Report of 2022-2023 SEG-CAGS fied trip

From Oct. 17th to 21st, 2023, the SEG-CAGS Student Chapter had the honor of inviting Academician Jingwen Mao and Associate Prof. Wei Jian to lead a field trip. Staff members from the Natural Resources Department of Jiangxi Province, Jiangxi Geological Survey Institute, Gannan Nonferrous Geological Brigade of Jiangxi Province, East China University of Technology, and Jiangxi Vocational College of Applied Technology jointly carried out a field activity and achieved success.

The field trip lasted for 5 days, starting from Nanchang and ending in Ganzhou. The route covered Ganxian, Anyuan, Huichang, and Xunwu counties in Ganzhou. The Xiahu large heavy rare earth element (HREE) deposit and the Shitouping super-large HREE deposit were investigated. During the field trip, multiple academic exchanges and reports were conducted, which provided a deeper understanding of the ion-adsorption rare earth elements (REEs) deposits in southern Jiangxi. Guiding suggestions were provided for further deposit development and prospecting work.

In Xiahu HREE deposit in Ganxian county, the chief engineer of the deposit introduced the geological characteristics and mineral distribution law of the deposit to all inspection personnel (Fig. 1). Subsequently, the ore-forming rock and the distribution of weathering profile (ore body) were investigated in the field (Fig. 2 and 3), and an on-site demonstration of ion-adsorption REEs leaching experiment in the weathering profile was conducted.

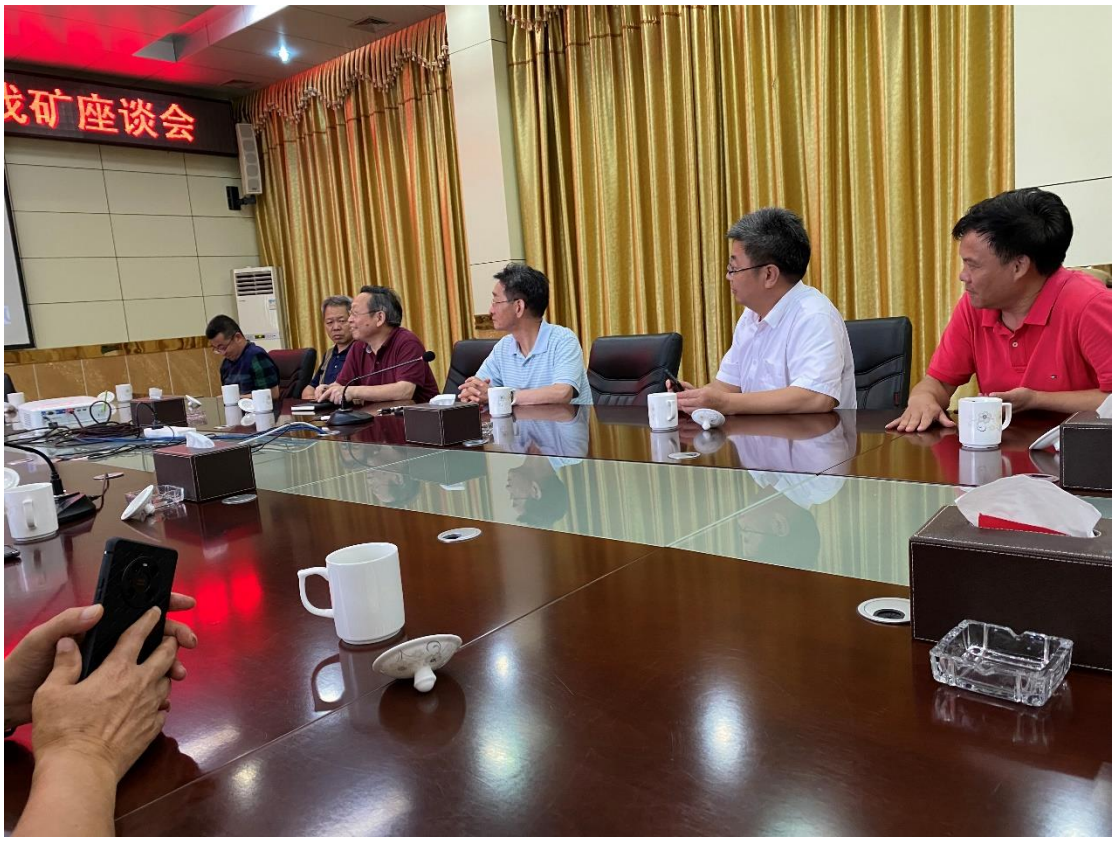


Fig.1 The chief engineer of the deposit introduced the geological background to all inspection personnel.

