The Similarity Index: A New Tool for Seismic Coherency

HYEWON SA[1], GWANG H. LEE[1], YISEUL LEE[1], and DON SUNWOO[2]

[1]*Department of Energy Resources Engineering, Pukyong National University*
Busan 608-737, Korea

[2]*Korea Institute of Geoscience and Mineral Resources Daejeon 305-350, Korea*

The similarity index (SI), computed from the singular value decomposition of sea-bed echoes, has been used to map the acoustic diversity of the sea bed. We applied the SI to stratigraphic surfaces of 3-D seismic volume and compared the results with the correlation- or semblance-based coherency which is one of the most widely used seismic attributes for a measure of lateral changes in seismic response, caused by variation in structure, stratigraphy, rock properties, and the presence and type of hydrocarbons. The SI-1, based on the first principal component, reveals more continuous and distinct faults than the conventional seismic amplitude. However, the SI-1 appears to be sensitive to minor seismic response variations and shows very densely-populated contour-like artifacts. The SI-1 – coherency crossplots show a non-linear relationship, suggesting that SI-1 is not comparable to the coherency. On the other hand, the SI-2, based on the first two principal components, is comparable to or slightly better than the coherency, locally revealing minor structural and stratigraphic features that are not recognizable in the coherency.

Keywords: Attribute; Coherency; Similarity