

Can Millet paint rampart craters?

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Rampart craters are common in Martian craters. They have many morphologically interesting features on its ejecta blanket that are distinctly different from those of craters on other planets. The ejecta blanket of rampart craters is characterized by existence of concentrated mass at the distal edge, which is contrasting to the normal crater. The ejecta blanket of rampart craters also has walls or cliffs at the distal edge and these walls show a sinuous shape. These observations indicate that fluidization of the ejecta material during the formation process plays important role for the construction of their characteristic morphology. However, their mechanism of the fluidized process has not been clarified yet. Here we will focus on their fluidized process and dynamics of rampart formation based on laboratory experiments.

We used a transparent rectangular tank filled with water and paved millets at the bottom of the tank, which is Japanese traditional grains, A-Wa. Water and millets are as analogs to Martian atmosphere and regolith, respectively. We injected a heavier fluid in the water to produce a vortex ring. It descended through the water and impacted the paved millets at the bottom of the tank. Millets were entrained by the vortex ring and transported by the radial flow, and finally the vortex ring became unstable and sedimentation process of millets was induced.

In this presentation we will discuss the dependence of the concentration of the millets, density contrast of millets to water, and intensity of the vortex ring on the formation process of rampart morphology.