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Interactive comment on “Low titanium magmatism in northwest region of Paraná continental flood basalts (Brazil): volcanological aspects” by F. B. Machado et al.

F. B. Machado et al.

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To Anonymous Referee #2

Thank you for your careful revision and helpful suggestions. In fact, the manuscript has English language problems, which cause misunderstandings. We will do efforts in order to correct the writing and improve all the text, including the paper arrangement. We agree that the aims of the manuscript have to be described properly, following also the comments of the referee#1.

Main objectives of the paper:

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1 – To describe in detail the morphology of different lava outpourings of the continental basalts of Paraná Basin, as well as the interaction between the first flows and sandy sediments (Botucatu Formation), particularly at its northwestern border. This area has never been investigated in previous studies. Although similar structures were only found in the Huab Formation (located in the African counterpart), there are strong evidences that the paleoenvironment was less humid in the studied area.

2 - To correlate the different geochemical signatures of major and trace elements (including REEs) with the different morphologies identified in the lavas. The geochemical data will be compared with those of the literature, in order to verify if the magma-type discrimination proposed by Peate et al (1992) requires some modification. This is essential because in the nineties only few basalts of the investigated area were available.

3 – To define the lava chemostratigraphy in order to get a better understanding about how the magmatic evolution occurred in the area and its relationship with the Paraná Basin entire volcanism.

Also following your suggestion, in the amended version of the manuscript for SE, we will exclude the data and discussion about mineral chemistry and temperature. Those topics will be focused in a new individual submission. Therefore, the title of the paper will be changed to “VOLCANOLOGICAL ASPECTS OF NORTHWEST REGION OF PARANÁ CONTINENTAL FLOOD BASALTS (BRAZIL)”.

Major comments:

1) The sample coordinates will be included in the amended version of the manuscript, which will be submitted to SE. The location of the samples will be also shown in the map of Fig. 1 (as it can be seen below).

2) Thank you for the suggestion. We will better describe the interaction of the sediments with the lavas. We will use the figure presented below in order to explain the occurrence of the sand-filled cracks (Fig. 2).

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3) Please, see the description about HTi and LTi nomenclature for the PCFB in the answers to referee#1.

References

Jerram, D.A., Stollhofen, H., 2002. Lava-sediment interaction in desert settings; are all peperite-like textures the result of magma-water interaction? *Journal of Volcanology and Geothermal Research*, 114, 231-249. Peate, D. W., Hawkeswort, C. J., Mantovani, M. S. M., 1992. Chemical stratigraphy of the Paraná lavas (South America): classification of magma types and their spatial distribution. *Bull. Volcanol*, 55, 119-139. Self, S., Thordarson, Th., Keszthelyi, L., Walker, G. P. L., Hon, K. Murphy, M. T., Long, P., Finnemore, S. 1996. A new model for the emplacement of Columbia River basalts as large, inflated pahoehoe lava flow fields. *Geophysical Research Letters*, 30, 2689-2692.

Interactive comment on *Solid Earth Discuss.*, 6, 2215, 2014.

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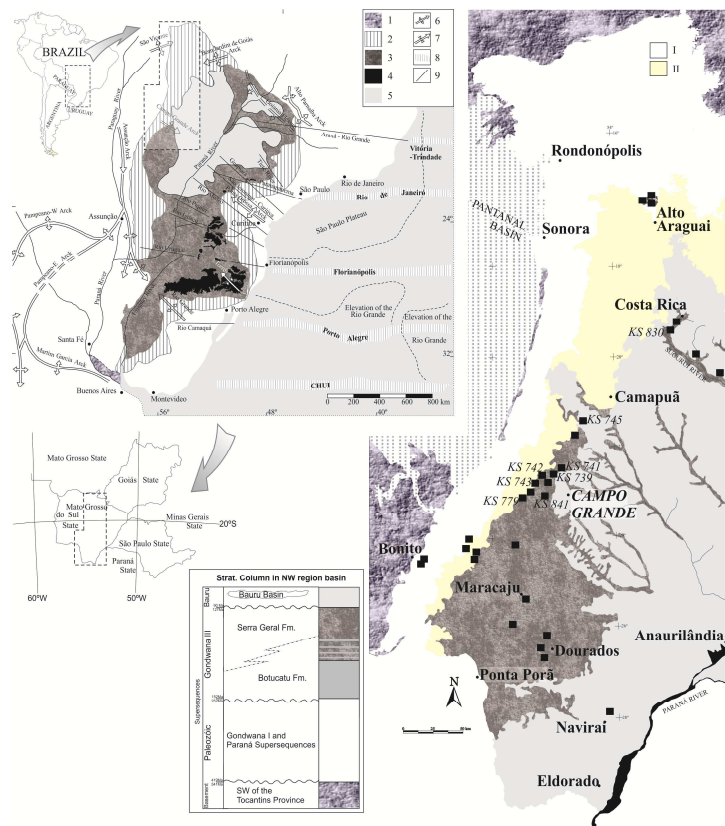


