Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Itokawa is not Brazil: granular segregation on asteroids TROY SHINBROT, Rutgers University, PINAKI CHAKRABORTY, TAPAN SABUWALA, Okinawa Institute of Science & Technology — Recent photographs of the asteroid Itokawa have revealed strong separation between regions populated almost entirely by sand and other regions consisting only of larger boulders. This size separation has been attributed to the Brazil Nut Effect (BNE), however we point out here that the BNE depends on conditions such as isotropic gravity, parallel sidewalls and periodic vertical shaking that are wholly absent on asteroids. On the other hand, surface areas of boulders and sand appear to be comparable on Itokawa, and in this situation it follows that the asteroid must have suffered many orders of magnitude more collisions with sand particles than with boulders. We observe that a sand particle will tend to bounce off of a boulder but will sink into a sea of similar sand particles, and so we predict that sand seas must grow on such asteroids. We carry out experiments and simulations to evaluate this and related predictions, and we demonstrate that this new mechanism of segregation based on simple counting of grains can produce the strong separation of sizes reported.

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Date submitted: 28 Jul 2015 Electronic form version 1.4