

Petroleum systems of subandean basins based on geochemical characterization of oils

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In most areas of the Subandean megatrend exploration is far from being mature, although geochemical data show that Upper Cretaceous source rocks account for more than 90% of the oil in place discovered to date. Geochemical investigations of some of the most productive Subandean sedimentary basins have been conducted using a wide selection reservoir oils. The objectives were to identify and characterize the oil types, and to assess the depositional paleoenvironments and the age of their source rocks, in order to establish and predict the petroleum systems in the basins.

The integration of geochemical and geological data allowed the differentiation and characterization of five major age related oil types in the Subandean basins studied: Upper Devonian marine epicontinental; Upper Jurassic marine anoxic; Triassic lacustrine freshwater; Upper Cretaceous marine anoxic, varying from carbonate to siliciclastic; and Tertiary marine deltaic, ranging from distal to paralic.

Thermal evolution levels ranging from early mature to overmature and post-generation alteration processes such as biodegradation can explain most of the compositional differences within each oil type. Basin modelling suggests that the Subandean paroxysm had played a major role in the establishment and preservation of the petroleum systems of the area (generation, migration pathways, reservoir leaking, biodegradation, secondary cracking of oil and gas, oil mixing etc.). Two major pulses of generation and expulsion occurred, one before (Eocene-Oligocene), and the most important after the andean paroxysm during Late Miocene.

Although this study confirms the Upper Cretaceous marine anoxic oil type as the most important in the Subandean megatrend, the Tertiary type presents a promising oil-prone potential for future exploration.