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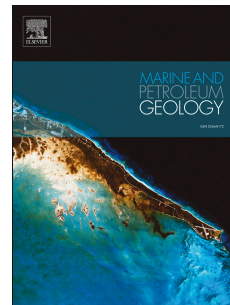
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Depositional environment and geochemical characteristics of the Lower Carboniferous source rocks in the Marsel area, Chu-Sarysu Basin, Southern Kazakhstan

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ABSTRACT: There are two sets of carbonate source rocks in the Lower Carboniferous layers in Marsel: the Viséan (C_{1v}) and Serpukhovian (C_{1sr}). However, their geochemical and geological characteristics have not been studied systematically. To assess the source rocks and reveal the hydrocarbon generation potential, the depositional paleoenvironment and distribution of C_{1v} and C_{1sr} source rocks were studied using total organic carbon (TOC) content, Rock-Eval pyrolysis and vitrinite reflectance (Ro) data, stable carbon isotope data, gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS) analysis data. The data were then compared with well logging data to understand the distribution of high-quality source rocks. The data were also incorporated into basin models to reveal the burial and thermal histories and timing of hydrocarbon generation. The results illustrated that the average residual TOC contents of C_{1v} and C_{1sr} were 0.79% and 0.5%, respectively, which were higher than the threshold of effective carbonate source rocks. Dominated by type-III kerogen, the C_{1v} and C_{1sr} source rocks tended to be gas-bearing. The two source rocks were generally mature to highly mature; the average Ro was 1.51% and 1.23% in C_{1v} and C_{1sr}, respectively. The source rocks were deposited in strongly

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