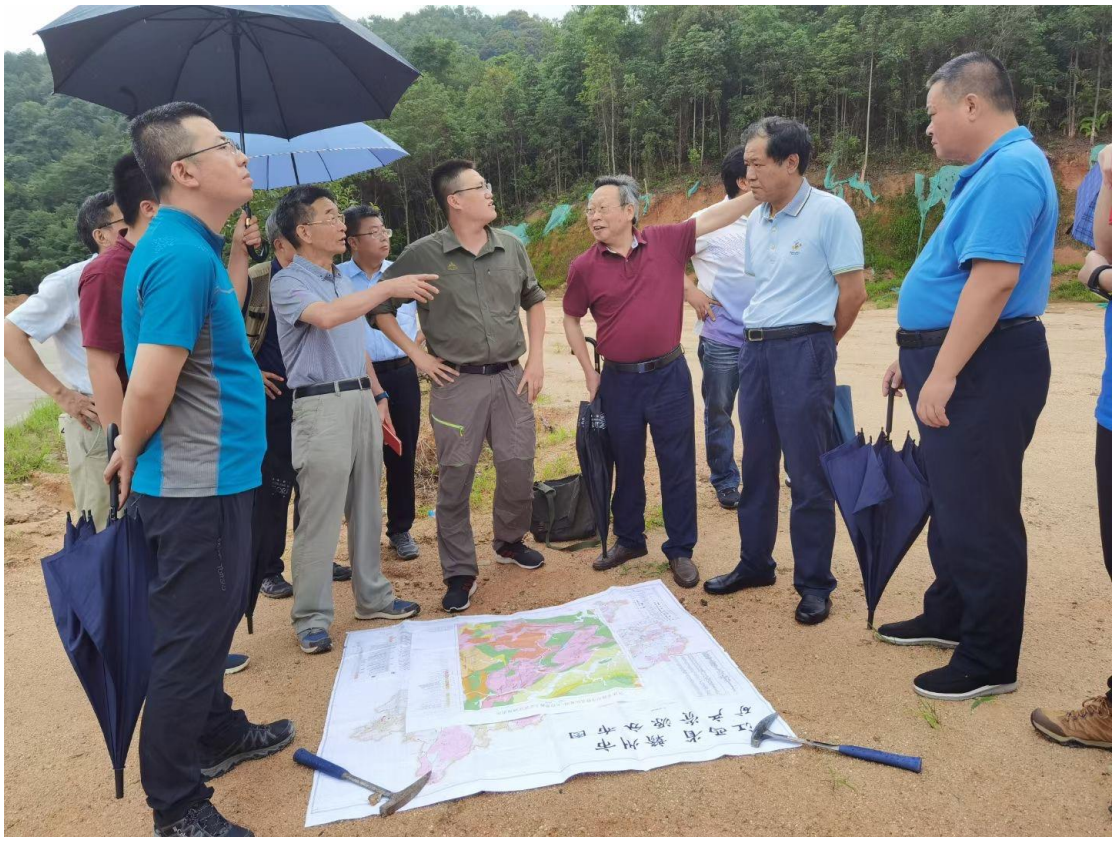


Fig. 2 The field trip in Xiahu REE deposit.

