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Interactive comment on "Geological nature of mineral licks and the reasons for geophagy among animals" *by* Alexander M. Panichev et al.

Anonymous Referee #2

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General comments

Considering the approach as a whole, my first impression is as following :

This scientific work that is regarding geophagy as an example of self-medication is very interesting and of great actuality at the frontiers of earth sciences – material sciences-chemistry – biology –environment –health.

As well expressed in the abstract, the paper discusses the reasons of animal geophagy in two regions of the eastern Sikhote-Alin volcanic belt (Russia). The mineralogical and chemical characters of the consumed materials and the geological conditions of their formation have been investigated in detail. A comparison of the ingested material and of the excrements of the geophagic animals are presented. It is proposed that the hydrothermally altered rhyolitic tuffs, consisting of 30-80 % of zeolites and smectites

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are selected by the animals to eliminate excessive and toxic concentrations of certain elements widespread in specific habitats. Such a discussion concerns the fundamental problem of the interaction between living systems and minerals. It relates to the subtle organic-inorganic associations able to give potentially healthful or harmful effects This paper follows previous work of the authors that clearly demonstrated the importance and need of adopting interdisciplinary approaches The present study is restricted to wild herbivores in a selected area, but follows a still too rare interdisciplinary approach, that brings together the efforts of biologists and geologists, specifically volcanologist, petrologists and geochemists.

About geophagy Geophagia (or pica) may concern numerous animals and even humans. The present paper is citing Panichev et al. 2013 who cited already Young et al. 2008 and Young et al.2010. For those who have access to it, the book of Young 2011 is giving a quite exhaustive fascinating bibliographic review examining many hypothesis about the causes of human pica, including hunger, nutritional deficiencies and protective capacities, among others. [Young, S. (2011). "Craving Earth: Understanding Pica: the Urge to Eat Clay, Starch, Ice, and Chalk." New York : Columbia University Press, ©2011.]

About mineralogic and geochemical criteria The geological data are well detailed, even too much. The processing of the samples and acquisition of the mineralogical and geochemical data is much less detailed and some assumptions remain totally confusing. This section is not satisfactory and should, could be significantly improved

Specific comments

Regarding the sampling :

Line 78 Provenance and sampling localities of the 50 rock samples studied is missing Figures 6 and 7 present the kudur and sampling localities (Kudur 1-11 in fig 6 and kudur 1-7 in fig 7) but nothing is given in the text on how the 10 samples of table 1 and the 11 samples of table 2 have been selected and how far representative they are.

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Among all these samples, the authors present data only for 2 coprolites, and from the same location. It is very little representative without argumentation.

Line 315 and following (Section 3.5) The data of tables are interesting of course but the restitution in the text is strange and refers certainly to a larger number of analysis because the sum of percentages for zeolites and clay minerals between text and table do not agree.

I read : According to X-ray diffraction analysis (Table 1), all kudurites and their source rocks have a substantial content of zeolites (35-80%). But I do not find which sample is giving 80% zeolite . . .

In Table 1, sample 5-1 is interesting because it is free of zeolite. Why do you not give the elementary analysis of this sample in table 2 ? You speak about opoka for it but opoka is rich in silica and your sample is not . . . Why do you keep it if it is not eaten by the animals ?

Line 360 Fig 8 Why do you not present each sample at both magnification (1μm and 50 μm)

Section 3.6. Comparison between table 2 and 3 What is the difference between samples 1A and 4A from table 2 and samples 1K and 4K from table 3? Why are the values of sample 3-3 vary from on table to the other ?

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