Assessment of Climate Variability in the Genesis of Nonmarine Stratigraphic Sequences in the Iglesia Basin, Argentina

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The Neogene Iglesia Basin of Argentina provides excellent opportunities to explore the genesis of stratigraphic sequences. Located between the Frontal Cordillera and Precordillera thrust belt at 30° – 31° S latitude, this “piggyback” basin experienced syntectonic alluvial, fluvial, and lacustrine sedimentation from 17 – 4 Ma, based on paleomagnetic and radiometric dating. Eleven seismic sequences within 3.5 Km of strata are correlatable with outcrop boundaries. Sequence stratigraphic techniques aid prediction of reservoir distribution and description of basin architecture. However, fundamental understanding of the causative roles of tectonism, climate, and autocyclic stresses is prerequisite. This study will attempt to extract the climatic signal using paleohydrologic, pedologic, and lithofacies analyses.

Paleohydrologic and lithofacies analyses will reveal variations in stream discharge and distribution across sequence boundaries. Measurement of paleochannels throughout the section will allow modeling of time-variant flow velocity and discharge through use of hydraulic geometry equations. Mapping lateral lithologic changes and measuring paleocurrent indicators will establish facies relationships and aid in the assessment of how drainage network evolution affected the generation and distribution of the sequences.

Numerous paleosols within Iglesia Basin strata provide morphological and geochemical data about climate change. Analysis of calcic horizons, soil structure, and mineral weathering may constrain the pedogenetic climate and the recurrence interval of sequence-forming events. $\delta^{13}C$ and $\delta^{18}O$ isotopic ratios of soil carbonates allow estimation of regional ecology, meteoric water composition, and glacial history. Paleosol development suggests periods of minimal sedimentary transport velocity and geomorphic stability, which will support paleohydrologic calculations and lithofacies interpretations of stream distribution.