Preparation status of Multi-Band Camera onboard SLIM lander

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Smart Lander for Investigating Moon (SLIM) project is on going at JAXA. It will be launched in fiscal year 2021 as Japan’ s lunar-landing mission. The main purpose of this project is to demonstrate various techniques for pinpoint landing within a hundred meters in radius on the moon. Demonstration of the SLIM landing technology will cause a paradigm shift from "exploring where it is easy to land" to "exploring where we want to land." After landing, the SLIM project plans to operate Multi-Band Camera (MBC) to observe around the landing site. We are now testing an engineering model of MBC.

As a landing site for SLIM mission, one of the small fresh craters just outside of the Theophilus crater is selected. This crater (diameter ~200 m) locates 13.3º S, 25.2º E outside the southwest rim of Theophilus and named “Shioli”. There is olivine-rich lithology, which is probably mantle (or the lower part of the crustal) origin excavated by the Nectaris basin forming impact as suggested by the global distribution of the olivine-rich sites (Yamamoto et al. , 2010) , well before the formation of the Theophlius. In order to identify this unknown lithology and estimate its origin, MBC has a spatial resolution (1.3 mm/pixel at 10 m) that distinguishes plutonic rock texture and a band combination (10 bands; 750, 920, 950, 970, 1000, 1050, 1100, 1250, 1550, 1650 (nm)) that identifies mineral species. And most importantly, MBC has plan to estimate Mg # (=Mg/(Mg+Fe) atomic ratio) of olivine.

In order to advance basic research on spectroscopic observation of lunar rocks, we have developed a line spectrometer using the same image sensor (Xenics, FPA0.9-1.7_640_4_TE1) as MBC. The range of observable wavelength is 850 - 1700 nm (can be expand to 750 - 1700 nm in the future) . Line Spectrometer can observe continuous spectra and also have one-dimensional spatial information. By observing various rock samples with this spectrometer, we would like to succeed in deriving the detailed mineralogy of the olivine-rich exposure in the lunar spectroscopic observation at the SLIM project. Preliminary observations show that olivine grains in rocks are more difficult to observe than powdered olivine, and the locations where absorption peaks can be observed are biased toward mineral grain boundaries.

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