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Geochemical Correlation of Northwestern Niger Delta Oils: Evidence from Light Hydrocarbons

Mango has proposed a steady-state catalytic process for the origin of light hydrocarbons (LHs) (1997, 2000a). Ratios of LHs in his kinetic scheme could be useful in grouping oils according to origin and post-generation history. Due to a lack of consensus on the Niger Delta petroleum systems and considering the cost effectiveness and ease of analysis, Mango's LH parameters have been applied to sixty-five oils from the Western Niger delta. Higher molecular weight parameters of these same oils indicated three oil families: 1) mainly marine, 2) marine and terrigenous, and 3) mainly terrigenous. The LHs, however, showed only two groups. Surprisingly, the two families that appeared most distinct in higher hydrocarbons (1 and 3) were indistinguishable in LHs. This apparent contradiction could be indicating an erroneous categorization of family 1 oils, however. These oils are rich in high-molecular weight wax (solid at room temperature) suggesting a terrigenous rather than marine input. If family 1 and 3 oils are genetically distinct (marine and terrigenous) as the higher hydrocarbons suggest, the LHs are ineffective in typing Niger Delta oils, and thus do not provide a complementary or alternative and cheaper tool for assessing the Niger Delta petroleum systems. If, however, families 1 and 3 oils are genetically similar as the LHs suggest, the LHs provide a powerful complement to the higher hydrocarbons. Whatever the case, the combination of light and higher hydrocarbons clearly provides the strongest overall assessment of the Niger Delta petroleum system.