IS BEDDING AND/OR SIZE-GRADING PRESENT IN LUNAR REGOLITH BRECCIAS ? Abhijit Basu, Department of Geology, Indiana University, Bloomington, IN. 47405.

The purpose of this poster presentation is to draw attention to a few rare examples from lunar regolith breccias (60275, 60255, 60215) where bedding may be observed at microscopic scales, and (micro) graded bedding may be suspected. We observed these features while surveying a number of Apollo 16 regolith breccias for an entirely different objective. It is possible that a more thorough search and survey for bedding features in regolith breccias may reveal a wider presence of graded bedding. Bedding in these breccias may be defined by a preferred orientation of elongate grains and/or by differences in grain sizes of clasts. Clast-rich layers alternating with matrix material may also define bedding. Graded bedding is seen not so much in a definitive decrease in the sizes of all clasts across bedding, but more in the decrease in the size of the largest clast present. If this turns out to be the general case, then the graded bedding suspected should be a direct result of decreasing competence of the supporting medium of clasts in the regolith; shear strength of the medium or dispersive forces within the medium contribute to competence [1-3].

Viscous sintering, with its energy derived from shock events, is probably the principal process of lithification of lunar regolith breccias [4-6]. Shock processes leading to volume expansion on stress release may also cause lithification [7]. None of these processes require that clasts in the regolith be flattened, or a sense of bedding be imparted, or the clasts be moved around such that even some graded bedding may develop in the resulting breccia. In the absence of schistose parent rocks on the moon, there is no a priori reason for clastic grains to be elongated to begin with. Therefore, unless some size grading takes place no bedding may develop in the lunar regolith. Sufficient documentation is not available to prove significant size grading of fragmental material during ballistic transport at very small scales. Grain flow processes may however result in some inverse grading at small scales [8,9]. If sufficient density contrast between clasts and a suevite-like "melt" is achieved, considerable size grading among clasts may be achieved during flow, especially if the flow is decelerating and sufficient time is available [10,11].

Stratification has been observed in drill cores in lunar soils [12,13]. One may even suspect that stratification may have been destroyed in part while obtaining and transporting the cores. However, evidence for graded bedding is not common. This report is probably the first to draw attention to such a feature, measurements of which may help us quantitatively assess some lunar regolith transport processes.

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