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The Use of Laser Scanning Microscope (LSM) Method in The Pennsylvanian Siliciclastic and Carbonate Reservoirs of the Amazon Basin, Brazil

The laser scanning microscope (LSM) method was used to investigate the pore distribution of sandstones and oolitic limestones from intracratonic Paleozoic Amazon Basin, with area of 450,000 km² and, filled by a 5,500 meters thick succession of sediments.

The Pennsylvanian sequence is composed of Monte Alegre fluvial-eolian sandstones, average porosity of about 25% and permeability greater than 1Darcy, is considered the best hydrocarbon reservoir. Bioclastic and oolitic limestones, dolostones, fine-grained sandstones, which have local reservoir potential and, thick evaporitic sequences formed by anhydrite, halite and sylvite, considered to form the best seal of the basin, represent the Itaituba and Nova Olinda formations.

Samples of sandstones and oolitic limestones were impregnated under vacuum with a low viscosity fluorescent resin and visualized by the LSM method. The LSM enabled us to capture digital intensity maps of green fluorescence excited by blue (488nm) Kr-Ar laser beams. Quasi 3-D images of pore structures were constructed from optical slices (confocal images) of the thick sections.

As a results, the pore spaces of sandstones and oolitic limestones were successfully filled with the fluorescence resin allowing the visualization of pore shapes, pore inter-connectivity and grain packing in 3-D. The LSM method can be used to visualize and map details of reservoir characteristics.