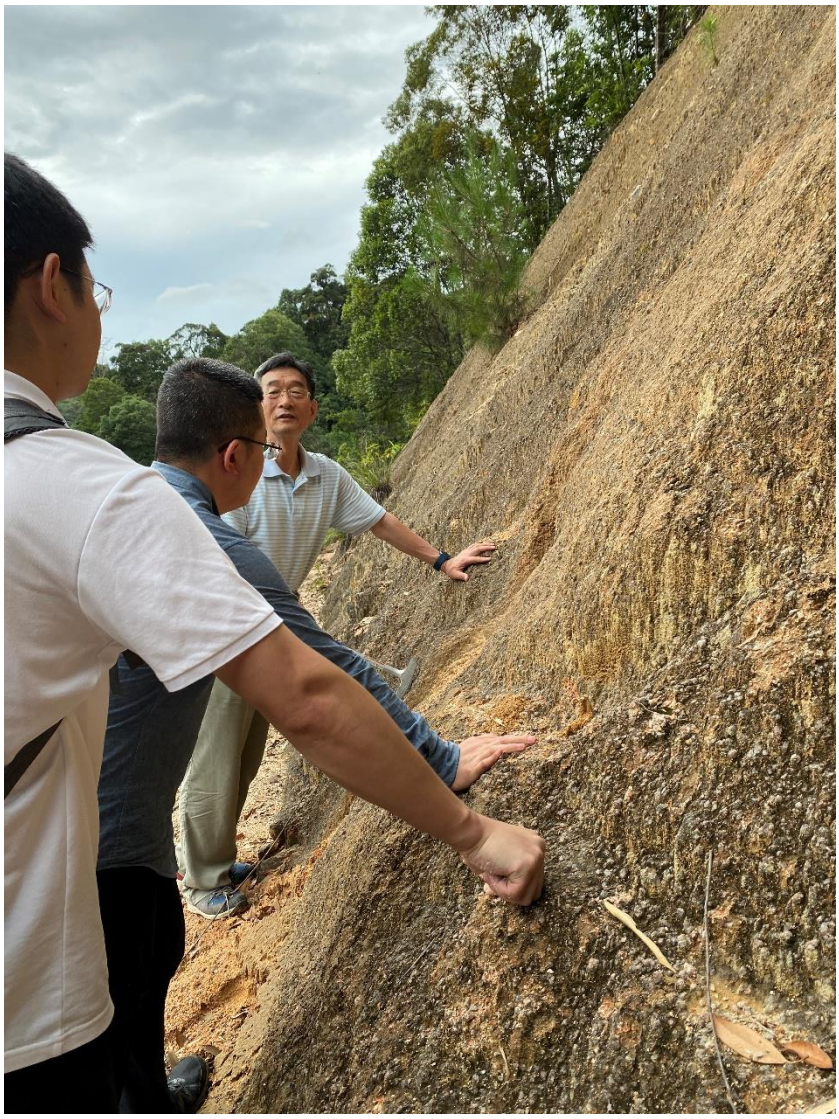
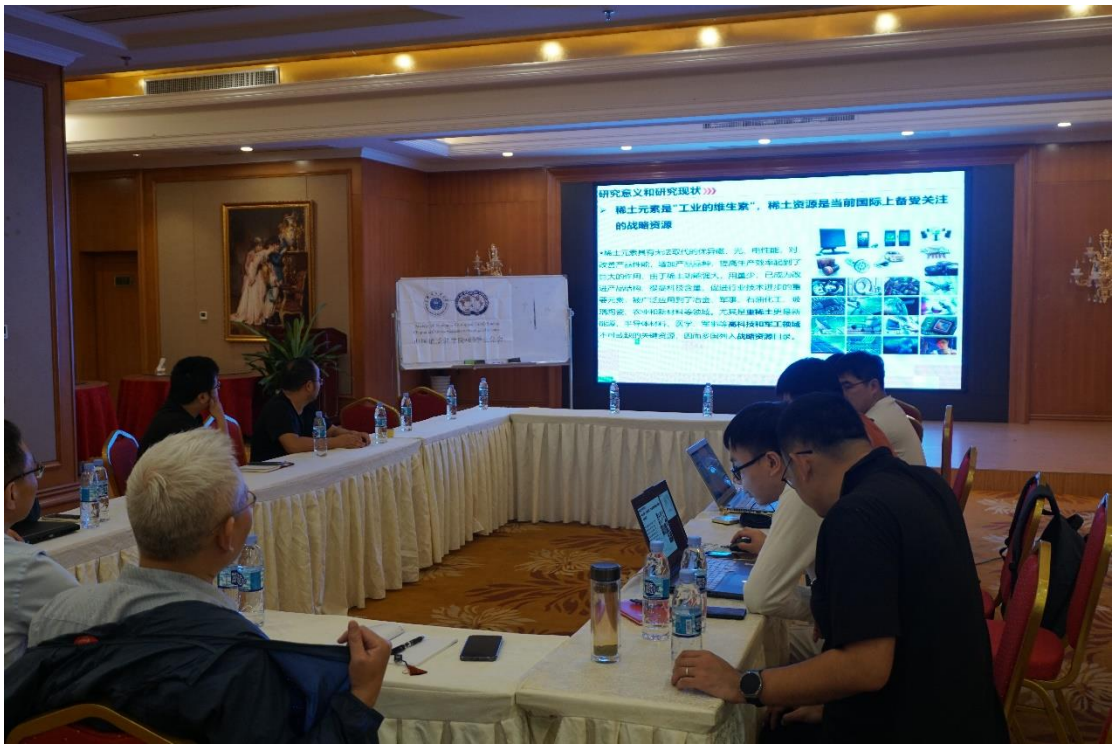


