Hydrocarbon-bearing dolomite reservoir characterization: A case study from eastern Canada

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Carbonate reservoir rocks constitute 20% of sedimentary rocks while it holds more than 50% of the world's proven hydrocarbon reserves and accounts for 40% of the world's total hydrocarbon production. Therefore, carbonate reservoirs are very important targets for oil and gas exploration. Hydrocarbons are produced where these carbonates have been fractured and dolomitized and laterally sealed by tight, undolomitized limestone. However, it is a difficult task to differentiate between limestone and dolomite. Nevertheless, a photoelectric (Pe) log curve can be used at the well location to discriminate between limestone and dolomite formations. While Pe logs exhibit almost constant values for background limestone, the dolomite units are represented by low values of Pe relative to the higher and almost constant values of background limestone. The purpose of the present work is to map the lateral extent of a dolomite reservoir unit in the area of interest in eastern Canada using a Pe volume derived from seismic.

For this study, multiattribute regression analysis and probabilistic neutral network (PNN) are used to validate and predict hydrocarbon accumulations associated with hydrothermal dolomite. The Pe property has been effectively predicted and validated throughout the 3D volume and has been found to characterize the dolomite reservoir efficiently.