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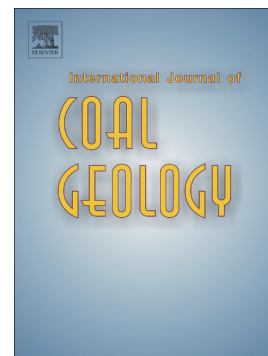
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Geochemical characteristics and origin of natural gas from Wufeng-Longmaxi shales of the Fuling gas field, Sichuan Basin (China)

Rui Yang ^{a, b}, Sheng He ^a, Qinhong Hu ^b, Dongfeng Hu ^c, Jizheng Yi ^d

^a Key Laboratory of Tectonics and Petroleum Resources, Ministry of Education, China University of Geosciences, Wuhan 430074, China.

^b Department of Earth and Environmental Sciences, the University of Texas at Arlington, Arlington, TX 76019, USA.

^c Exploration Company, Sinopec, Chengdu 610064, China.

^d Petroleum Exploration and Development, Jiangnan Oilfield Branch Company, Sinopec, Wuhan 430223, China.

Abstract

As the first giant shale gas field in China, the Fuling gas field has recently been regarded as one of the most important regions for natural gas exploration and production in the Sichuan Basin. However, the origin of natural gas from Upper Ordovician Wufeng and the bottom of Lower Silurian Longmaxi (WL) shales in the Fuling gas field is poorly understood to limit a comprehensive understanding of gas generation, accumulation and exploration.

In this work, based on molecular and stable carbon isotopic composition of a total of 24 gas samples from five shale gas wells in the Fuling field, we analyzed the geochemical characteristics and gas origin, and discussed the cause for the geochemical anomalies (carbon isotopic reversals). Molecular composition results show that gases from the Fuling gas field are dry and mainly composed of methane (97.9 - 98.9 %), with a very low level of ethane (C₂H₆), propane (C₃H₈) and non-hydrocarbon gases (mainly CO₂ and N₂). These dry gases are classified as oil-associated gas and mainly derived from secondary cracking. Due to the lack of gas samples across a maturation gradient from immature to late mature, the WL gases in the Fuling field show an unclear evolution trend between the $\delta^{13}\text{C}_2$ and wetness values; however, all these samples are located in the isotopic reversal zone. Carbon isotopes

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