"A New Correlation of Compressional and Shear Slowness for the Tight Gas Nikanassin Group in the Western Canada Sedimentary Basin based on Geostatistical Analysis"

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Abstract

Geostatistical analysis is a powerful tool that is used in exploration and development of hydrocarbons in cases where a limitation on data availability such as slowness values is. A strong relationship of compressional – shear values for tight gas reservoirs in the Western Canada Sedimentary Basin (WCSB) is not available at this time. As a result, previous correlations published in the literature for conventional reservoirs are generally used in the Nikanassin group.

This study shows new relationships based on a strong correlation between compressional and shear wave slowness for the tight gas Nikanassin group in the WCSB, Alberta (Figure 1). The results of a geostatistical analysis study are presented for estimating shear slowness values from compressional well log curves in areas where shear data are not available.

This study focuses on: 1) univariate statistical analysis of compressional and shear slowness, 2) generation of a relationship between shear slowness (primary variable) and compressional slowness (secondary variable), and 3) creation of a 2D statistical distribution of shear slowness, Furthermore, the study provides new equations supported by geostatistics analysis of well logs from the tight gas Nikanassin Group.

Analysis such as estimation of shear slowness (maps), cross-validation of the shear estimation and shear stochastic simulation were made in order to support the relationship of compressional – shear values. As a result, this estimation method gives better representation of the spatial uncertainty of shear velocities while preserving the general trends imposed by the hard data (Figure 2).

The proposed study has direct application in tight gas formations of the WCSB. The equations can probably be extended to other regions around the world, which possess tight gas formations with similar characteristics to the ones described in this work.

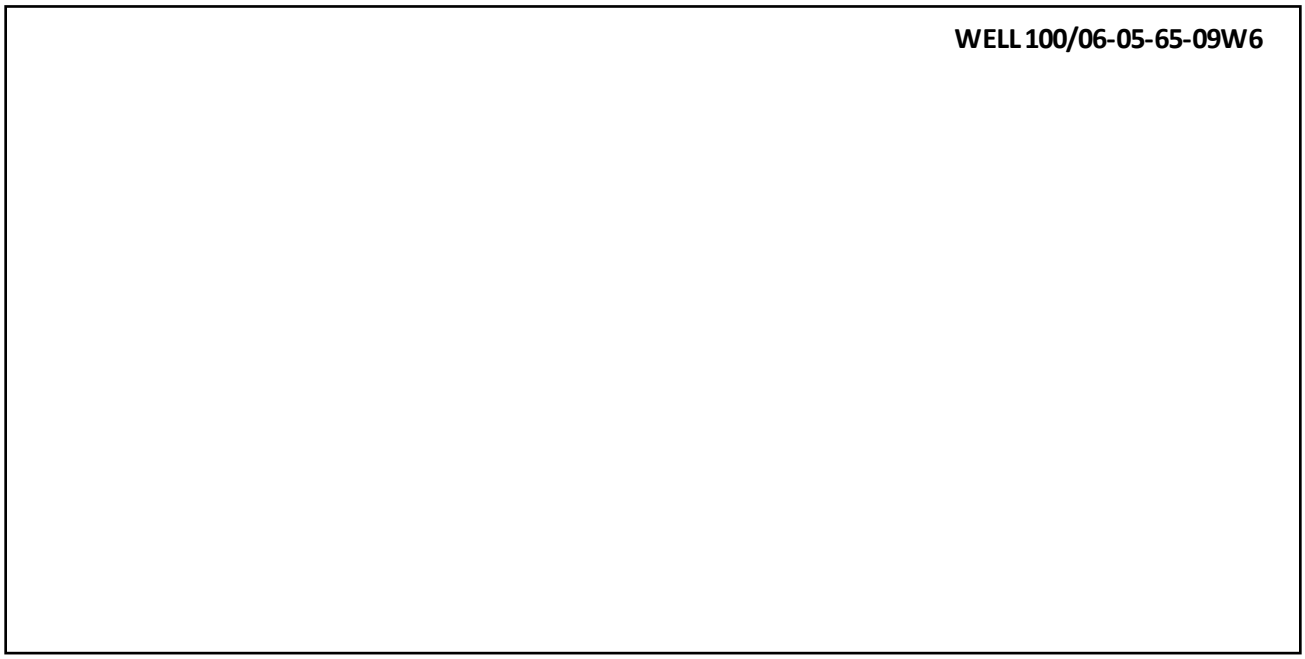

Figure 1: Study area in west-central Alberta, Deep Basin, Canada (left side). Type log of the Nikanassin Group (right side) GeoScout, 2011.

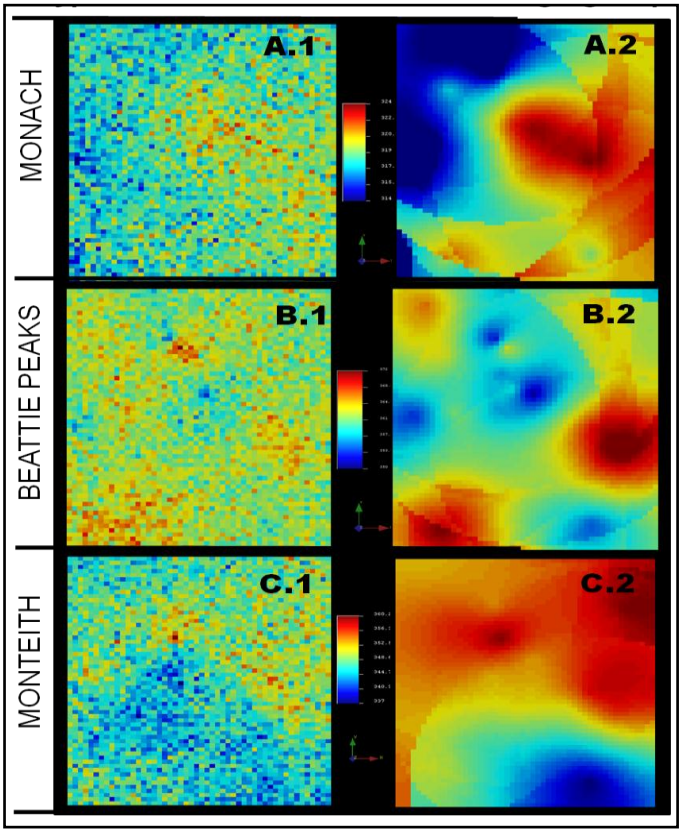

Figure 2: E-type maps from Co-Sequential Gaussian Simulation of shear slowness (A.1, B.1, C.1) and Co-Kriging maps (A.2, B.2, C.2) for each Nikanassin formation (Monach, Beattie Peaks and Monteith).