COMPARATIVE MORPHOLOGICAL ANALYSES OF IMPACT MELT ROCK EMPLACEMENT IN TERRESTRIAL AND APOLLO IMPACT BRECCIAS TO UNDERSTAND "SUEVITE" FORMATION

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Introduction: The term "suevite" is defined as "a polymict breccia with a particulate matrix, containing lithic and mineral clasts in all stages of shock metamorphism, including impact melt particles" [1]. The term is applied across various spatial and geologic contexts, raising concerns that it has been misused [2,3]. Suevite was also used in early analysis of lunar breccias, with some authors directly comparing lunar impact craters to the Ries crater [4–7]. A common problem associated with the formation of suevites is that the geologic conditions associated with the Ries impact crater are often used in the modeling in the formation of suevites [8]. A critical question revolves around the role of volatiles in the formation of "suevites". The goal of this study is to understand better the formation of polymict impact breccias with "particulate" matrices – on the Moon and Earth.

Methodology: Thin section samples of 28 impact melt-bearing breccias from the Apollo 16 and 14 missions were analyzed following the semi-automatic image analysis process outline by Chanou et al. [9]. Particle analysis (i.e. morphology, shape complexity, and particle sorting) of the melt-rock phases within each sample was compared.

Discussion: By isolating the clasts within these samples, as seen in Figure 1, an understanding of the morphology of the melt-roc phase can be determined. Apollo samples were compared to several thin sections and hand samples of melt-bearing breccias from terrestrial craters, including: the Ries, Mistastin Lake, and West Clearwater Lake impact structures. We present the similarities between these two groups and the implications for formation.

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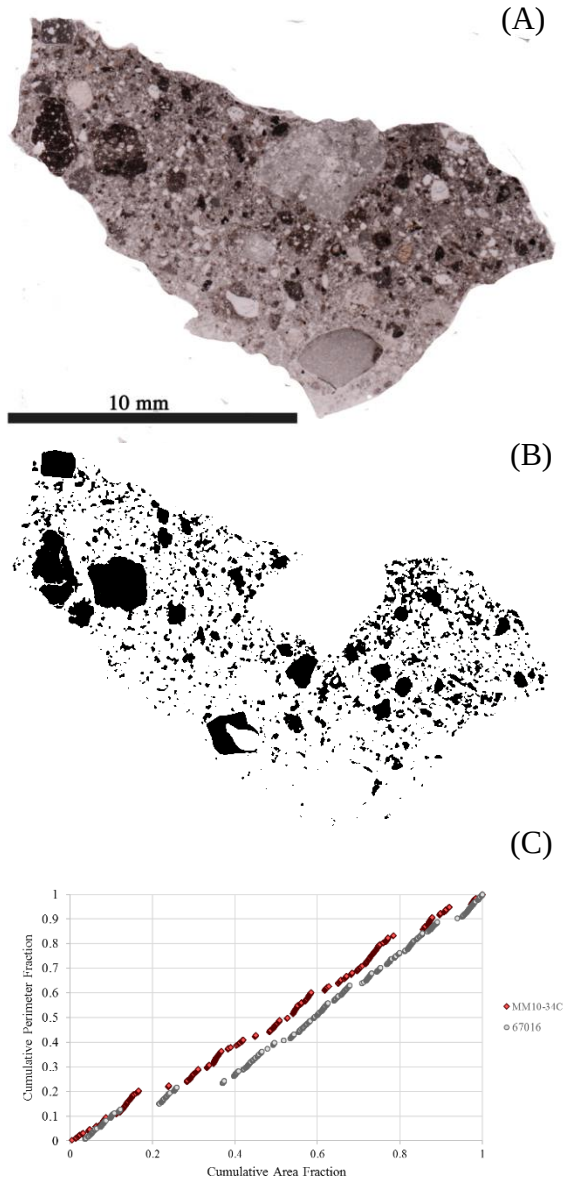

Figure 1: (A) Apollo 16 sample (67016) in plain polarized light. (B) 67016 converted to an 8-bit greyscale of only impact melt-rock clasts present. (C) Sorting of 67016 compared to a melt-bearing impact breccia from Mistastin Lake impact structure (MM10-34C)