Fig. 3 Observing the distribution characteristics of the weathering profile of the parent rock.

During the field trip to the Xiahu HREE deposit in Ganxian county, it was discovered that the ore-forming rock is mainly Yanshanian (180-67 Ma) muscovite granite, two-mica granite, and alkali granite, and the ore body is the weathering profile of the parent rock. With the consent of local staff, some typical samples were collected for learning and observation. During this period, experts such as Academician Jingwen Mao gave detailed explanations of the geological phenomena and mineral distribution characteristics of this area, which greatly benefited inspection personnel.

The upcoming inspection is the Shitouping super-large HREE deposit, which was discovered in recent years and is located at the junction of Anyuan County, Huichang County, and Xunwu County, the progress report of the deposit's relevant staff and scientific research team was listened to and exchanged (Fig. 4 and 5). A preliminary understanding of the basic geological characteristics of the deposit was obtained, followed by a field investigation (Fig.

6 and 7).



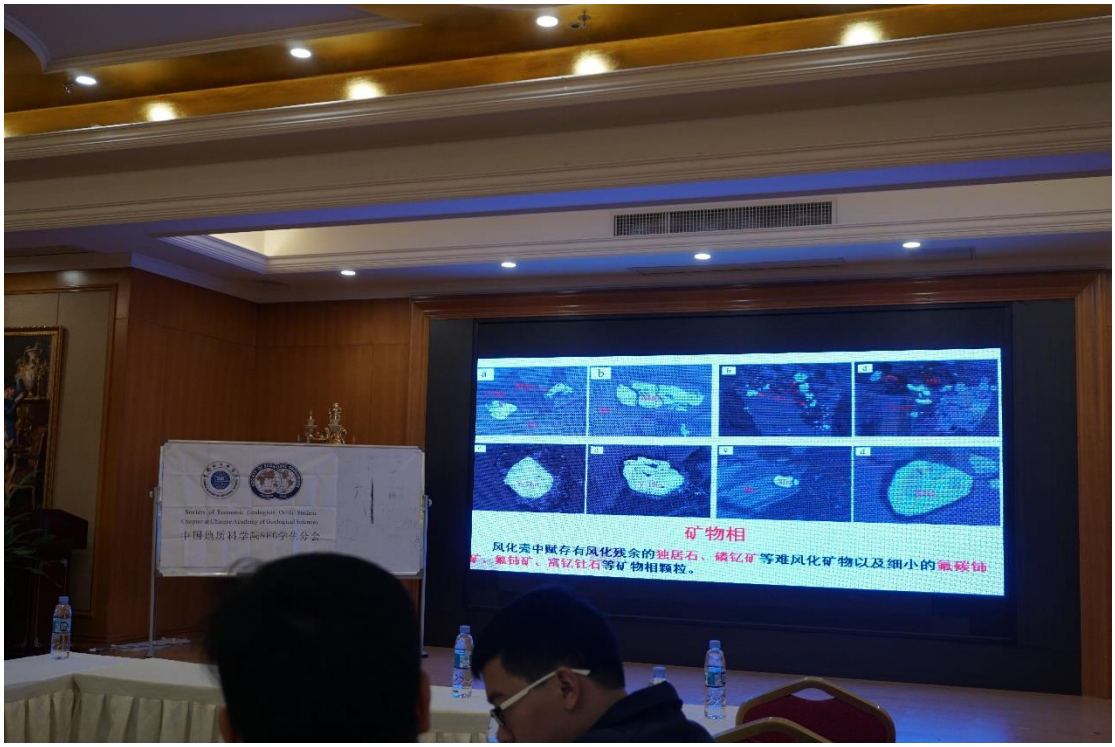


Fig. 4 and 5 Show the work and research progress report of the Shitouping REE deposit.

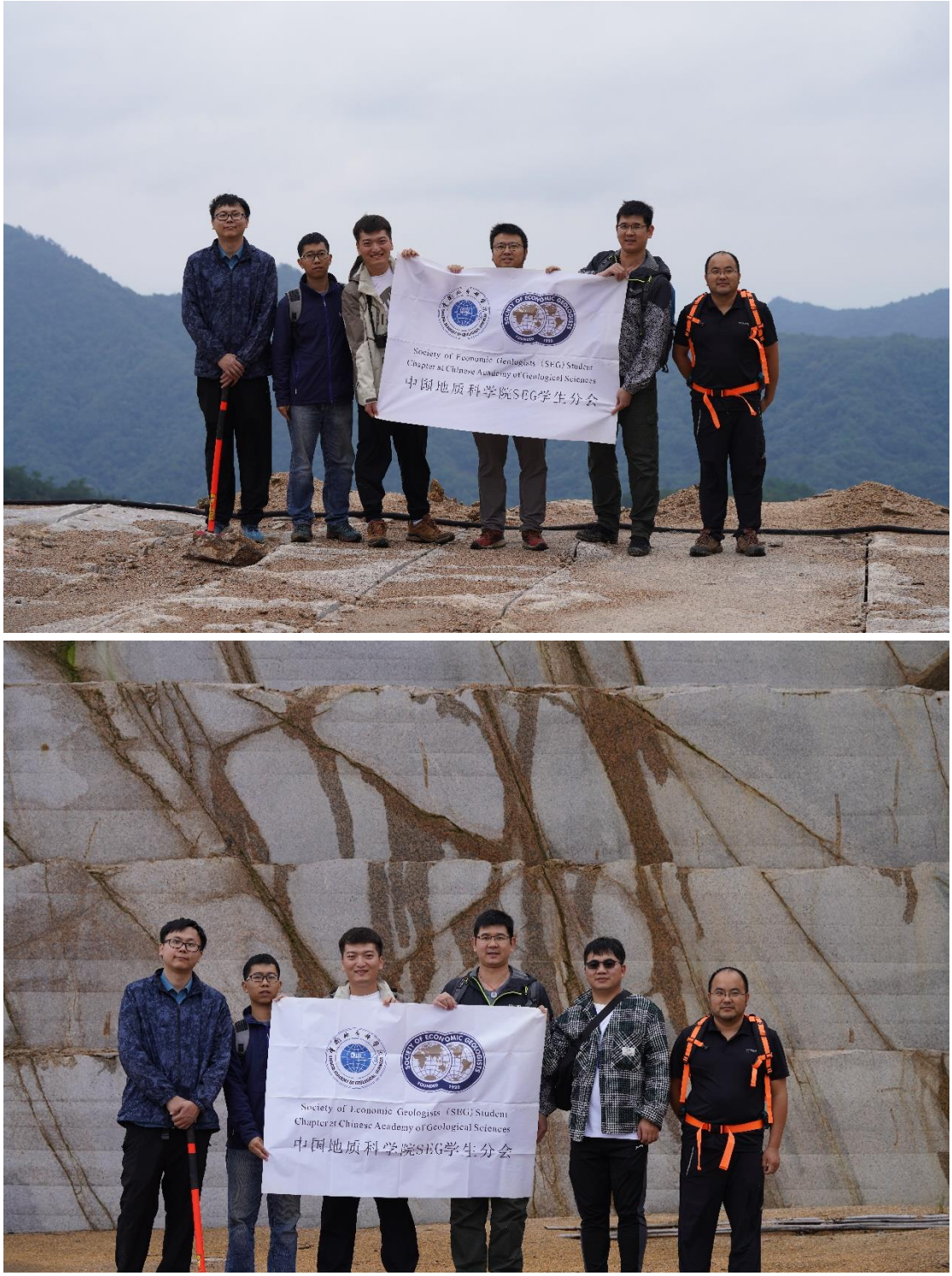


Fig. 6 and 7 Show the field investigation of the Shitouping REE deposit.

