Geo-chemical Characteristics of the Sediments in Southwest Indian Ridge

Dasong Huang, Xiaoyu Zhang, Lingling Yao, Yong Du, and Binbin Jiang
Zhejiang University, Department of Earth Science, Hangzhou, China (cubesir@foxmail.com)

Abstract: Major elements, trace elements and rare earth elements measurements were carried out on twenty-one sediment samples taken from the Leg II and III in Chinese reasearch cruise DY-30 which explored in Southwest Indian Ridge. The results show that all of the samples can be divided into two groups: Si-rich group and Ca-rich group. Similar to silicates/aluminosilicates, Si-rich group sediments enrich Si(SiO$_2$: 34% to 49.6%), Mg(MgO: 4.92% to 27.5%), Fe (Fe$_2$O$_3$: 7.78% to 10.65%) and Al(Al$_2$O$_3$: 4.87% to 12.15%), which are very different from Ca-rich group sediments that enrich Ca(CaO: 39.7% to 53.9%), LOI (29.32% to 42.98%) and Sr (972ppm to 1680ppm) that are similar to biogenetic carbonate. The variation range of ΣREE of Si-rich group sediments is 12.89ppm to 44.90ppm similar to Ca-rich group sediments that is 16.82ppm to 35.11ppm, while the ratio of LREE/HREE of Si-rich group sediments (1.03 to 1.83) is much less than Ca-rich group sediments (2.39 to 5.36). The normalized REEs with North American Shale Composite (NASC) in samples show N-MORB characteristics in Si-group sediments though the ΣREE are a bit lower, and slight negative Ce anomaly in both two groups (δCe: 0.80 to 0.43) while positive Eu anomaly is relatively distinctive in Si-group sediments (δEu: 1.14 to 1.60). Contents of CaO+LOI in Ca-rich group sediments are mostly higher than 80% (even 90%) indicate biodeposition is prominent in contrast to Si-rich group sediments (CaO+LOI: 11.33% to 46.68%) that are concerned with the mixture of basalt, ultrabasic rocks and calcareous sediments. The good correlation coefficients for major elements (SiO$_2$, Al$_2$O$_3$, MgO, TiO$_2$ and LOI) corrected by CaO (for mitigating the effects of biodeposition) in Si-rich sediments with the comparison of the ΣREE-P2O$_5$ among the Si-rich group sediment, Ca-rich group sediments and basalt in Southwest Indian Ridge also support the basalt is the main material source of Si-rich group sediment. Both of the δCe values and the U/Th-V/(V+Ni)$_{[\text{U+FF09]}$ plot show an oxide sedimentary environment, and content of CaO with linearity among the major elements in Ca-rich group sediments point out the study area is above the Carbonate compensation depth (CCD) and sedimentary environment is quite stable.