Research Advances

Accration and Subduction of Seamounts in West Junggar

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Recently, through implementation of the National Nature Science Foundation of China (No. 41303027) and Special Fund for Basic Scientific Research of Central Colleges (310827153506, 310827153407, 2014G1271058), we focused on basalts in Darbut and Karamay ophiolitic mélanges in West Junggar which is a part of the Central Asian Orogenic Belt, and made some advances as follows.

In the ophiolitic mélanges, imbricate thrusts, duplexes, "web" structures, pinch-and-swell structures, and shear band cleavages are widely developed. The pillow lava occurs within the fault zones as small blocks within the matrix of ultramafic rocks. Despite the deformation, pillow structures were well preserved at some localities. The pillow basalts are characterized by LREE enrichment and HREE depletion, very weak or no Eu anomalies, and no obvious Nb, Ta and Ti negative anomalies, indicative of a typical OIB affinity. Therefore, the pillow lavas are considered as accreted seamounts fragments in West Junggar accretionary complex (Fig. 1).

Recent studies on the worldwide ocean evolution worldwide indicate that enriched basalts are not only limited to plume setting, but are actually widespread and can be found in oceanic spreading ridges and some arc-related settings. Moreover, Hirano et al. (2006) proposed a petit spot model, which appears to be unrelated to any "mantle plume". However, we agree with Hofmann and Hart (2007) that a nonplume origin for young volcanoes seaward of the Japan trench cannot be used to argue that plumes do not exist anywhere. Therefore, we tend to use the mantle plume of transition zone to explain the formation of the OIBs in West Junggar.

In fact, except for seamounts accretion, substantial seamounts were subducted. Seamounts may be a significant source of material to the "subduction factory" (Fig. 1), in particular, by providing trace elements such as K, Ba, La, Ce, U, Th, Au, Cu, and Cs. When seamounts were subducted, they not only affected mantle geochemistry due to their enriched geochemical characteristics, but also played a significant role on geochemistry of arc and back-arc lavas and the formation of hydrothermal deposits on the supra-subduction zone setting. Therefore, the OIB-type volcanic rocks and gold and copper deposits in West Junggar may be related to the seamounts subduction (Fig. 1).

References

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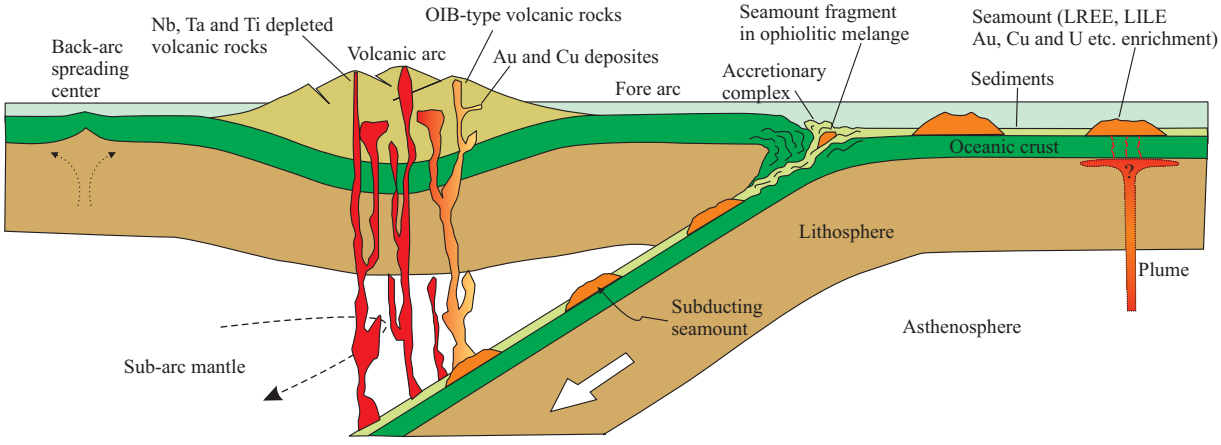

Fig. 1. Seamounts accration and subduction in West Junggar ocean and its geological effects.

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