岩石学报
ACTA PETROLOGICA SINICA

寇彩化,张招崇,侯通,廖宝丽,李宏博. 2011. 滇西剑川OIB型苦橄玢岩:俯冲板块断离的产物?. 岩石学报, 27(9): 2679-2693

滇西剑川OIB型苦橄玢岩:俯冲板块断离的产物?

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基金项目：本文受国家973项目(2009CB421002)、国家自然科学基金(40925006)和111计划(B07011)联合资助.

摘要：

滇西剑川地区出露小规模的OIB型苦橄质次火山岩,主要由橄榄石、单斜辉石和斜长石组成,其中橄榄石主要为贵橄榄石,$Mg^{\#}$最高可达88.8。全岩SiO_2含量为43%~48%,MgO含量为12%~24%。根据橄榄石-熔体平衡原理,恢复的原始岩浆为苦橄质岩浆(MgO=13%,FeO=10%)。苦橄玢岩的微量元素标准化图解与洋岛玄武岩(OIB)相似,具有相对富集轻稀土(LREE)和大离子亲石元素(LILE)的特点。此外,斑晶橄榄石中普遍含有熔融包裹体和尖晶石包裹体。尖晶石属于富铬尖晶石,$Cr^{\#}$最高可达69.0,且尖晶石具有较低的Al_2O_3(12.5%~18.6%)和较高的TiO_2(0.2%~1.7%)含量。微量元素模拟结果表明,苦橄质岩浆是高温高压(T≈1470℃,P≈2.7GPa)条件下石榴子石相橄榄岩低度部分熔融(4%~7%)的产物。结合苦橄玢岩的分布特征,推测苦橄质岩浆的形成可能与中新世时印度板块向欧亚板块高角度深俯冲过程中板片的断离导致软流圈物质沿着板片窗上涌而发生熔融有关。

英文摘要：

Small scale OIB-type picritic porphyrite, comprising olivine, clinopyroxene and plagioclase, outcrops in Jianchuan area, western Yunnan, and the olivine is predominantly chrysolite with the $Mg^{\#}$ up to 88.8. The bulk-rock compositions characterized by relatively low SiO_2 (43%~48%) but high MgO (12%~24%) content. On the basis of the principle of the olivine-melt equilibrium, we conclude that their parental magma is picritic (MgO=13%, FeO=10%). The normalized rare-earth element (REE) patterns of picritic porphyrite is similar to that of ocean island basalts (OIB), rich in light rare-earth element (LREE) and large ion lithophile element (LILE) as well. In addition, melt and spinel inclusions have been recognized in the phenocryst olivine. The spinel inclusions are relatively enriched in Cr with the maximum $Cr^{\#}$ of 69.0 and have low Al_2O_3 (12.5%~18.6%) and high TiO_2 (0.2%~1.7%) contents. The result of modelling of the trace elements implied that the picritic magma was derived from the asthenospheric garnet-bearing peridotite which had experienced relatively low degree of partial melting (4%~7%) under the condition of high temperature and pressure (T≈1400℃, P≈2.7GPa). Taking the regional geological setting into consideration, we infer that the deep dynamic mechanism refers to the partial melting of upwelling asthenosphere due to the open of slab window, which probably had been triggered by the break-off of the India slab subducted at a high-angle bebeath the Eurasia plate.

关键词：苦橄玢岩 原始岩浆 板片断离 软流圈上涌 剑川

投稿时间： 2011-03-21 最后修改时间： 2011-07-04