Well-velocity variogram sensibility analysis when building geologically constrained velocity models for onshore seismic data.

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As known, onshore seismic data usually lacks the quality observed in marine seismic data. Normally the flows of building velocity models for these land media do not account the entire complexity of the areas, commonly not representing the lateral velocity variability of the overburden due to impossibility of representing it through picking velocities during velocity analysis process. Currently, the effort in building geologically constrained velocity models in complex areas, such as the one for the onshore data is becoming usual, especially where is possible to adopt tomographic inversion and/or FWI velocity updating prior the seismic migration process. In the other hand, there is an advantage not deeply explored when dealing with onshore data that is the number of drilled wells available. The velocity information from these wells may directly impact the result of the velocity model if it is properly handled, once it can precisely infer the velocity lateral variation noticed in the area and how to control the inherent behavior of this variation in a 3D manner. Therefore, understand the spatial behavior of the well-velocity is a fundamental step to generate confident and geologically constrained velocity models for onshore data. An alternative approach we propose to minimize the effort in be filtering the existing velocity models during the processing stage, is the adoption of a variogram usage to honor the well-information inside the whole velocity model flow. In this case, after selecting specific geostatistics tools it is mandatory to adequate standard offered variograms to specific situations we are interested in, sometimes adopting variogram for any specific region/layer, for the wells, or simply by attempts and errors. To exemplify, we applied the methodology in an onshore data of the NE Region of Brazil. We decided to use the kriging with external drift as the algorithm of simulation and several variogram controlling the well information extrapolation. The dataset was chosen once it presents high geological and structural complexities such as high velocity conglomerates in one of the borders, and because there are wells controlling the exploitation area of the field. The field presents an elongated fault, crossing its entire extension, and in some parts with circa of 1,500 m of displacement, also posing different velocity rocks, side by side. We split the wells in two groups: one to be used as conditioning data, and the other to be used as blind tests. We present the result to attest the benefits in be applying this suggested approach in building geologically well-constrained velocity models using variogram to control it.