Variation and complexity of the Late Permian Emeishan basalts: Reappraisal of plume-lithosphere interaction processes

QI HE[1], LONG XIAO[1], JIANYE CHEN[2] AND RUI GAO[1]

[1]Faculty of Earth Science, China University of Geosciences, Wuhan, 430074 China
[2]Institute of Geology, China Earthquake Administration, Beijing, 100029 China

New petrologic and geochemical data of the Emeishan basalts from Lijiang-Shangri-La area have been studied. Integrating previous published geochemical data of basalts and picrites from the Emeishan large igneous province (ELIP), we find that there are large compositional variations of the Emeishan basalts and they were generated from heterogeneous mantle sources accompanying complex plume-lithosphere interaction processes. This study suggests that the following. We give a new classification scheme, based on additional parameters, and the genesis of the two groups. High-Ti basalts were products of the plume head derived magmas similar to OIB-like basalts, whereas the low-Ti basalts from ELIP have significant lithospheric signatures, which were most likely derived from melting of subcontinental lithospheric mantle (SCLM) by plume-SCLM interaction.

Thus, the plume-lithosphere interaction processes are more complicated than previously thought. We infer that the thermal structure, spatially distributed compositional heterogeneities of the plume head and dependent and/or independent processes, which take place in different parts of the plume, are important in controlling the composition of lavas from a given locality.

Inconsistent maturities explained by the different molecular indicators of oil samples in Hetaoyuan Formation of Biyang Depression, China

S. HE*, S.F. LI, G.Q. LIU AND Y.G. HOU

Key Laboratory of Tectonics and Petroleum Resources of Ministry of Education, China University of Geosciences, Wuhan 430074, China
(*correspondence: shenghe@cug.edu.cn)

Biyang Depression is a typical Cenozoic oil-rich sub-basin in Nanxiang Basin, east China and its main oil-producing sandstone reservoirs are in the low part of He3 (H3L), up part of He3 (H3U) and He2 part (H2) in the Hetaoyuan Formation of Late Eocene-Middle Oligocene with the current burial depths of about 1100-3600m.

The molecular indicators are often applied to interpret maturities of organic matters [1]; however, the difference of maturities explained by various molecular indicators of saturated biomarkers and aromatic compounds in the same oil samples can be sometimes appeared. The maturities of 45 crude oil samples in Biyang Depression using the different molecular parameters are studied carefully and the values of maturity parameters for 6 typical crude oils are listed in Table 1. It can be observed that the explained maturities for the crude oils in Well B1 to B2 from saturated biomarkers are different from the maturities interpreted by indicators from methylphenanthrene index (MPI1) and the stable carbon isotopes of aromatics ($\delta^{13}C_{ARO}$ PDB, ‰). Based on analyses of oil geochemical character, source rock maturation of He3 part and oil-source correlation, this study suggests that the inconsistent results of maturity from different geochemical indicators are likely caused by the mixed with a small amount of immature oil, rather than an existence of industrial immature oil from the immature source rocks of He2 part.

Well	Depth (m)	Ph/nC_{18}	C29ββ/(αα+ββ)	MPI1	$\delta^{13}C_{ARO}$
B1	1083, H2	1.35	0.29	0.63	-27.52
B2	1966, H2	5.59	0.19	0.82	-27.91
B3	2381, H3U	1.22	0.42	0.75	-27.40
B4	2564, H3U	1.25	0.41	0.62	-28.12
B5	3325, H3L	0.70	NA	1.54	-25.21
B6	3560, H3L	0.56	NA	1.23	-25.38

Table 1: Oil maturities explained by geochemical indicators

[1] Peters *et al.* (2005) *The Biomarker Guide*, Camb.Uni.Press.