Geochemical characteristics of crude oil from M1ss Member in Tarapoa block, Oriente Basin, Ecuador

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The bulk geochemistry of 17 crude oil samples from TW block were investigated. Results show that: 1) The crude oils are low mature to mature oils: all crude oils are low in saturate content (14.5~23.7%) and saturate to aromatic ratio (0.49~0.87), high in non-hydrocarbon (14.4~29.7%) and asphaltene content (20.45~39.7%); C32 hopane 22S/(22S+22R) and C30 moretane/ C30 (hopane+moretane) value range between 0.55~0.58 and 0.09~0.10, all these indicate that the crude oils are the product when the source rock just entered oil window(Ro=0.7~0.9%); 2) Crude oils are mainly originated from marine source rock: Carbon number of alkanes series range between C9-C33, front peak distribution, with main carbon number of C11, C13 and C15; ΣC21-/ΣC22+ range between 2.0-5.5, which indicates that low algae and other aquatic organisms are the source materials; OEP values ranges from 0.95 to 1.02, without obvious odd-even predominance, which instructs little contribution of terrigenous plant to crude oil generation; 3) Crude oils are formed by two stages charging, early charged oil are generally degraded: Heptane value is larger than 13, isoheptane values is larger than 0.5, Toluene/n-heptane ratio ranges between 1~3, N-heptane/methyl cyclohexane ratio value range 0~1, "UCM" are obvious in all the alkanes total ion figure of crude oils; 25-norhopanes, character biomarker of crude oil degradation, are found in all crude oils, all these indicate that crude oil had experienced degradation; Meanwhile, complete normal alkanes series still exist in crude oil proves that normal oil (without degradation) exist in crude oil samples, so the conclusion could be made that crude oil is composed by normal oil and degradation oil and formed by two stage charging with degradation of earlier charged oil; 4) 4-/1-MDBT and 1,4/1,5-dimethyl carbazole analysis shows that the crude oil origin from two supply points, the west supply point and the east supply point, the closer to oil supply point the higher chance to get later charged oil and the higher chance to drill medium or light oil, so the area close to oil supply point should be pay much more attention.