

Solid Earth Discuss., referee comment RC2  
<https://doi.org/10.5194/se-2021-108-RC2>, 2021  
© Author(s) 2021. This work is distributed under  
the Creative Commons Attribution 4.0 License.



## Comment on se-2021-108

Anonymous Referee #2

---

Referee comment on "Rare earth elements associated with carbonatite–alkaline complexes in western Rajasthan, India: exploration targeting at regional scale" by Malcolm Aranha et al., Solid Earth Discuss., <https://doi.org/10.5194/se-2021-108-RC2>, 2021

---

In the manuscript with the title "REE's associated with carbonatite-alkaline complexes in western Rajasthan, India: exploration targeting at a regional scale", the authors present a mineral prospectivity approach to determine potential target sites for REE exploration. The work is based on extensive previous experience by the authors in the field of mineral prospectivity analysis and uses state-of-the-art methods, applied to a regional case study. As such, it is an interesting contribution to the field and suitable for a publication in a scientific journal, specifically for the special topic on the state of the art in mineral exploration.

Overall, the manuscript contains all elements that are relevant for a scientific publication, but I do have several concerns about the structure itself. The manuscript contains an excessive amount of tables. Even if one can usually argue that tables help summarising information, it appears quite the opposite here: as a reader, one is constantly shifting between reading text in the main document, and reading text in the tables. In my point of view, this is really not helping and distracts from the main contribution of the manuscript. In addition, almost all tables contain a very high amount of redundant information (see comments below). I would strongly suggest to re-structure the document in a form that the relevant aspects are in the main text, and to place all tables (if they should be kept) in the appendix.

Another point concerns the results section: this is almost non-existent (two short paragraphs) and actually a lot of outcomes are missing here. They are then described in the discussion (e.g., lines 318-334). Also here, I would suggest to carefully revise results and discussion section to place the content at the part where a typical reader would expect them - this is to some extent always up to personal choice, but I think that a restructuring will definitely help clarifying the main contribution of the work.

Concerning the scientific contribution: all main components of the used data sets are well described and justified. What is missing is a description of the approach itself (the fuzzy inference system). The authors refer to previous publications on the topic - but actually, they are partly paywalled and will not be accessible to all readers (I also could not find openly available preprints). I would suggest to include some more details into the manuscript. In the current form, it is very difficult to understand how exactly uncertainties are considered and which of the novel approaches are implemented. Also, the description would benefit from some of the base references (if I am not mistaken, then the approaches go back to the work of Duda in the 1970's).

In the interest of open science and in order to better understand the approach itself (and to make it reproducible), it would also be very beneficial to make the processing scripts available on an open repository (e.g, GitHub or an institutional repository).

One key aspect of the approach is that the authors estimate uncertainties in the resulting prediction maps. This is an important extension, when compared to conventional prospectivity mapping approaches. It should be mentioned, though, that the analysed systemic uncertainties only address a small part of the overall set of uncertainties (here called "systemic", similar to "epistemic?"): the uncertainties in the hyper-parameters of the distributions. Many other uncertainties which, I think, the authors would also group under the term "systemic" are not included (choice of the distribution, model structure, choice of using a FIS, ...). To be sure, this is acceptable, as no approach yet exists to consider all uncertainties, but it should at least be mentioned that the uncertainty estimates are limited to this specific aspect.

Further (minor) comments to specific sections in text (identified by line numbers):

75: In the UQ literature, the terms epistemic and aleatory are commonly used. How do the terms systemic and stochastic refer to these?

97: Please describe the geologic/ geodynamic setting instead of a list of continents and countries.

147: As the presented work strongly depends on the mineral system model, it would be important to include the full reference here - or, at least, to provide an accessible version of a preprint (if the paper is not yet accepted). In the current form, this model can not be evaluated.

Table 4B, C: highly redundant information - see general comments above.

Table 5: last column: why Piece-wise linear twice? Overall, also highly redundant.

Fig. 4: Also here, a lot of redundant information. A more compact description would help for a clearer representation.

233, FIS-model(s): Were the three separate models chosen on basis of a geodynamic/mineral systems consideration or on basis of the operator functions (into "AND" and "Product" branches)?

Fig. 5: scale, colorbar, missing, difficult to interpret. Suggestion: include subfigures for detailed areas and include description in results section (instead of discussion).