Analyses Polarimetric Properties of Reiner Gamma Swirl through Wide-Angle Polarimetric Camera (PolCam) Data onboard Danuri

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Reiner Gamma Swirl is one of the most interesting lunar swirls, which are albedo anomalies on the lunar surface associated with a magnetic field. Lunar swirls lack topographic and mineralogical characteristics but exhibit a distinct albedo feature. Their formation, time scale, and relation with the magnetic field remain relatively unknown. There are some studies with observation data both Earth and lunar orbiters to understand the nature of these swirls. However, the polarimetric properties of the lunar swirls are relatively not well-known. The Wide-Angle Polarimetric Camera (PolCam) onboard Danuri, South Korea's first lunar orbiter, successfully collected polarization data during lunar orbits. The scientific objectives of PolCam include creating global lunar maps of the degree of polarization and titanium. Under normal operation, PolCam observes the moon, including the near- and far-sides at a spatial resolution of about 68 m/pixel with phase angle range from 0 to 135 degree. In this study, we analyze the Stokes parameters, degree of polarization, and grain size of Reiner Gamma Swirl using the first lunar orbiter's polarimetric data to understand the nature of the Reiner Gamma Swirl.