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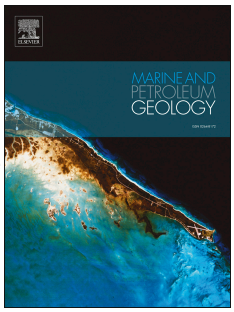

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Pore structure and fractal analysis of Lower Carboniferous carbonate reservoirs in the Marsel area, Chu-Sarysu Basin

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Abstract: Evaluation of carbonate heterogeneity, closely related to pore geometry and connectivity, is important in oil and gas field production and reservoir prediction. To profoundly understand the heterogeneity of Lower Carboniferous carbonate reservoirs in the Marsel area, including Visean (C_1v) and Serpukhovian (C_1sr), the pore structure and fractal characteristics are investigated using routine petrophysical measurements, X-ray diffraction (XRD), cast thin section analysis, scanning electron microscopy (SEM), and mercury injection capillary pressure (MICP) tests. The origin of potentially prolific reservoir, the relationships between fractal dimension and reservoir physical properties, mineral composition and pore structure are also discussed. XRD results reveal that the mineral compositions are highly heterogeneous in C_1v and C_1sr. Routine petrophysical experiments indicate that C_1v and C_1sr are generally tight. However, some high porosity-permeability zones exist in C_1sr, which is described as a potentially prolific reservoir. The cast thin section and SEM analyses identify three main pore types in the potentially prolific reservoir: interparticle dissolution pores, intercrystalline dissolution pores, and moldic pores. The

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