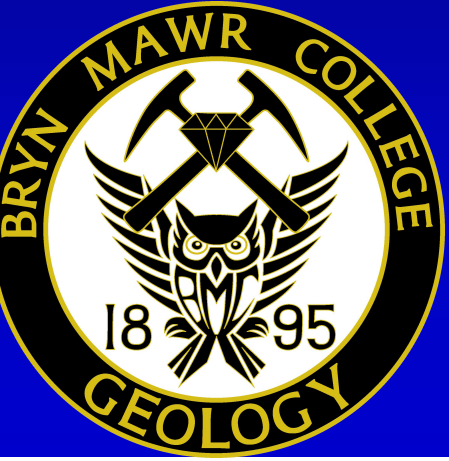


Understanding Gaps within Studies of the Great Bank of Guizhou



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Abstract

The Great Bank of Guizhou is one of the few isolated carbonate platforms around the world. It is located in Guizhou Province, Southwest China, and contains full records of multiple cross-sections under the initiation, development and end of this distinct feature through Late Permian to Late Triassic. Its detailed history has been revealed by careful studies while other important geochemistry information about the Earth within this structure remained undiscovered. A better understanding of this distinct feature is crucial to our exploration of the end-Permian mass extinction, and also the carbon emission we are now experiencing. Identifying the gap in the current information about the Great Bank of Guizhou would help to generate a clearer interpretation of the Permian Triassic boundary, climate change, and the future of the Earth.

Introduction

The Great Bank of Guizhou (GBG) is an isolated carbonate platform located within the Nanpanjiang Basin of Guizhou Province, China. Carbonate platforms, the sedimentary features that grow up with calcareous deposits, have specific needs of the depositional environment. The larger Yangtze carbonate platform became isolated due to the development of the Nanpanjiang Basin and the GBG is the northernmost of them. It underwent drowning after the Nanpanjiang Basin rapidly subsided and was buried from the Middle Triassic to Late Triassic.

The Great Bank of Guizhou is distinctive due to its particularly long history through Late Permian (~252 Million years ago) to Late Triassic (~201 Million years ago), and its relatively continuous and abundant carbonate sedimentation. Well exposed features of the end-Permian extinction horizon have been found in the platform interior sections and it provides detailed information about the end-Permian mass extinction, which is closely related to extreme carbon emission and its impact. The GBG also presents valuable fossils of the biotic recovery in the Triassic, and variable records of the carbonate platform architecture which help to further study the carbonate platform morphology.

Methods

Analysis of publications that focus on the Great Bank of Guizhou area about their research topics and directions. The analysis is mainly based on geochemical proxies these articles and journals mentioned within their contents.

