Palaeozoic Petroleum Systems in Tarim Basin, Northwest China: A Geochemical Overview and Perspective

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The Tarim Basin, located in northwestern China, has now become one of the most important bases of petroleum resources in China. Although exploration efforts in the last two decades have greatly enhanced our knowledge on the petroleum systems in the basin, the generation, migration, accumulation and preservation of the Paleozoic marine-sourced oils are still not well understood and being vigorously debated. This ambiguity has caused high uncertainties and risks for petroleum exploration in the basin. In this paper, we highlighted the recent research findings on three major debates in the basin from the geochemical viewpoint: (1) Which source rocks provided the major hydrocarbons for the Palaeozoic petroleum systems: Cambro-Ordovician euxinic source rocks or Middle-Upper Ordovician dysoxic and/or anoxic marls? (2) When was the main charging stage that was responsible for the major commercial discoveries in the basin: Yanshanian stage or Hercynian stage? (3) What is the evidence of and what had caused the in-reservoir hydrocarbon secondary alteration including the destruction, re-adjustment and re-accumulation of the palaeo-petroleum reservoirs?