
The Effect of Sample Volume on Micro-Rebound Hammer UCS Measurements in Gulf Coast Cretaceous Carbonate Cores

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ABSTRACT

Micro-rebound hammers (MRHs) are nondestructive tools that are increasingly being used in mechanical characterization of core in reservoir characterization studies. The micro-rebound hammer responds to rock hardness as a proxy for unconfined compressive strength (UCS) but is sensitive to sample volume, rock heterogeneities, grain size, and macropore size. In this study, we systematically investigate the effect of sample volume on several rock types from both quarry and Cretaceous outcrops, using two different techniques for data collection. Our results show that a significant drop in MRH-derived UCS is observed below 12 in³ (197 cm³) of sample volume. This is relevant to most core-based study because the core material, typically preserved as a thinner archive side and a thicker sample side, is often fractured or broken into fragments of varying size. In addition, larger scatter in MRH-derived UCS values is observed for samples with heterogeneities such as bioturbation or large moldic pores, as well as samples with large grains. This study also shows that sample-volume effect seems not to greatly affect the relative values of MRH-derived UCS; therefore, the shape and trend of MRH-derived UCS curves on core are a reliable dataset that can be used for mechanical characterization in reservoir studies.

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