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Geological and Geochemical Characteristics of Cherts in Mianlue Tectonic Zone

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1 Geological Setting

Many orogenic belts in the world are formed by multi-periods compound orogeny. Different type of rocks, tectonics and metallogenesis are the recordings of orogenic activity (Deng et al., 2013; Li et al., 2013; Yang et al., 2014). Among them, Chert is one of the most characteristic sedimentary rock types which can suggest the sedimentary environment and the tectonic background. Qinling orogenic belt is an important belt which stretches from west to east of central China, and lots of Paleozonic chert outcrops were found in Mianlue tectonic zone which can reveal the sedimentary environment and tectonic background of Qinling orogenic belt.

In this study, we have done research on Devonian cherts from Wenxian area in the west Mianlue tectonic zone, including field work of the cherts outcrops, petrology, mineralogy, major and trace elements of the cherts, and the sedimentary environment of cherts have also been analyzed (Baldwin et al., 2011; Ledevin et al., 2013). Combined with the studies related to cherts in the east of Mianlue tectonic zone (Li et al, 1997; Sheng et al., 1997; Zhang et al., 2003; Lv et al., 2004; Liu et al., 2005), we conclude the sedimentary environment and the tectonic background of Qinling orogenic belt in Paleozoic.

2 Elemental Geochemistry Characteristics

Cherts from Wenxian area can be divided into grey-white blocky and grey-dark brecciated cherts, and both of them are hot water sedimentary cherts with bedding or banded structure and conformity to upper and underlying strata in the field. And they are mainly made up of fine crystalline to microcrystalline quartz grain (84.85%-99.07%, average value is 91.99%) with few calcite, sericite and mud material, while the grey-white cherts are purer than the other one with more SiO_2. According to the Fe_2O_3/TiO_2-$Al_2O_3/(Al_2O_3+Fe_2O_3)$, V/Y-Ti/V and La_N/Ce_N-$Al_2O_3/(Al_2O_3+Fe_2O_3)$ discrimination diagrams, cherts are mainly formed in or near the continental margin (Fig. 1).

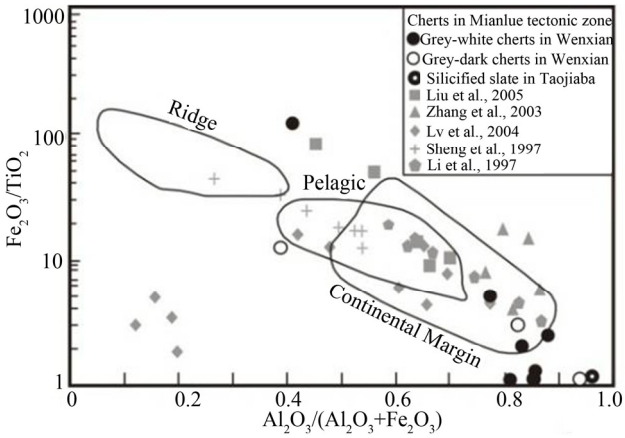

Fig. 1. Fe_2O_3/TiO_2-$Al_2O_3/(Al_2O_3+Fe_2O_3)$ discrimination diagram of cherts from Wenxian, Mianlue tectonic zone.

It is noticeable that the grey-white cherts are affected by materials from continental margin less than the grey-dark one based on the fewer ∑REE contents (11.96-51.06×10^{-6} compare to 171.26-236.11×10^{-6}). The rare earth patterns of the two kinds of cherts are similar with flat model after North American Shale Standardization (NASS) (Fig. 2). And the feature of cherts which shows no Ce anomaly (grey-dark is 0.95-1.05) or weak Ce positive anomaly (grey-white is 1.07-1.12), Eu weak negative anomaly (grey-dark cherts is 0.66-0.87, the other is 0.70-0.90), and low $(La/Yb)_{SN}$ value (grey-dark is 0.95-1.10, the other is 1.64-4.07) is similar to the classical cherts formed near the continent margin in the world. All the geology and geochemistry features suggest cherts from Wenxian area are formed in or near the continental margin while the

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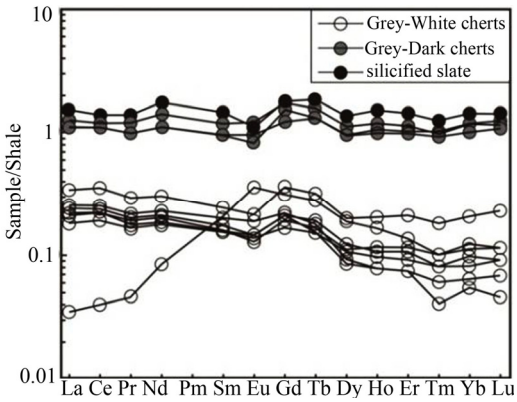

Fig. 2. NASC-normalized REE distribution pattern for cherts from Wenxian, Mianlue tectonic zone, Western Qinling.

grey-dark cherts may contain more continent materials than the grey-white one.

3 Conclusions

Combined with the studies of cherts in the east of Mianlue tectonic zone in Paleozoic, it suggests that it is sea basin sedimentary environment in the north of South China Block continent margin from early Paleozoic to early late Paleozoic, where there are a lot of continental margin materials added into the SiO_2-rich hot water, and then cherts are formed from the west to the east of Mianlue tectonic zone. Meanwhile, Western Qinling is under the continent rifting tectonic background, and a lot of rifting basins and deep fractures are formed in different stages of rifting activities which have a contribution to the forming of cherts.

Acknowledgments

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