Results

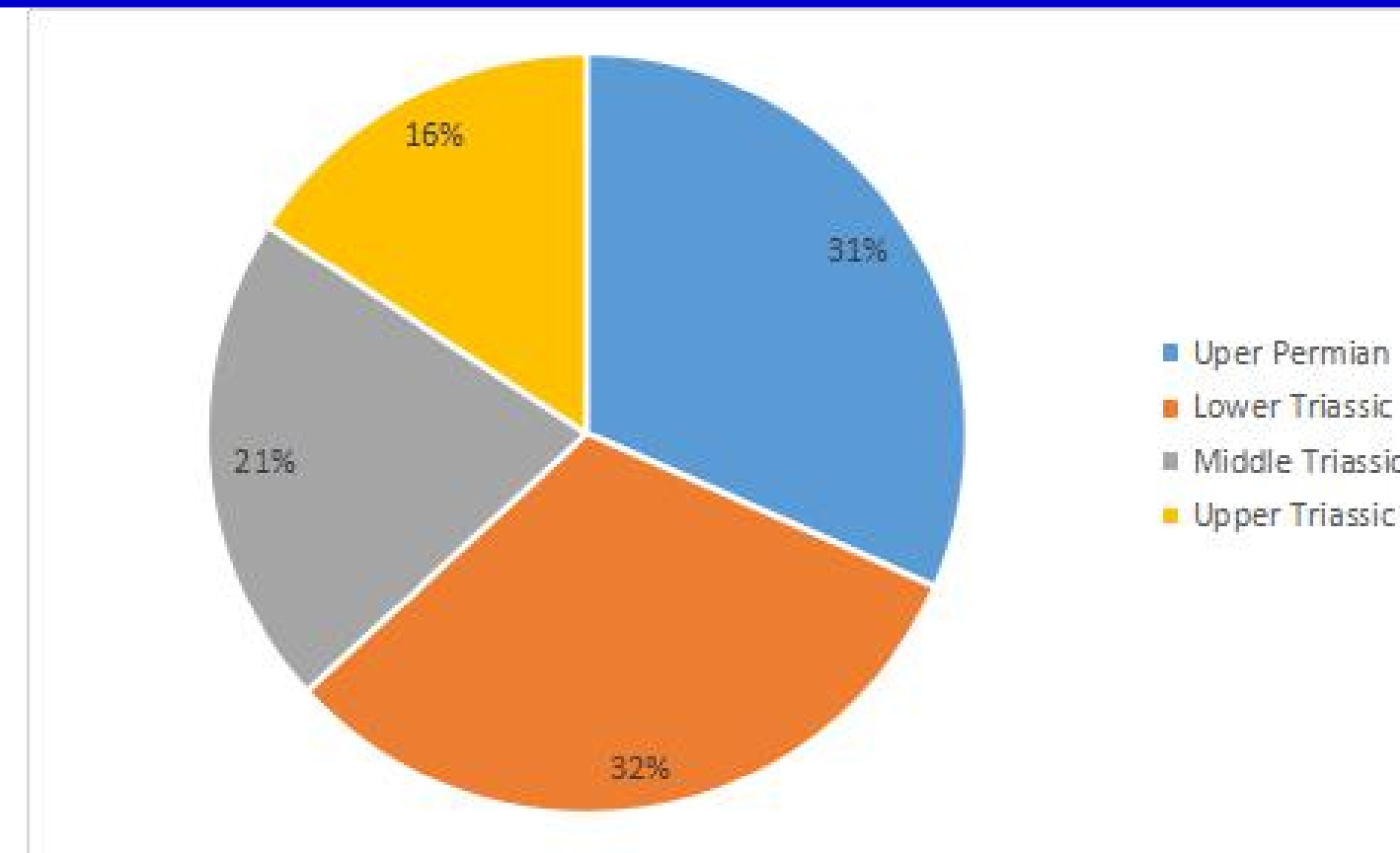


Fig. 1. Abundance of multiple geological directions that chosen articles focus on about the Great Bank of Guizhou area. (n=8)

