

JOINT INTERPRETATION OF GEOPHYSICAL DATASETS USING MACHINE LEARNING METHODS TO CHARACTERISE THE ALHAMA DE MURCIA FAULT (EAST BETIC SHEAR ZONE)

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Abstract

Joint interpretation of multidisciplinary is the best way to conduct accurate subsurface characterization; however, this approach has its benefits and drawbacks. In this work, we propose the use of machine learning techniques to integrate three geophysical data sets (Vp-P wave velocity, Vs - S wave velocity and ERT - electric resistivity) to characterize a cross-section (La Salud, 1 km long) of the Alhama de Murcia Fault (AMF), one of the most active faults of the Iberian Peninsula. In our approach, we joint the three data sets in a common multiparametric grid, then we investigated the performance of three different unsupervised machine learning methods for finding classes inside our final data set. In our approach, we joint the three data sets in a common multiparametric grid, then we investigated the performance of three different unsupervised machine learning methods for finding classes inside our final data set. The three clustering algorithms that we have applied are a Hierarchical, a Fuzzy c-means and a Model-based. The last one has been shown as the better for class discrimination, having, as a result, a 2D model with a good correlation with the known geology of the area. The three classes obtained have been assimilated into lithological units and from their relationship, we have been able to deduce structural elements. This work provides new insights into the characterization of the Alhama de Murcia Fault zone.