METHODOLOGY FOR GRAPHICAL ANALISYS OF SEISMIC RECORDS BASED ON SELF-ORGANIZED MAPS (SOM NEURAL NETWORKS) AND WAVELET TRANSFORM

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Abstract:

A methodology for graphical analysis of seismic records based on self-organizing maps (SOM neural networks) and wavelet transform is proposed in this paper. This methodology helps petroleum engineer to recognize areas where there is probably oil. The methodology consists of the following. Let be a seismic cube that includes at least one well and a geological horizon of interest. First, a wavelet transform (1D continuous analysis) of each trace of each gather forming the seismic cube is calculated. The Mexican Hat wavelet transform has been used for its resemblance to Ricker pulse; the selected wavelet scale should cover at least the potential producing zone thickness. Second, the transformed gathers are stacked. Third, a surrounding around the geological horizon of interest is selected by taking the corresponding segments of the stacked gather. Fourth, these segments are classified by a SOM neural network. Fifth, the class containing the stacked gathers very close to the well is chosen. Finally, this class could indicate points on the horizon where there is probably oil.

Following some results are shown. Figure 1 shows a stacked gathers cube comprising a well and a horizon of interest. The producing zone of the well is on the horizon. In Figure 2, a class containing that intersection is displayed; the light spots have the same geometrical characteristics of the producer point.

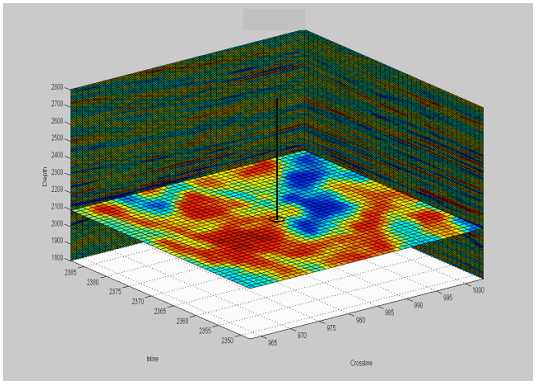

Fig 1. Seismic cube, horizon (plane), well (black line) y producing zone (black ring).

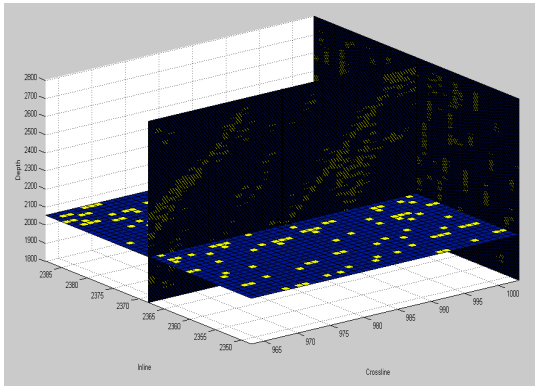

Fig 2. Class that contains the intersection of the well with the horizon (light points).