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David Shaw

Washington University in St. Louis

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EXPLORING SPACE WEATHERING EFFECTS ON ASTEROID REGOLITH BRECCIA

David Shaw

Mentor: Ryan Ogliore

In this work we study space weathering effects on asteroid surfaces returned from the Weston, Fayetteville, and Kapoeta meteorites. We first used a freeze-thaw technique to break up the sample, by submerging it in water and repeatedly freezing then thawing. Over many cycles, we managed to obtain pristine sample dust. We then mounted the dust into a scanning electron microscope to examine the surface closer. In particular, we wanted to look at the effects of solar ray irradiation on the asteroid surface, as well as micrometeoroid flux. The second process involved scanning millions of square microns' worth of surface areas, searching for craters that would signal evidence of micrometeoroid impacts. We researched previously found crater densities on lunar surfaces and attempted to make a comparison with our sample asteroid crater density, but despite searching millions of square microns' worth of pristine surface, we have yet to find convincing evidence of micrometeoroid impacts. We also utilized x-ray spectroscopy to look at the mineral compositions of our meteorite sample, and compared it to known elemental ratios of earth-bound olivines and pyroxenes.