MONOCHROMATIC INTENSITY MEASUREMENTS OF SELECTED AREAS OF LUNAR SURFACE FOR POSSIBLE INVESTIGATIONS

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Abstract. Absolute photoelectric intensity measurements of 104 selected lunar regions are given in five interference filters 4035 Å, 4765 Å, 5538 Å, 6692 Å and 7922 Å. Among these regions, eighteen lunar regions have been measured repeatedly for several phase angles between $+86°$ and $-43°$. They include observations made very close to the full Moon. A catalogue has been compiled to serve as a basin for possible investigations of colour contrasts of lunar grounds, variation of the ratio of reflectivity with wavelengths and phase angles for morphological studies. The study can be extended for the brightness phase variation, opposition effect and radiance factors at zero phase in five colours.

1. Introduction

In recent years it has been possible for the first time to investigate the nature of the lunar surface at close with space vehicles of Russian and American origin. In spite of the success of these lunar probes, the nature of only a small part of the lunar surface has been identified. It is evident that the number of lunar missions will remain limited and the Earth-based observations will continue for further studies of the photometry of lunar surface. In addition to, the Moon is now used as a standard for interpreting observations of other planets and satellites.

The extensive literature on the photometry of the lunar surface has been reviewed by several authors (Minnaert, 1961; Fessenkov, 1962; Barabashov, 1962; Kopal, 1966; Hapke, 1971). These eminent astronomers have also reviewed previous work of other investigators. Therefore, a short bibliography is given in the present work to show the need of the present data.

Modern photometric measurements of lunar grounds have been made by Fedoretz (1952); Gehrels *et al.* (1964); Peacock (1968); Jones (1969); and Shorthill *et al.* (1969). Fedoretz and Jones' measurements have been carried out using photographic technique. Many studies have been carried out for the data of Fedoretz. The increase in the brightness of some Lunar regions up to 20° after zero phase is not confirmed. Jones (1969) investigated his data for the evaluation of the uniformity of the photometric function over the lunar disc.

Interesting results have been obtained by the photoelectric measurements of Gehrels *et al.* (1964). They demonstrated the opposition effect of the lunar surface which represents a steep increase of photometric curves of all lunar surface elements for phase angles less than 5°. Gehrels *et al.* (1964) have used cases where good overlap of observations have been available to apply the data of Fedoretz (1952) to their own

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values. The extensive photoelectric measurements of Peacock (1968) do not include measurements near full Moon. Shorthill *et al.* (1969) have studied the photoelectrical properties of 300 selected lunar features from measurements that have been made at 23 phase angles. Pohn *et al.* (1969) have made the first determination of lunar radiance at zero phase angles by investigating the close up photographs taken from Apollo 8.

More photoelectric measurements of lunar grounds are suggested, and in particularly at different wavelengths. Up to the present time, the brightness values of the full Moon (absolute or relative to that at a non zero phase angles) remain unknown. The data of the light curve measurements obtained photoelectrically are insufficient for various studies. The lack of basic empirical data at different wavelengths greatly affect the theoretical studies of the optical and scattering properties of the lunar surface. By measuring the systematic brightness variation with phase, the reflection characteristics of selected lunar grounds can be determined. Further study can be done for the relation of brightness of various formations with angle of incidence, reflection and phase.

The spectral reflectivity differences measured by McCord (1969) have opened a new field of study. The curves of the ratio of reflectivity with wavelengths show different spectral curve shape which are dependent on lunar morphology. It is interesting to study on the basis of the present material the variation of the ratio of reflectivity with wavelengths for different regions and phases. The shape of the curves of each groups of apparently similar grounds will last for morphological studies.

The colour differences of a large number of lunar regions are much recommended for further investigation. The question of the colour differences of the lunar regions with possible correlation with physical parameters is not settled up to the present time (Hapke, 1971).

Dollfus and Bowell (1969) have found many disagreements between various determinations of normal albedos which have measured by various authors. Gehrels *et al.* (1964) have detected higher values of albedos than the previous determination. They have found also a difference of 20% between albedos determined by them 1956 and 1963, and attributed the difference to luminescence.

Obviously, furhter studies of photoelectrical observations of lunar grounds are needed; and to serve this aim, new data for intensity measurements in five interference filters are given. Factors are given to transfer the data for absolute values. The present data can be investigated for colour as well as intensity variations.

2. Observations and Data Reductions

The program of the present observations has been arranged originally in cooperation with Astronomy Department of Manchester University and Kottamia Observatory in Egypt. The photoelectric observations have been done in the Cassegrain focus ($f/18$) of the 74″ telescope of Kottamia Observatory. The photometer used is the three-beam photoelectric photometer of Astronomy Department, Manchester University designed by Roberts (1964). It uses three independent amplifiers as well as three photomultipliers of type E.M.I. 9558B. The filters have peak transmissions at 4035 Å, 4765 Å,

5538 Å, 6692 Å and 7922 Å, with bandwidth of 100–200 Å. The photometer measures the intensity of the selected areas on the lunar surface instantaneously in three wavelengths.