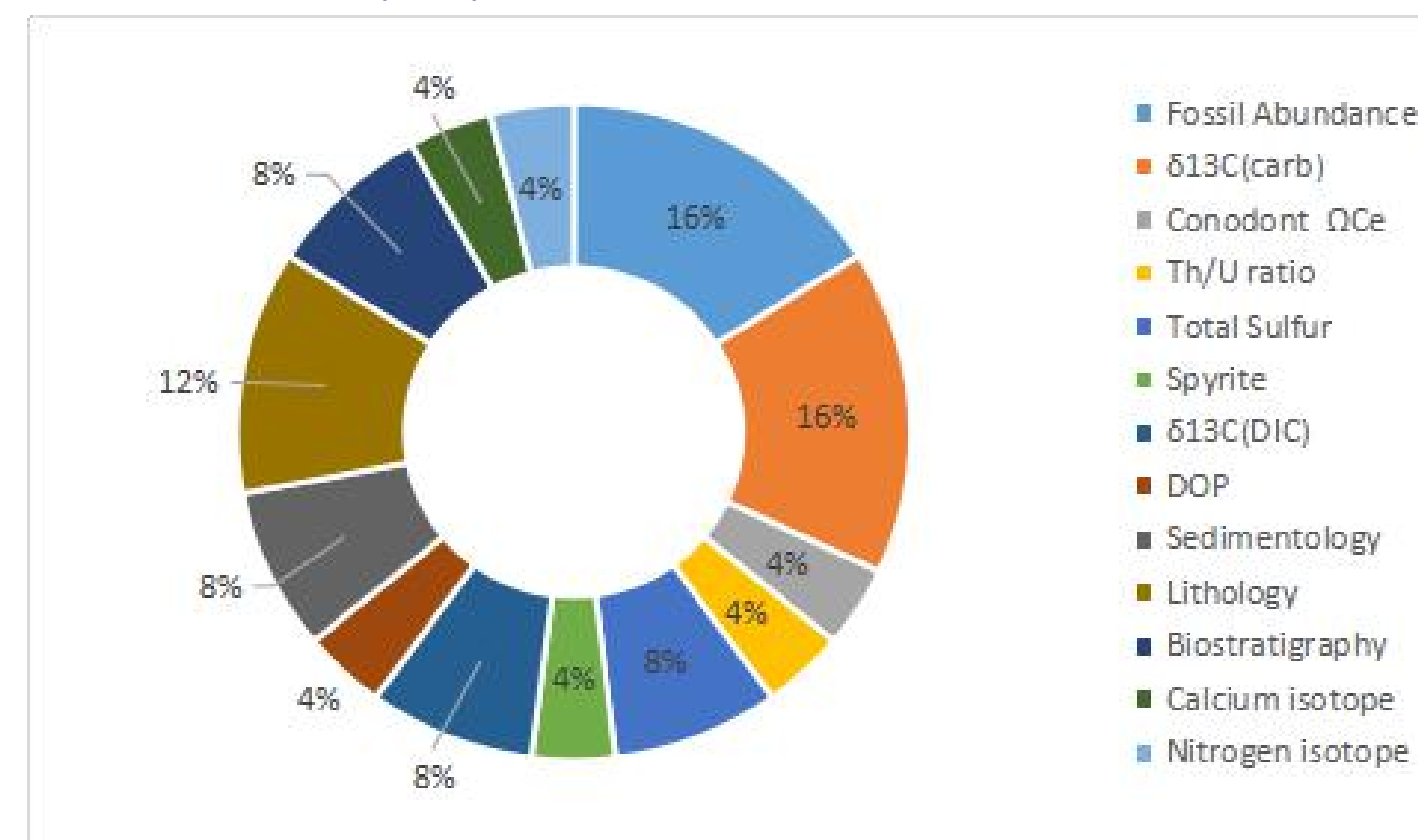


Fig. 2. Percentage of different focus of time period among the chosen articles. (n=8)

Discussion

As shown in figure 1, most of the geological researches related to the Great Bank of Guizhou focus on the Permian-Triassic Boundary period. In addition, most of them focus on the biostratigraphy including fossil abundance and the carbon isotope from carbonate rocks while fewer discoveries are based on the geochemistry aspects. The complete understanding of the GBG area needs more studies on different geochemistry proxies, including TOC, different element isotopes, and radioactive data. Diverse geochemistry datasets from the GBG area might lead to more correspondence among them and help to generate the complete history of the Permian-Triassic boundary, and also further understanding of the recent carbon emission.

The end-Permian mass extinction had been studied deeply but several questions haven't been solved while the Great Bank of Guizhou could provide explanations for them in some ways. However, the number of studies in the Great Bank of Guizhou area is relatively low among the Permian-Triassic Boundary studies, as presented by figure 3.

