A 150km-Transect through the Southeast Area of the Neuquén Basin, Argentina: the Contribution of Geochemistry in the Appraisal of Five Productive Petroleum Systems

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The Neuquén Basin constitutes the most prolific hydrocarbon basin of Argentina with a current daily production around 360 MBO and 2.6 BCFG. Considerable exploration activity conducted in the last years by numerous oil companies has led to improve the knowledge on the complex features of the petroleum systems of the basin, including their extension, productivity and efficiency for effective hydrocarbon accumulation.

This paper deals with the geochemical appraisal of five productive petroleum systems of the southeastern portion of the basin, with the distinctiveness that they have been recognized to partially coexist in a restricted geographical area represented along a 150km extension transect (Fig.1). The identification of the stratigraphic and areal distribution of source rocks and their thermal maturity trends, together with the associated hydrocarbon accumulations, stands for a multifaceted task, in which petroleum geochemistry strengthens its key role as an exploration tool.

The South Huincul and Huincul High areas (1 and 2 in Fig.1) represent a challenge for understanding the distributions of different oils sourced either from the low-mature, sulfur-rich, highly-anoxic Vaca Muerta facies or from the moderate-mature, low-quality type II/III Los Molles shales. A comparable but overall more mature Los Molles facies developed towards the basin center has also fed reservoirs in areas where the typical platform to basinal Vaca Muerta source facies (3 in Fig.1) appears to have acted as the principal charge system. In addition, both Los Molles and Vaca Muerta intervals contributed to accumulations in zones where non marine oils sourced from the lacustrine fresh-water Pre-Cuyo (4 in Fig.1) and lacustrine saline Pre-Cuyo (5 in Fig.1) source rocks, locally accumulated within individual deep half-grabens.
Fig. 1. Source rocks (SR) and reservoir rocks (RR) of the five petroleum systems recognized in the 150km-transect of the southern Neuquén Basin.