The ore-forming rock in the deposit is mainly composed of Yanshanian biotite monzogranite and biotite syengranite (Fig. 8), with an average content of 513 ppm of RE_2O_3. Among them, biotite monzogranite is mainly enriched in LREEs, while biotite syenogranite is mainly enriched in HREEs. The minerals containing REEs mainly include fluorides (fluorite and fluorocerite), fluorocarbonates (bastnaesite, parisite and synchysite), phosphates (apatite,

monazite and xenotime), and silicates (zircon and thorite). After a long period of weathering and leaching, the parent rock has formed thick weathering profiles (e.g., Fig. 9), with a grade of RE_2O_3 between 10-3420 ppm and an average of 600 ppm. In the weathering profile, dark minerals dominated by biotite have been completely altered, Fe-Mn substances have been precipitated, feldspar has mostly turned into clay minerals (such as kaolinite, illite, and halloysite), and the original residual crystals have been preserved. Quartz, as a relatively stable mineral, has mostly been retained (Fig. 10). The ore body of this deposit is also located in the weathering profile, similar to the Xiahu HREE deposit.

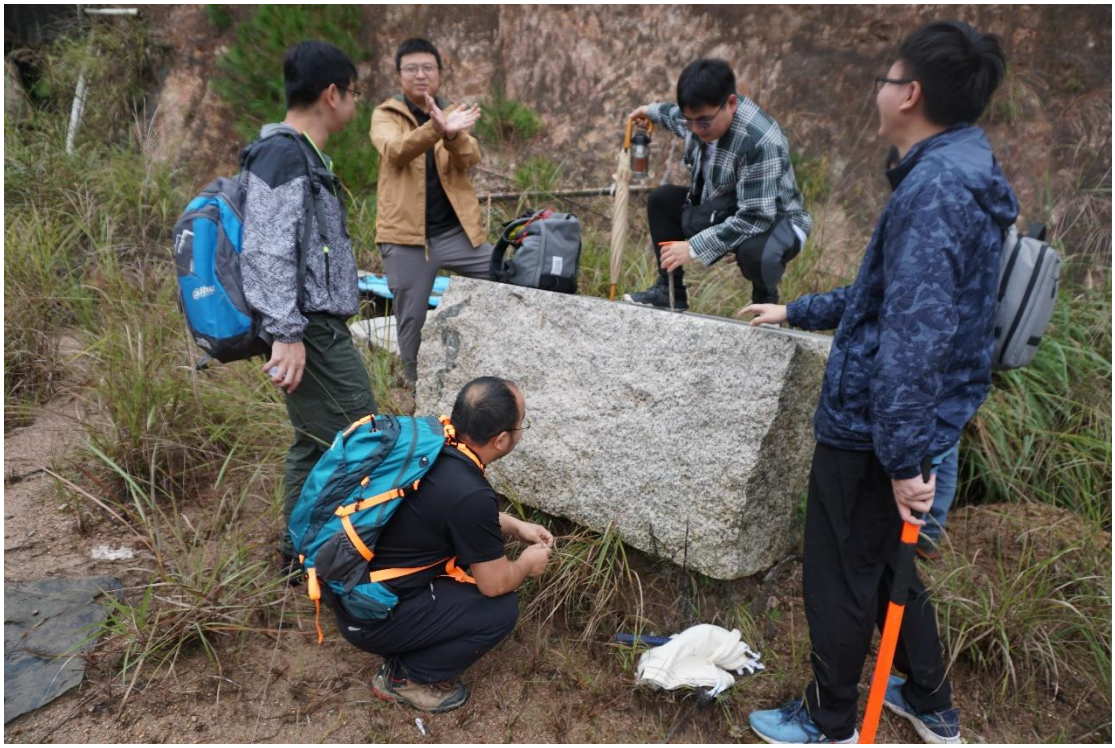
Fig. 8 The ore-forming rock of the Shitouping REE deposit.

