Recognition of Stratigraphic Surfaces and Sequences through the Integration of Geophysical and Biostratigraphic Data: An Example from the Tampico-Misantla Basin, Mexico

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ABSTRACT

Sequence stratigraphic principles combined with biostratigraphic data improve the recognition of stratigraphic successions, genetic units, and stratigraphic surfaces. Graphic correlation can further assist by identifying and quantifying apparent hiatal surfaces between depositional sequences. These apparent hiatal surfaces can be the result of significant unconformities from forced regressions, more subtle expressions of lapout from normal regressions (offlap) or transgressive surfaces (onlap). Further, the correlative conformity between depositional sequences can be constrained in time through the use of Wheeler diagrams generated from graphic correlation or time-depth plots.

The workflow for constraining the correlative conformity with a Wheeler diagram is explained and two examples from the Tampico-Misantla Basin, Mexico, illustrate the utility of this integrative approach.

Ninety-nine wells were evaluated and 33 were selected for graphic correlation to assist in the recognition of sequence boundaries though the construction of 3 northwest-southeast cross-sections. A Wheeler diagram from one of these cross-sections shows the recognition of 5 significant sequence boundaries with implied erosional events and periods of non-deposition before and after the correlative conformity, respectively. One example illustrates the graphical recognition of downlap and toplap associated with a prograding fan and another illustrates the recognition of an important erosional event on the flank of the basin at the Paleocene-Eocene boundary.