Risk Reduction in Gas Exploration: Application of Compositional Kinetic Analysis to the Deep Neuquén basin, Argentina

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The Neuquén basin of west-central Argentina contains source rocks that provide the hydrocarbon charge for at least 4 petroleum systems. These source rocks are summarized as the Late Triassic / Early Jurassic “pre-Cuyo” lacustrine sequences; Early Jurassic Los Molles proximal and distal marine sequences; Late Jurassic / Early Cretaceous Vaca Muerta restricted shelfal, shelfal, and distal marine sequences; and the Early Cretaceous Agrio marine sequences. A knowledge of the spatial distribution of these source rocks, within the context of the physical attributes that exert control over the products generated at high levels of thermal stress, is critical to the quantification of exploration risk. Where bulk kinetic parameters of kerogen decomposition are very useful for determining the timing of oil generation, *compositional kinetic analysis* provides invaluable data for determining the actual products that will be released from the kerogen under specific geologic conditions. This new data is combined with the latest techniques to independently quantify expulsion temperatures for different hydrocarbon phases. Forward and inverse modeling methods are used to demonstrate the application in the deep intervals of the Neuquén basin; a particular focus is directed toward the evaluation of gas resource potential.