TANG Limei, MA Weilin, CHU Fengyou, YU Xing and DONG Yanhui, 2013. Classification The Petrology and Geochemical Characteristics of Magellan Seamounts. *Acta Geologica Sinica* (English Edition), 87(supp.): 267-268.

The Petrology and Geochemical Characteristics of Magellan Seamounts

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Since the inception of deep-rooted mantle plume hypothesis(Morgan, 1971,1981), and the elegant explanation of volcanic age progression along the Hawaii-Emperor seamount chains in Pacific (Clague&Dalrymple,1989), mantles plumes and hotspots have been widely invoked to explain mantle anomalies within the interiors of lithospheric. In past two decades, the hotspot hypothesis have been subjected to critical re-evaluations (Anderson, 2002, 2004; Hamilton, 2003; Foulger&Natland, 2003). Understanding the nature of hotspot volcanism is though important, because hotspots trails are used to obtain the absolute motion of the lithospheric plates through geological time and because hotspots are an important means of heat transport between the deep mantle and the Earth's lithosphere (Koppers et al., 1998). Seamounts constitute some of the most direct evidence about intraplate volcanism, when seamounts formed and into which tectonic setting they erupted are a useful reflection of how the properties of the lithosphere interact with magma generation in the fluid mantle beneath(Hillier, 2007).

Magellan Seamount Trail (MST)in the West Pacific Seamount Province (WPSP;Fig. 1) is defined as a complex, short and discontinuous chain of guyots which formed in what is now the South Pacific Isotopic and Thermal Anomaly (SOPITA; Fig. 1). The ages of the studied guyots are estimated to range between 100–80 Ma based on the orientation of the MST and existing models of absolute Pacific plate motion (Epp,1984; Duncon,1985; Engebreston et al.,1985; Lonsdale,1988; Henderson,1985; Wessel et al.,1997). In this study, the petrology and geochemical characteristics of Magellan Seamounts are introduced.

The basalt samples of Magellan seamount are not very fresh, but the structure of rocks can also be seen under microscope(Fig.2). Feldspar, pyroxene, olivine can be

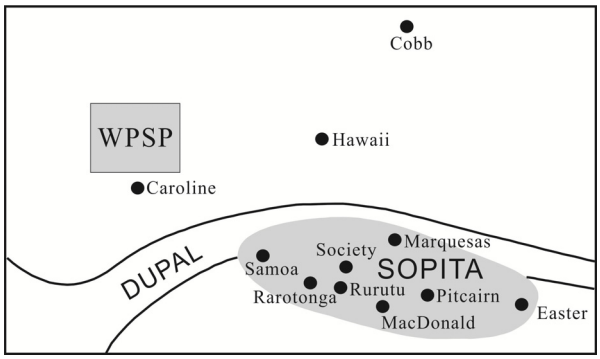

Fig. 1 Location of the West Pacific Seamount Province (*WPSP*). The South Pacific Isotopic and Thermal Mantle Anomaly (*SOPITA*), the DUPAL isotopic mantle anomaly, and the present day active hotspots of the Pacific Ocean are plotted for reference(Modified by Koppers et al., 1998).

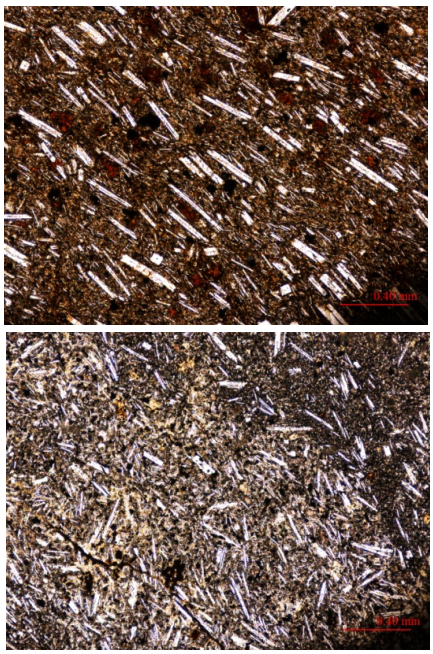

Fig.2 The micrograph of samples from Magellan Seamounts

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seen form the micrograph, some sample altered more serious, and there were some carbonate in them. The basalt samples of Magellan seamount are all belongs to alkaline types (Fig.3), and their tectonic background is within plates (Fig.4). From the Chondrite-normalized REE diagrams (Fig.5a), we can see that the basalt samples of Magellan seamount are enriched in LREE, the REE type is similar to Kohala Volcano of Hawaii and Azores Archipelago (Wilson, 1989), and belongs to OIA (Oceanic island alkali basalt). From the MORB-normalized spidergrams (Fig.5b),we can see that compared to MORB, the basalt samples of Magellan seamount are enriched in LIL, such as Sr, K, Rb, Ba, and also enriched in HFS, such as Th, Ta, Nb, Ce, Zr, Hf, the spidergrams type is similar to the typical OIB spidergrams (Sun et al., 1989).

