Organic geochemical characteristics of Miocene and Pliocene sedimentary rocks in the southern Taiwan

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The considerable amount of seepages exposed in the southern Taiwan show its hydrocarbon exploration potential, though it is still not clear where the hydrocarbon sources are in this region. This study presents the hydrocarbon and biomarker results revealed by gas chromatography tandem mass spectrometry (GC-MS-MS) and pyrolysis-gas chromatography mass spectrometry (Py-GC-MS) from outcrop rocks in southern Taiwan. The age of these samples ranges from the mid-Miocene to late Pliocene. The Rock-Eval analysis indicated that these samples are mainly composed of type III organic matter, and that the grades of organic matter contents are poor to fair. The GC-MS-MS analytical results of biomarkers extracted from the rock samples indicate that the strata are mainly of neritic facies.

The maturity revealed by biomarkers and vitrinite reflectance (%Ro) indicates that most of these samples are of low to modeate maturity, which is also supported by the Py-GC-MS data of the kerogen pyrolysis results. However, we also found the %Ro in the carbonaceous materials from the Pliocene strata is lower than that in the host rocks in the borehole of this region, suggesting the younger strata haven't be buried deeply and the %Ro of the strata should not be so high. Therefore, it might be attributed to the re-deposition processes that are associated with the erosion resulted from the intense orogeny and stronger precipitation, or other different depositional environments.

In addition, the Py-GC-MS results revealed the cracking hydrocarbons exist in the kerogens of these mature rock samples collected from mid-Miocene to early Pliocene, which indicates the hydrocarbons of the seepages could come from the above-mentioned strata or earlier one. The results may provide an insight into the future exploration in onshore and offshore southern Taiwan.