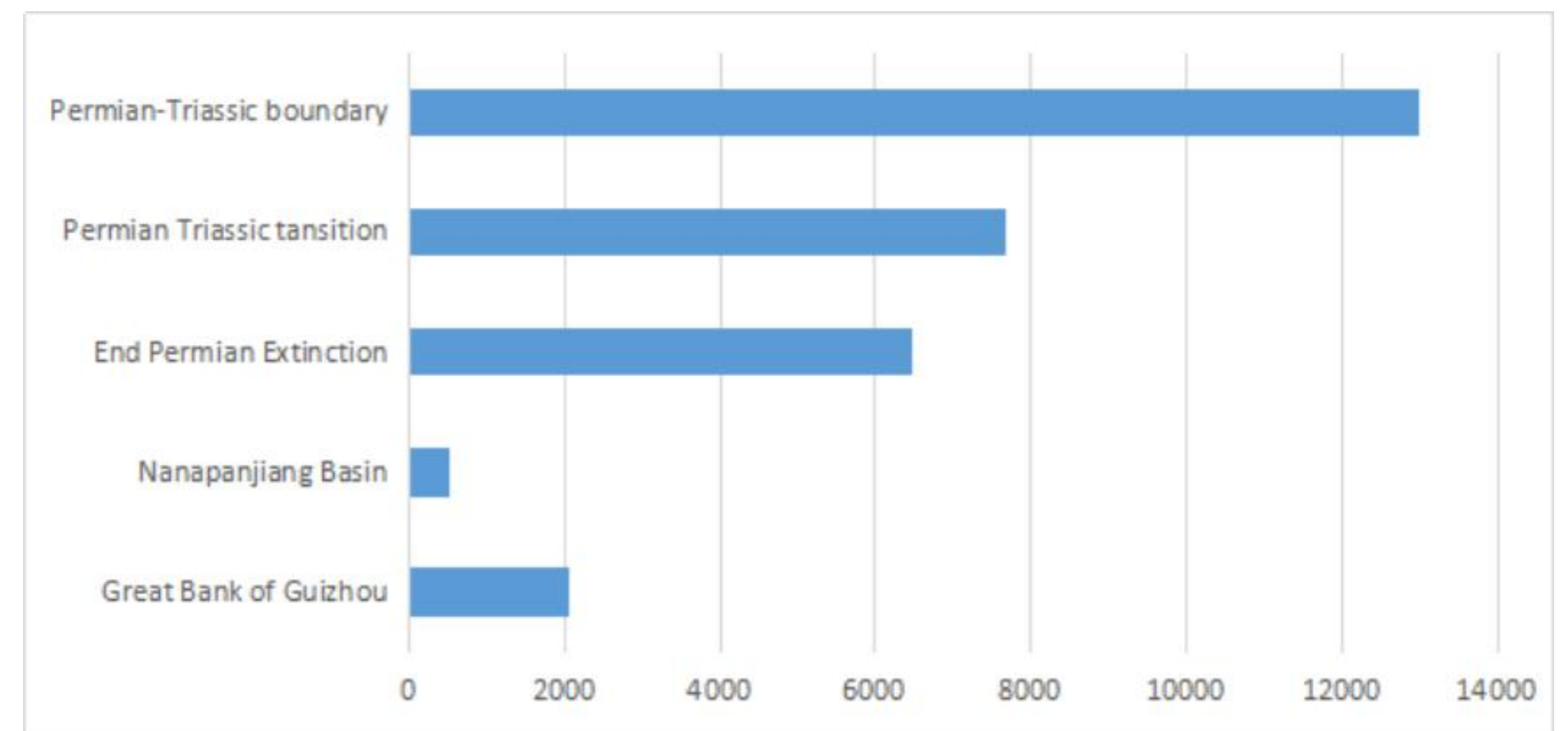


Fig.3.

Direct results of found geological articles and journals when using different keywords in academic website (Tripod, as an example); showing the results related to the Great Bank of Guizhou are low in amount.

Conclusions

Gaps within the current studies of the Great Bank of Guizhou should be filled with more investigations in multiple geochemistry directions. The deeper understanding of the GBG and the Permian-Triassic boundary would further help our understanding of the Permian-Triassic boundary and applications of the carbon cycle.

References

- Enos, P., Wei, J., Lehmann, D., 1998. Death in Guizhou-Late Triassic drowning of the Yangtze carbonate platform. *Sedimentary Geology*, (118), pp.55-76.
- K.M. Meyer, M. Yu, D. Lehmann, B. van de Schootbrugge, J.L. Payne. "Constraints on Early Triassic carbon cycle dynamics from paired organic and inorganic carbon isotope records." *Earth and Planetary Science Letters* 361 (2012): 429-435
- Kelley, B., Lehmann, D., Yu, M., Minzoni, M., Enos, P., Li, X., Lau, K. and Payne, J., 2017. The Late Permian to Late Triassic Great Bank of Guizhou: An isolated carbonate platform in the Nanpanjiang Basin of Guizhou Province, China. *AAPG Bulletin*, 101(04), pp.553-562.
- Lehmann, D., Enos, P., Payne, J., Montgomery, P., Wei, J., Yu, Y., Xiao, J. and Orchard, M., 2005. Permian and Triassic depositional history of the Yangtze platform and Great Bank of Guizhou in the Nanpanjiang basin of Guizhou and Guangxi, south China. *Albertiana*, (33.2), pp.149-168.
- Payne, J. and Clapham, M., 2012. End-Permian Mass Extinction in the Oceans: An Ancient Analog for the Twenty-First Century?. *Annual Review of Earth and Planetary Sciences*, 40(1), pp.89-111.
- Song, Haijun, Paul B Wignall, Jinnan Tong, David P.G Bond, Huyue Song, Xulong Lai, Kexin Zhang, Hongmei Wang, and Yanlong Chen. "Geochemical Evidence from Bio-Apatite for Multiple Oceanic Anoxic Events During Permian-Triassic Transition and the Link with End-Permian Extinction and Recovery." *Earth and Planetary Science Letters* 353-354 (November 1, 2012): 12-21.
- Song H Y, Tong J N, et al. 2014. Paleo-redox conditions across the Permian Triassic boundary in shallow carbonate platform of the Nanpanjiang Basin, South China: *Earth Sciences*, 57: 1030-1038, doi:10.1007/s11430-01304843-2
- Wu, Y S, Jiang H X, and Fan J S. "Evidence for sea-level falls in the Permian-Triassic transition in the Ziyun area, South China." *Geological Journal* 45(2010):170-185. doi:10.1002/gj.1168

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