Key words: petrology, geochemistry, Magellan Seamounts

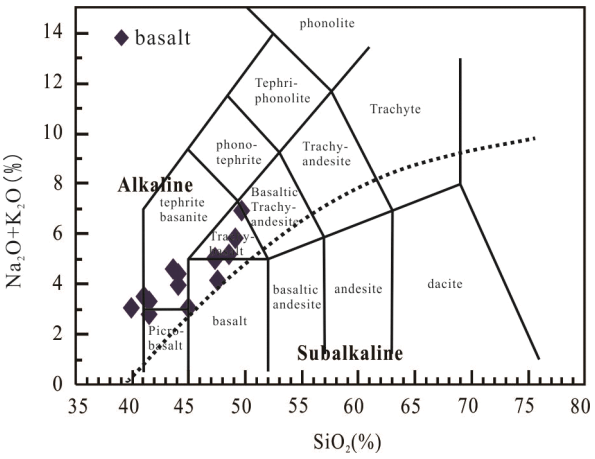

Fig.3 TAS diagram of Magellan seamounts

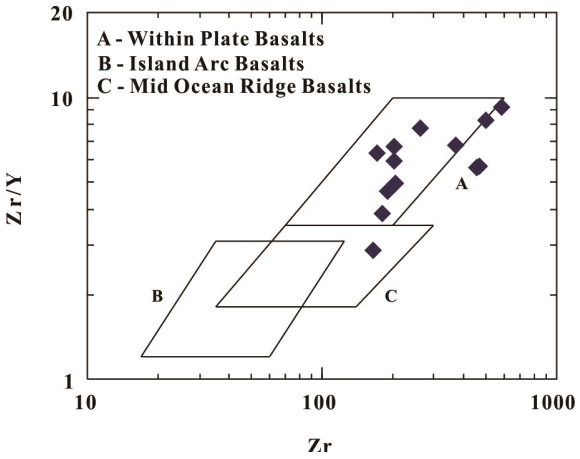

Fig.4 Zr/Y-Zr diagram of Magellan seamounts

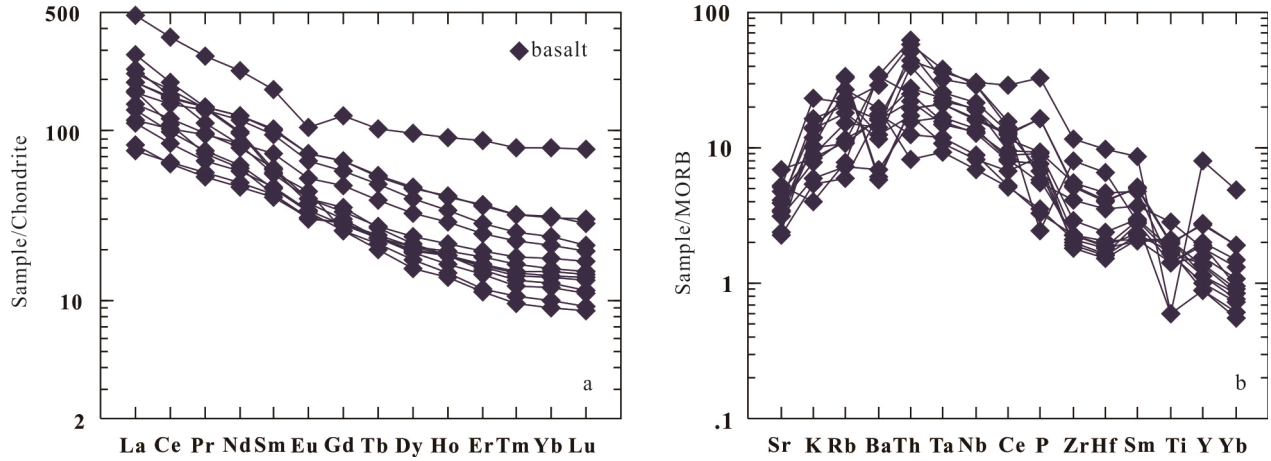

Fig.5 Chondrite-normalized REE diagrams(a) and MORB-normalized spidergrams(b) of Magellan seamounts