Fig. 1 - -- Simplified Geological map of the studied area.

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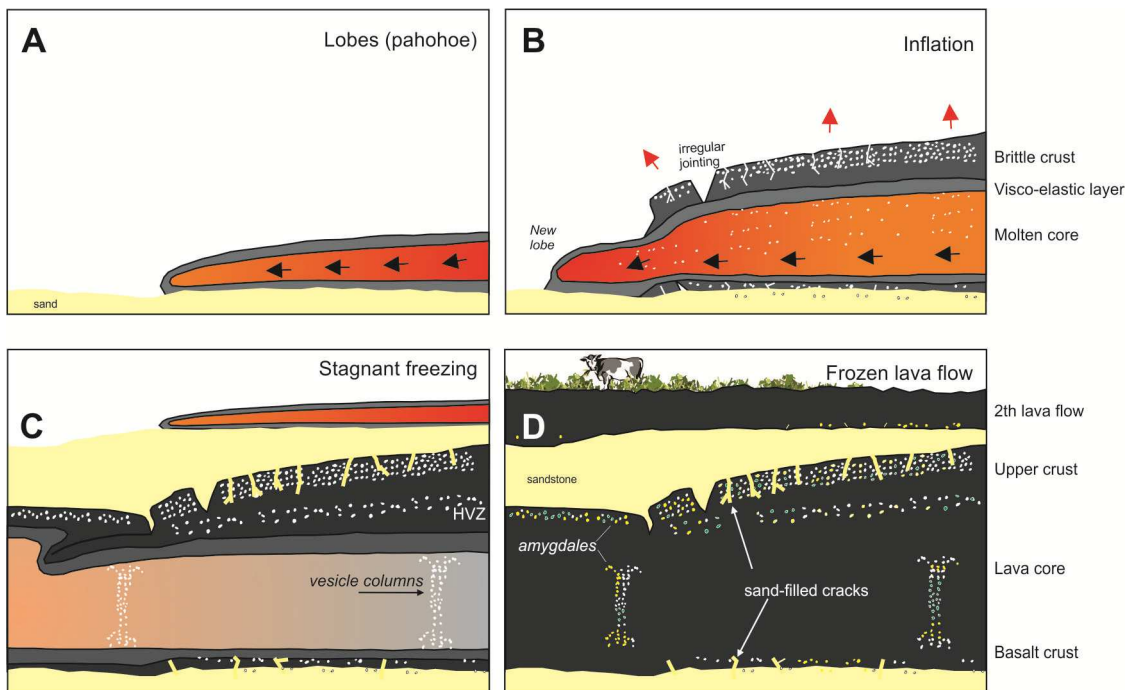


Fig. 2 - Sketches of sand-filled cracks generation observed in flows of PMP, integrating the propositions of Self et al. (1996) and Jerram and Stolfens (2002). (a) Lobe formation with brittle crust on the surface; (b) Inflation due to lava injection into the lobe, causing irregular jointing in the basalt upper crust and generating trapped horizontal vesicular zones (HVZ); (c) After stagnation, columns of vesicles may form vertical cylinders within the lobe and regular joints may be generated, during the slow cooling of the lava. Before diagenesis, by lithostatic weight sand invades the bottom of the flow (sand-filled cracks), and fills the irregular joints during the sedimentation process, which was synchronous to the lava outpouring. (d) All the processes can be identified based on vesicle distributions, jointing patterns and sand-filled cracks. Vertical scale varies from 1-8 m.

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