Scientific Operations and Data Processing for Wide-Angle Polarimetric Camera (PolCam) onboard Danuri

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South Korea's first lunar orbiter, Danuri, was successfully launched on August 5, 2022, and arrived on the lunar orbit after a four-month journey along the WSB/BLT trajectory. After a month of the commissioning phase, scientific operations were started in early February 2023. The wide-angle Polarimetric Camera (PolCam) onboard Danuri is the first payload to measure the polarimetric properties of the lunar surface and its primary goal is to produce global lunar maps for degree of polarization and titanium. The PolCam team performs routine operations that observe the latitude from -70 to +70 degrees for every orbit. The normal mode of Polcam is to observe the entire moon including near- and far-side once a month with a spatial resolution of about 68 m/pixel. In order to acquire a high-resolution map, we operated another mode (the resolution is about 34 m/pixel) for four months from early April and the latitude was divided into four sections, -70 to -30, -40 to 0, 0 to 40, and 30 to 70 degrees, for each month. The most important consideration in our polarimetric measurements is a large phase angle of 80 degrees or more. To enable a phase angle larger than 90 degrees on the lunar surface, PolCam has two identical cameras tilted 45 degrees from the nadir direction and they look opposite sides across the orbit direction. In the case of off-nadir imaging, the larger the tilted angle, the more severe the image distortion caused by complex lunar terrains, so more precise geometric and topographic corrections are required. It is essential to employ highly accurate measurements of spacecraft attitude, reference frames, and ephemeris. The data processing pipeline of PolCam is composed of self-developed software to handle the raw data with the SPICE toolkit and simple scripts to execute several corrections, calibrations, and mapping with the Integrated System for Imagers and Spectrometers (ISIS) applications. The software will be provided in two versions: IDL and Python. Here, we introduce (1) a brief overview of the operational progress until November this year, (2) the overall procedure of data processing software from Raw to Level 2, and (3) data formats for the upcoming public release.