

In-situ rock physical properties established from continuous drilling parameters: invaluable datasets to analyse state of drilling and rock strength

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Surface drilling parameters are excellent datasets to understand in-situ physical properties of the rock. We here present some results from land-based drilling experiments at Atsugi and Boso, Japan. We have acquired large surface drilling datasets together with approximately 100 m of continuous cores. Methods such as Specific Energy (SE) and Equivalent Strength (EST) have been used here to analyse drilling process and physical characteristic of the rock. Results from subsequent core scratching experiments enabled very good correlation and validation of the calculated SE/EST with the measured Unconfined Compressive Strength (UCS). Our field results also demonstrate that the calculated SE/EST successfully detect fractures in the formation, show developing drilling dysfunctions such as vibration, and bit balling. The results also indicate that the frequency and amplitude of the SE/EST oscillations may be used in detecting lithological changes of the drilled rock medium.

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