UPDATE ON ARCHIVING HIGH-RESOLUTION LUNAR GAMMA-RAY SPECTRA. N. Yamashita[1] and T. H. Prettyman[1], [1]Planetary Science Institute, Tucson, AZ 85719 (yamashita@psi.edu).

Introduction: The origin and evolution of the Moon can be explored by precisely determining the elemental composition of the lunar regolith [e.g. 1].

Gamma rays emitted from the Moon are rich in information about the composition of the lunar subsurface to depths <1 m [2]. JAXA's Kaguya (SELENE) mission included a high-resolution gamma-ray spectrometer (GRS) to determine regolith elemental composition. To date, several elements including K, Th, U, Ca, and Fe have been globally mapped and reported [3-5].

Work is under way to further promote utilization of the Kaguya GRS (KGRS) data. We will fully calibrate and correct gamma ray spectra acquired by KGRS and archive them in the Planetary Data System (PDS). Upon completion, the high-resolution gamma-ray spectra will be available to the lunar and planetary community.

Methods: Data reduction methods similar to those applied to other planetary gamma-ray missions including Lunar Prospector, Mars Odyssey, and Dawn are used to process gamma-ray spectra [e.g. 6-8]. We are processing all the raw gamma-ray spectra and deriving geometry corrections needed for mapping studies [9].

We first removed spectra with data glitches and those acquired when the spectrometer was not fully configured. We derived correction factors to remove artifacts of the differential non-linearity of the analog-to-digital converter from the spectra. Centroids of major gamma-ray peaks in every spectrum in the time-series have been determined to facilitate gain correction and energy calibration. Spacecraft ephemerides and pointing were derived from the SPICE kernel for the mission. Solid angles corresponding to each spectrum were calculated using a lunar shape model using methods described by [8].

Results: Some of the rock-forming elements that make up the lunar surface were mapped in Fig. 1. Neutron corrections were applied to the maps using Lunar Prospector Neutron Spectrometer data [e.g. 10]. At the conclusion of this work, fully corrected and calibrated time-series gamma-ray spectra acquired by KGRS will be delivered to PDS, along with ancillary information and documents needed for geochemical study of the lunar surface.

References: [1] Hartmann W.K. et al. (1986) (Eds), Origin of the Moon. [2] Reedy R.C. (1978) *LPS IX,* 2961-2984. [3] Yamashita N. et al. (2010) *GRL* 37, L10201. [4] Yamashita N. et al. (2012) *EPSL* 353-354, 93. [5] Naito M. et al. (2018) *Icarus* 310, 21. [6] Lawrence D.J. et al. (2004) *JGR* 109, E07S05. [7] Prettyman T.H. et al. (2004) *JGR* 109, E05001. [8] Prettyman et al. (2011) *SSR* 163, 371. [9] Yamashita N. et al. (2017) *LPS XLVIII*, Abstract #1615. [10] Prettyman T. H. et al. (2006), *JGR,* 111, E12, E12007.

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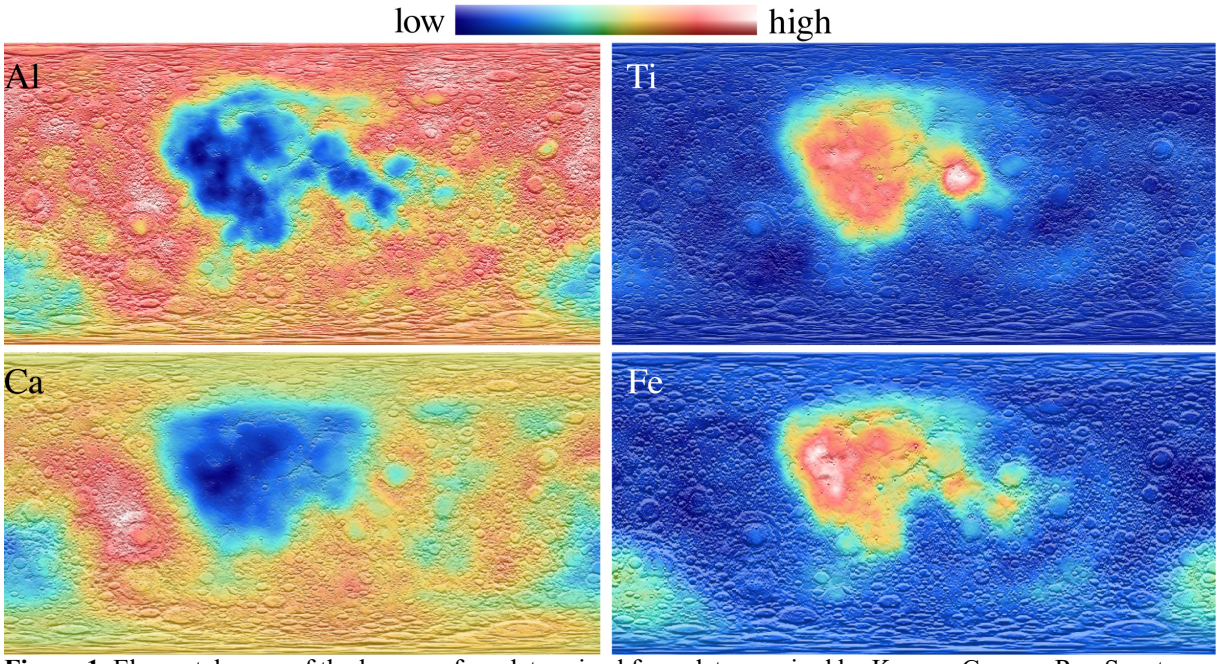

Figure 1. Elemental maps of the lunar surface determined from data acquired by Kaguya Gamma-Ray Spectrometer, displayed on a relative scale [3-5,9]. These are similar to maps determined from Lunar Prospector data [10].