paper that inferred two different plumes involved in the generation of the Caribbean LIP..

Lines 125-127: “Although there is strong geochemical evidence that supports the origin of the CLIP as melting of the paleo-Galápagos plume head (Geldmacher et al., 2003; Hastie and Kerr, 2010; Kerr and Tarney, 2005; Thompson et al., 2004),” Again could you consider the two plume model of Kerr and Tarney 2005

Line 173: change “slabs shapes” to “slab shapes”— I also note that “flat slab” appears later in the sentence. Could the sentence be edited to reduce the mention of “slab” to one occurrence.

Line 433: “A total volume of ∼12 x 106 km3 is calculated for what is interpreted as the CLIP fossil plume conduits” That is an impressive volume

Lines 448-450: “Previous studies based on geochemical analyses of CLIP-related magmatic rocks have proposed the present-day Galápagos hotspot as the origin of the thermal anomaly responsible for the development of the CLIP (e.g. Duncan and Hargraves, 1984; Geldmacher et al., 2003; Kerr and Tarney, 2005; Pindell and Barrett, 1990; Thompson et al., 2004).” Again consider the two plume model of Kerr and Tarney 2005

Lines 440-441: you mention fossil plume conduits in the Northern East African system. Perhaps you could also mention examples in India, associated with the Deccan LIP and also in the Parana region of Brazil associated with the Parana-Etendeka LIP. Parana –Etendeka LIP (Van Decar et al., 1995), the Deccan LIP (Kennett and Widiyantoro,

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1999), and Ontong Java LIP (Richardson et al., 2000; Klosko et al., 2001)

Line 455: change “short after” to “shortly after”

Line 524: change “Particularly” to “In particular”

Line 540: “To summarise, based on the argumentation above, the major offset between the paleo-position of the CLIP at 90 Ma and the present-day Galápagos hotspot can be interpreted either as:. . .. . .2) The CLIP was formed by a different plume, which – if considered fixed - would be nowadays located below the South American continent (Fig. 13).” Consider again the two plume model of Kerr and Tarney 2005

Please also note the supplement to this comment:
https://se.copernicus.org/preprints/se-2020-153/se-2020-153-RC1-supplement.pdf

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