

Predicting Magnetic Resonance Permeability and Porosities from Triple Combo Data for Cost Effective Field Development

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Frequently, during field development, only a small fraction of wells have porosity, permeability, bulk volume irreducible fluid and micro porosity available from either Magnetic Resonance log or core data. Reservoir simulation modeling and field development can be improved if magnetic resonance porosity, permeability, bulk volume irreducible fluid and micro porosity are available from every well. We have developed a post processing interpretation work flow which computes all of these parameters for every well in the field from triple-combo or quad combo data. The computation is based upon associations developed by a neural network that has been trained using wells having triple-combo and magnetic resonance logs or core data.

A field wide clustering procedure (Facies ProfileSM) is run on every well after data normalization of the triple combo data to ensure that associations developed in one well can be applied to another. In essence, the geology of the wells is confirmed to be similar, as seen by the logs.

The resulting electro-facies are also of use to the sedimentologist to confirm facies identified from core analysis and to the geologist to validate formation tops. In some cases, these types of analyses indicate significant change in the formation geology or formation fluids. Observed changes may trigger action to run another Magnetic Resonance Log.

The interpretation work flow and some Field examples are presented. In addition, variations of this technology to predict triple combo data (LWD or wireline) from pulsed neutron capture data and to repair "bad" logging data (from washouts, rugosity, etc), or to correct logs for gas effects will also be presented.