Abstract #304073

BOULDER-SIZE DISTRIBUTIONS AS INDICATORS FOR DEPOSITION PROCESSES ON EARTH AND MARS

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The northern plains of Mars are scattered with vast fields of boulders and blocks with unknown origins. Three primary origins have been proposed: deposition from the large outflow channels via megafloods; ejecta and rim remnants of impact craters; and reworking of older material (e.g. via periglacial processes). Here, we tested the megaflood deposition hypothesis by characterizing boulder deposits from the glacial lake Missoula megafloods in Eastern Washington and examining their resemblance to martian boulder fields. We used a terrestrial laser scanner (TLS) on the Ephrata Fan expansion bar to map boulder size-frequency distributions over an area of ~1000 m^2 focusing on the size, shape, positioning, orientation, and density of block/boulders with diameters (D) > 0.33 m. We compared the resulting distribution with those we measured from orbital visible imagery on Mars at resolutions of 0.25-0.5 m/px along with existing lander data. Preliminary results suggest that various martian northern plains boulder fields of unknown origin closely resemble those of the megaflood deposits. We also find quantifiable differences between poorly sorted impact ejecta fields (from craters of varying degrees of weathering) and more sorted and size-limited megaflood deposits. Comparisons were also performed on north-south transects from the mouth of the martian outflow channels to the upper latitudes characterizing the degree of sorting and mean boulder sizes. Preliminary sorting and size data may show support of a megaflood deposition origin.