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Petrophysical and texture classification of peak ring's granitoids form the Chicxulub impact crater. IODP – ICDP Expedition 364.

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In 2016, IODP – ICDP expedition 364 recovered cores from the peak ring of Chicxulub impact crater, offshore Mexico. Recovered target rocks moved more than 20 km in 10 minutes during the formation of the peak ring, the impact event also affected their physical properties. In this study, we use cluster analysis to identify subunits in the target felsic rocks (granitoid) of the peak ring, to explore how different parts of the recovered section have been affected by the impact.

Cluster analyses were performed on two datasets: 1) textures (digital line scans from split cores), and 2) petrophysical data (acquired on cores and downhole). This approach aims at helping to classify the different textures observed. For texture clustering, a sample patch (∼4x4 cm) was extracted from each core section described as granitoid. For all patches, gray-level co-occurrence matrix, local binary pattern and Gabor filter features were extracted to perform semi-supervised (k-means, agglomerative clustering, Gaussian mixture) and unsupervised (mean shift, Birch, affinity propagation) clustering. Unsupervised clustering points at three to six clusters of textures. For petrophysical data clustering; density, magnetic susceptibility, resistivity and natural gamma ray were used to perform semi-supervised clustering. Based on the number of clusters suggested by texture analysis, three to six clusters were suggested to the different algorithms ran on petrophysical data. Both classifications are compared to explore if changes in textures are correlated to changes in physical properties.