Fig. 9 Distribution characteristics of the weathering profile.

Fig. 10 The morphology of different minerals in weathering profile.

During the field trip, Associate Prof. Wei Jian and other scientific research

teams from different universities conducted a detailed observation and discussion of the deposit's phenomena (Fig. 11 and 12). Starting from multiple typical domestic and foreign deposits, they conducted comparative analysis on hot issues such as the migration process of REEs, their existence status, and the mechanism of REEs fractionation. They proposed innovative viewpoints based on their own scientific research knowledge, which provided an engaging lesson. Furthermore, some samples with typical phenomena were collected for further analysis and verification.



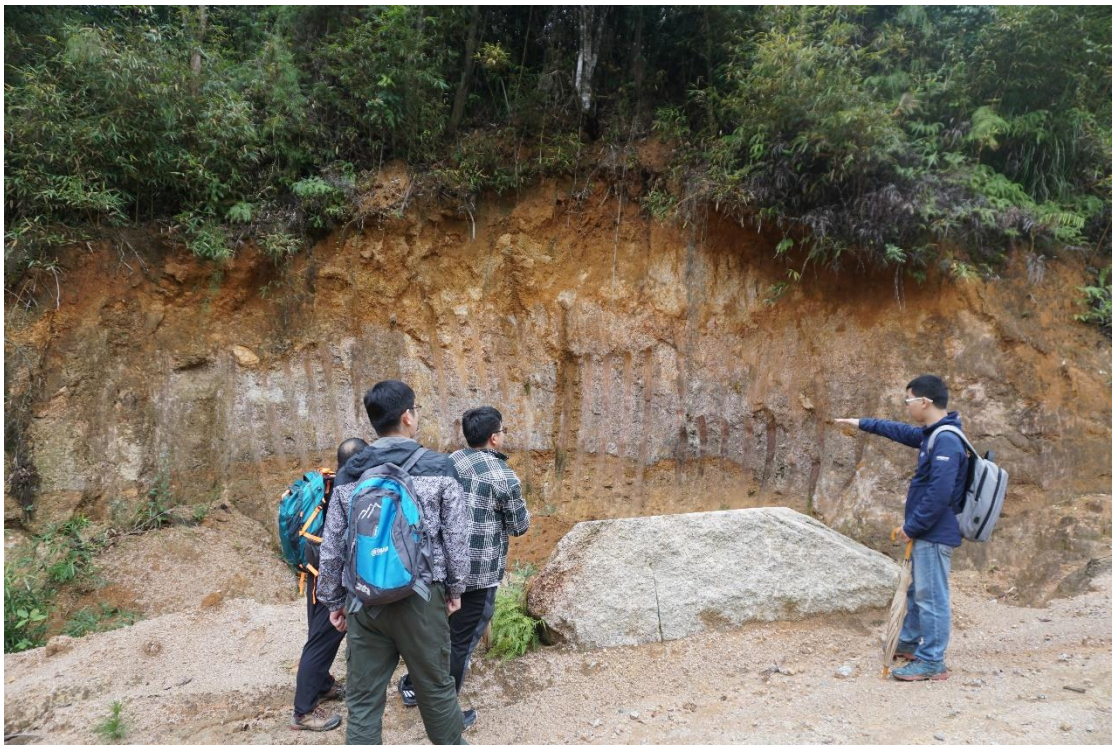


Fig. 11 and 12 The discussion of REEs enrichment process in ore-forming rock and weathering profile.

The SEG-CAGS Student Chapter concluded the field trip on Oct. 21st, with the support of the Natural Resources Department of Jiangxi Province, Jiangxi Geological Survey Institute, Gannan Nonferrous Geological Brigade of Jiangxi Province, East China University of Technology, and Jiangxi Vocational College of Applied Technology. The trip was a success as it not only helped students solidify their professional skills in field geology and enriched their geological knowledge and sparked their interest, but also had the opportunity to interact with experts face-to-face.