

## **Comments and Suggestions for Authors**

This study established a rapid quantitative identification criterion based on the basic chemical compositions combination rules in the red beds. The manuscript is well written and the topic is interesting and novel. By comparing the chemical composition combinations of 15 kinds of rocks collected from China in this study, it is proven that the quantitative criterion proposed in this study are effective. The work performed in the manuscript is comprehensive and in-depth. However, there are some minor problems that should be addressed before any further publication process.

### **Required changes:**

**Point 1:** In fact, the second section on methods is very rich in content. It mentioned previous research on the comparison between red beds and other rocks. But in this chapter, whether this part of the content overlaps with the introduction. Please provide a reasonable explanation. Additionally, as this section is too lengthy, it is recommended to add a suitable flowchart to facilitate better reading for readers. In addition, in section 2.1, the principle and instrument photos of the handheld elemental analyzer appear slightly monotonous. A schematic diagram can be formed by combining its principle and instrument photos.

**Point 2:** In the third section of Results and Discussion, both sections 3.2 and 3.3 describe the results through tables or figures. In section 3.1, it was found that the geomorphic characteristics of the red beds were mainly described through literature review, and the content was not rich enough. Can appropriate figures or table data be added.

**Point 3:** Some general recommendations regarding the presentation of contents. (1) figure 2. I suggest writing "Location of the study area" and, if possible, add a description of what there is in the photo. For example, can the sample be dispersed by adding a map of China. (2) In the research status of the introduction, it should take a positive attitude towards the previous research results on the whole and deny them praise. It could talk about advantages before disadvantages. (3) Do the colors in the small figures

in Figures 4 and 5 represent the same type of rock? Please make a note or add a picture frame in the image. (4) Can Table 3 also be presented in the form of an interval graph, and then 15 types of rocks can be scattered in this interval for intuitive judgment and verification.

**Point 4:** Problems in the tables and figures in the manuscript. Please carefully check the accuracy of the units and formats of all tables and figures. Such as, the format of each tables and figures needs to be consistent before and after.

**Point 5:** Some general recommendations regarding the contents of the paper. I found that the authors do not use the unified and correct significant figures and decimals in the whole paper (e.g., 43.5 and 0.40 in the table 3; 2.0% and 30% in the figure 6). It is necessary to correct the whole paper for accuracy and precision. And item 1 in conclusion is too general and appears to be not connected well to the presented results. Has the current problem been resolved, please either remove or be more specific. Minor grammatical problems in the full text need to be corrected (e.g., an adequate-fitting prediction method in the abstract).