SHOCK FEATURE ANALYSIS OF SELECTED SAMPLES FROM THE EYREVILLE CORE: CHESAPEAKE BAY IMPACT STRUCTURE, VIRGINIA, USA.

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The Chesapeake Bay impact structure (CBIS) is an 85 km-diameter buried crater centered near Cape Charles, Delmarva Peninsula, Virginia. The CBIS is a well-preserved feature and core samples from the mile-long Eyreville drill core provide a remarkable opportunity for analysis of shock metamorphism. Several likely shock-related features of selected samples from the ICDP/USGS CBIS Deep Drilling Project Eyreville core have been analyzed from throughout the impact-structure filling sequence.

Our work is built upon results from [1, 2, 3], further measurements of planar microstructures on a petrographic microscope fitted with a U-stage, and additional supplemental analyses.

Shock metamorphic effects: Effects of what may be at least low levels of shock deformation are noted in each section of the stratigraphic column of the Eyreville core as outlined by [3, 4, 5, 6].

The upper portion of the granite section (Assemblage 4 defined by [6]) displays what could be evidence of minor shock deformation. This evidence includes grains of potassium feldspar with vesiculated cores as well as albite, which displays alternated twin alteration likely due to asymmetric isotropization.

Lower suevites contain relatively large quartzose clasts with abundant PDFs dominated by {10-13} with subordinate {21-31} and {51-61} orientations. Judging from the volume of melt, the suevite section (Assemblage 2 in [6]) likely experienced shock from 13 GPa for KP 42 (4779.25-4779.40 ft or 1456.72-1456.76 m) and up to more than 35 GPa, in the cases of melt-dominated samples [7].

The schist/pegmatite and lower granite section (Assemblage 1 noted by [6]) contains kink-bands in muscovite, planar fractures and possible incipient PDFs in quartz, and fine, mechanical micro-twins in microcline. Sample KP 49 (5464.30-5464.75 ft or 1665.43-1665.56 m) consists of pieces of sheared clasts of granite possibly sourced from granites at the base of Assemblage 1 (5795.10-5795.25 ft or 1766.17-1766.21 m) entrained in flow-banded material as well as common microfaulting (Fig. 1). These features are suggestive of a shear zone.

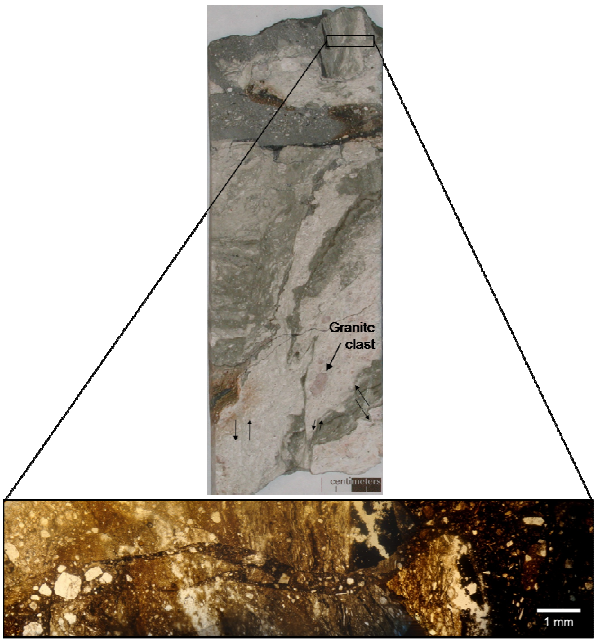

Fig. 1. Sample KP 49 displays features such as microfaulting and flow-banding likely associated with shearing. Inset image highlights a breccia dike.

Quartz grains display a wide range of shock effects throughout the drill core. PDF orientations have been extensively measured to estimate the pressures experienced in the various sections.

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