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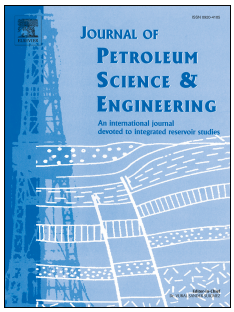

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Application of well logs integration and wavelet transform to improve fracture zones detection in metamorphic rocks

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Abstract: The traditional approach to fracture zones detection is based on a visual inspection of core samples, or the application of special well logging program represented by imaging well logging. However, not all wells are fully cored, as the core description of fractures in laboratory is time consuming and expensive. Additionally, the interpretation of special well logging program in detecting fracture zones also needs the geologists' experience. This study provides a complete set of methodology for fracture zones detection and fracture numbers calculation in which wavelet analysis is utilized. For the sensitive well logs in fracture zones, we have made a contrast between well logs and imaging logging that shows up density, caliper, resistivity and acoustic logs are more or less suitable. To meet little changes with the same trends in one curve which indicates the present of fracture zones, we proposed a method that integrates the above four well logs into one, named fractured integrated index. Decomposing the integrated curve with discrete wavelet analysis shows that the detailed wavelet coefficients(cD1) energy are highly suitable for detection of fracture zones. In addition to the above four well logs, microsphere focusing logging is also used to enhance the accuracy of the detecting analysis. The method is applied to Chinese Continental Scientific Drilling Main Hole located about 17 km southwest of Donghai in the southern segment of the Sulu UHP terrane, and the results are promising in accordance with the imaging logging and cores information.

Keywords:
Fracture zone detection
Wavelet transform
Fractured integrated index
CCSD-MH
Well logs

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