**Fluvial channel stacking and connectivity in the San Jorge Gulf Basin, Argentina**

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# Abstract

The San Jorge Gulf Basin has an extensional origin and is intraplate confined with mostly continental deposits. Its evolution is characterized by two tecto-sedimentary phases: the Neocomian cycle where lacustrine and marine deposits filled half-graben structures, and the Chubutian cycle existed when the basin was on sag phase filled with continental deposits. The source rocks of the study area are the black shales of D-129 Formation deposited in a large lake during the late Barremian and Aptian age. Expulsion and migration of hydrocarbon could have started 100 million years ago. Most of the hydrocarbon produced in GSJ basin are trapped from fluvial sandstones of the lower member of Bajo Barreal formation. Sandstones bodies have been deposited by ephemeral rivers with sudden and episodic events (Bridge et al, 2000). Sandstones sheets, wedge and lenses were identified on outcrops and represent the deposits of overbank sheet floods, levees, and crevasse splays respectively. Channel-form sandstone bodies represent channel bars and fills within channel belts. The normal faults system formed by rifting, has strike orientation NW-SE where roll over structures are the dominant traps. Extensional style was superimposed by a compressive system whose orientation is NNE-SSW. Compression and uplift were intensive in Los Perales field, and were initiated in the Tertiary, associated with regional uplift of the Andes Range on the west. Tectonic inversion also provided favorable structural traps and path for hydrocarbon migration. Most of the productive reservoirs on the basin are from the Chubut Group which comprises D-129, Castillo and Bajo Barreal Formation.

This study focused on the North of Los Cañadón Yatel, in GSJ basin, where very good results were obtained by identifying extremely heterogeneous fluvial channel reservoirs by using strata slice seismic amplitude data combined with Spectral Decomposition. This last method is a relatively new technology and proved to be useful for mapping thin layers below the seismic resolution. The fluvial channels are well mapped in Castillo Formation, a multilayer reservoir characterized by sandstone bodies deposited in fluvial river systems with high pyroclastic content.

A data reconnaissance allows the detection of geological events at an early stage of the Exploration process. To perform it, a workflow has been followed to create a comprehensive model based on all the seismic reflectors available in the data. This Model is a Relative Geological Time Model (RGT model). The RGTmodelling can be refined by editing the auto-tracked and stratigraphically sorted seismic horizons in a discrete stratigraphic framework called ‘Model-Grid’. A 3D interpolation of the discrete Model-Grid converts each seismic sample into relative geological time and delivers a continuous RGT model. Since the 3D RGT model is both vertically and spatially continuous, an unlimited number of chronostratigraphic surfaces can be generated. These depositional time surfaces can be extracted as dynamic series called Horizon Stacks. The Horizon Stack enables an interactive stratal slicing through the seismic volume where sedimentary as well as structural features can be highlighted with a strong accuracy.