SECTRAL PHOTOMETRIC PROPERTIES OF THE MOON. D. Domingue[1] and F. Vilas[2], [1]Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Rd, Laurel MD 20723, Deborah.domingue@jhuapl.edu, [2]NASA Johnson Space Center, Houston TX, 77058, Faith.Vilas-1@nasa.gov

We modeled the solar phase curves of the moon at a series of wavelengths using the full disk telescopic observations [1]. We endeavored to keep the database self-contained, that is, to use the values derived for the solar magnitude and phase curves of the disk-integrated [1]. These observations were made in a suite of 10 narrowband filters between 0.315 µm and 1.06 µm, and in the broad band Johnson UBV filters, as part of a larger program to obtain photoelectric photometry of the larger planets. Two aspects of the lunar observations are unique. First, the observations cover phase angles from 6^o through 120^o. More importantly, the observers used a special 20-mm diameter f/15 fused quartz lens constructed solely for this purpose. The lens reduced the whole lunar image in the focal plane to a size comparable to the planets observed as part of the same program. This image was fed directly into the photometer. Thus, these observations constitute the only existing set of phase curves of the entire lunar disk over a range of wavelengths. Table 1 lists the values of the Hapke model parameters which fit the data. Figure 1 is an example of the model fits to the data.

Table 1. Hapke Parameter Values to Lunar Disk-integrated Observations

	0.3590 (µm)	**0.3926 (µm)**	**0.4155 (µm)**	**0.4573 (µm)**
w	0.37	0.33	0.25	0.39
Bo	0.11	1	1	0.86
h	0.8	0.26	0.12	0.18
b	0.52	0.39	0.99	0.41
c	0.87	0.83	1	0.83
θ	40	40	40	40
rms (x10^{-5})	2.1	3.8	0.26	3.2

Error bars: w = ± 0.02, Bo = ± 0.05, h = ± 0.2, b = ± 0.02, c = ± 0.02, θ = ± 5

Table 1. Continued.

	0.5012 (µm)	**0.6264 (µm)**	**0.7297 (µm)**	**0.8595 (µm)**
w	0.34	0.66	0.71	0.60
Bo	1	0.6	0	0
h	0.13	0.37	n/a	n/a
b	0.31	0.59	0.6	0.63
c	0.66	0.94	0.91	0.91
θ	40	40	40	35
rms (x10^{-5})	5.2	2.7	27.6	146

Error bars: w = ± 0.02, Bo = ± 0.05, h = ± 0.2, b = ± 0.02, c = ± 0.02, θ = ± 5

Table 1. Continued

	1.0635 (µm)	**U**	**B**	**V**
w	0.77	0.38	0.69	0.2
Bo	0.23	0.01	0.49	0.98
h	0.8	0.18	0.44	0.3
b	0.63	0.52	0.52	0.35
c	0.94	0.85	0.88	0.795
θ	40	40	40	40
rms (x10^{-5})	33.9	2.6	17.5	1.4

Error bars: w = ± 0.02, Bo = ± 0.05, h = ± 0.2, b = ± 0.02, c = ± 0.02, θ = ± 5

Using the resulting Hapke modeling parameters we then examined the affects of changing viewing geometry on the spectral properties. Figure 2 shows how the spectral characteristics change as a function of incidence and emission angle, as predicted by the Hapke model. This figure is for a solar phase angle of 30 degrees. These results have implications for the predictions of Vilas et al (2005) [2], who see spectral signatures associated with some polar craters that could be interpreted as indicative of hydrated mineral species.

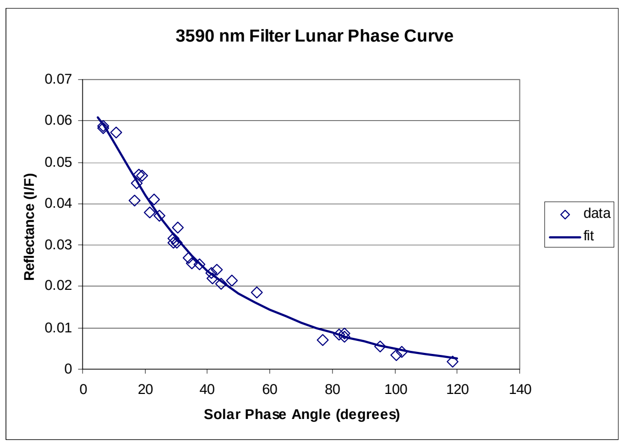

Figure 1. Lunar solar phase curve at 0.359 µm.

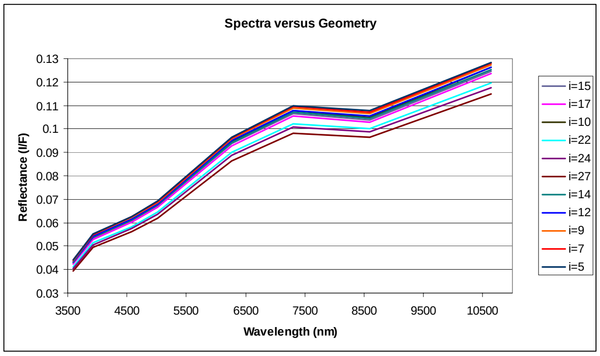

Figure 2. Model lunar spectra at 30° solar phase with varying incidence and emission angle (assumes angles are in-plane).

References: Use the brief numbered style common in many abstracts, e.g., [1], [2], etc. References should then appear in numerical order in the reference list, and should use the following abbreviated style:

[1] Lane, A. P., W. M. Irvine, 1973. Monochromatic phase curves and albedos for the lunar disk. Astron. J. 78, 267 – 277. [2] Vilas, Faith, Deborah L. Domingue, Elizabeth A. Jensen, Lucy A. McFadden, Cassandra R. Runyon, and Wendell W. Mendell, 2005. Phylosilicates near the lunar south pole. Inn preparation.

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