Geochemical and tectonic fingerprinting of ophiolites

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We present a new classification of ophiolites, incorporating the diversity in their structural architecture and geochemical signatures that result from the variations in petrological, geochemical and tectonic processes during formation in different geodynamic settings. We define ophiolites as suites of temporally & spatially associated ultramafic to felsic rocks related to separate melting episodes & processes of magmatic differentiation in particular tectonic environments. Their geochemical characteristics, internal structure and thickness vary with spreading rate, proximity to plumes or trenches, mantle temperature, mantle fertility, and the availability of fluids. Subduction-related ophiolites include *suprasubduction zone* and *volcanic arc* types, whose evolution is governed by slab dehydration and accompanying metasomatism of the mantle, melting of the subducting sediments and repeated episodes of partial melting of metasomatized peridotites. Subduction-unrelated ophiolites include *continental-margin*, *mid-ocean ridge* (*plume-proximal, plume-distal and trench-distal*), and *plume-type* (*plume-proximal ridge* and *oceanic plateau*) ophiolites that generally have MORB compositions. Subduction-related ophiolites develop during the closure of ocean basins, whereas subduction-unrelated types evolve during rift-drift and sea-floor spreading. Geochemical and tectonic fingerprinting of Phanerozoic ophiolites within the framework of this new ophiolite classification is an effective tool for identification of the geodynamic settings of oceanic crust formation in Earth history that in turn helps us deduce the processes by which these oceanic rocks were incorporated into continental margins. We apply this new ophiolite classification to Precambrian greenstone belts as a conceptual framework to examine potential vestiges of Proterozoic and Archean oceanic lithosphere.

Protection of organic matter by clay minerals in source rocks revealed by biomarker analysis

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Several mechanisms have been proposed in description the accumulation and preservation of organic matter(OM) in sediments, and the adsorption of clay minerals is concerned as an important way. It is significant that these different occurrences of OM studies with the biomarker information obtained from an source rock. The 10 source rock samples, an depth interval from 1294 to 3357 m from Shayejie formation in Dongying depression of China, were collected. The clay size fraction (<2μm) were isolated by sedimentary approach after the dispersion of the source rock by ultrasonic and deionized water. Both the clay size fraction and bulk source rocks were extracted by dichloromethane, and GC/MS was applied.

The normalized amount of the extractable organic matter (EOM) is higher in clay size fraction than it in the whole rock, 0.56mg/g and 0.37mg/g respectively, although the composition are similar between them. This suggestes that EOM mainly occurred as combined with clay size fraction in source rocks. The biomarker data show that there is no notable difference on characteristics of OM associated with clay fraction and in the whole rock. However, the differences between clay size fraction and whole rock show that the weak degradation of OM combined with clay fraction occur no matter caused by micro-organisms or thermalism, which could be demonstrated by the relative abundance of alkanes and isopreiods (Pr/nC_{17} and Ph/nC_{18} ratios are 1.44 and 1.54 in mean for the whole rock while 1.33 and 1.2 in mean for clay size fraction) and the ratios of maturity parameters(such as C_{31}22S/S+R ratios are 0.46 and 0.41 in average respectivelly, C_{29} ααα 20S/20(S+R) ratios are 0.18 and 0.14 in average respectively, for the whole rock and clay size fraction). In addition, the information acquired from biomarker of the whole rock may be obscured for the variety occurrences of OM in the whole rock, which should be caution.

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