No deviation from the linearity between the amplifiers and the recorders have been noted. A comparison between different steps of input ranges made for calibration has proved to show some variations in the corrections of different period of observations (Mikhail, 1970; Table III). The corrections applied for the observations of August are almost the same as that of October.

2.1. The observations

As stated before (Mikhail 1970), the nights selected for observations were mostly good photometric nights, cloudless, free from dust storms, and the visibility was good. However, some nights were interrupted by clouds for a short time, followed by cleaning. Such brief interruption did not show any effect on the stars measurements or the intensity of the standard region. On the nights of 8/9 October; 7/8 and 12/13 January; 4/5, 5/6 and 8/9 February; and 29/30 August the intensity measurements of the standard region showed some fluctuations in the observed values. The reason may be due to a slight change in the atmospheric condition during observations. However, for the colour index investigation, the results of these dates have shown to be reliable. This has been expected for the colour measurements as the recorded signals were coherent and the measurements were made for corresponding points on each of the three traces observed instantaneously. The month of May is among the best for photometric nights at Kottamia, and the nights in August have been mostly good photometric nights as well.

On each night of observation four types of readings have been recorded: dark current values, stars measurements, background and the measurements of lunar details. Star measurements are required to provide an aboslute standard for comparisons from night to night and for the detection of the atmospheric extinction coefficients. All the data of observations have been reduced to the same date of observations by intercomparing the observed stars from night to night.

2.2. Star measurements

The atmospheric extinction coefficients have been obtained for each night of observations in the usual way by plotting the measured magnitudes of the stars against different values of air masses. The plots show a straight line from which both the magnitudes of the stars outside the atmosphere and the atmospheric extinction coefficients can be determined. Thus, for each night of observations, and for different wavelengths, we can obtain the extinction coefficient factors as well as the stellar magnitudes at zero atmosphere. The extiction factors are applied to the lunar measurements to account for the effects of atmospheric absorption. The stellar magnitudes at zero atmosphere have been used to provide zero level for the readings. Table I lists the stars, their positions, spectral classes, their experimental magnitudes and the corresponding intensity at different wavelengths.

TABLE I

The observed stars

Stars	R.A.	Decl.	Sp. Type	m_{1035}	I_{4035}	m_{4765}	I_{4765}	m_{5538}	I_{5538}	m_{6692}	I_{6692}	m_{7922}	I_{7922}
α Leonis	10^h109	12.134	B_8	0^m524	61.720	4^m792	1.212	5^m477	0.644	8^m278	0.049	4^m945	1.052
α Bootis	14.235	19.359	K_0	0.951	41.650	4.156	2.176	3.984	2.549	6.070	0.373	2.251	12.580
α Canis Minoris	7.625	5.313	F_5	0.242	80.020	4.145	2.198	4.482	1.612	7.000	0.158	3.434	4.638
ε Orionis	5.575	−1.222	B_0	0.828	46.65	5.180	0.847	5.858	0.454	8.702	0.033	5.402	0.690
α Arietis	2.088	23.302	K_2	2.963	6.528	6.285	0.306	6.180	0.337	8.340	0.046	4.574	1.480

TABLE II

Transformation factors at different wavelenths to be applied to lunar data to be in absolute units ergs cm^{-2} s^{-1} $Å^{-1}$

Wavelengths	4035 Å	4765 Å	5538 Å	6692 Å	7922 Å
Brightness units ergs cm^{-2} s^{-1} $Å^{-1}$	4.235 ± 0.064 (p.e.) $\times 10^{-11}$	1.550 ± 0.080 (p.e.) $\times 10^{-9}$	1.668 ± 0.016 (p.e.) $\times 10^{-9}$	1.142 ± 0.015 (p.e.) $\times 10^{-8}$	3.088 ± 0.053 (p..e) $\times 10^{-10}$

The experimental intensities of the stars outside the atmosphere have been reduced to the absolute uniform system of brightness units ergs $cm^{-2}\ s^{-1}\ Å^{-1}$ in order to be applied to the lunar results. The standard stars α Bootis, α Leonis, α Arietis, and ε Orionis have been used in the determination of the brightness units. The absolute spectral energy values of the stars α Bootis and α Arietis are obtained according to the absolute spectral energy values of Willstrop (1965) which are limited to wavelengths distribution 6500 Å. The energy values for the two stars ε Orion and α Leonis are obtained for all the investigated wavelengths from energy values given by Hayes (1970). Table II lists for the measured wavelengths the brightness units that can be used for conversion to absolute units erg $cm^{-2}\ s^{-1}\ Å^{-1}$ for a region of 4.″936 apparent diameter on the Moon (at 1 AU from the Sun). In the blue side of the spectrum, the transformation factors of Table II show low accuracy. The reason may be due to the expected changes in the values of the extinction coefficients at these wavelengths, in addition to the long time needed to measure the comparison stars.

2.3. Lunar measurements and corrections

Hundred and four lunar regions have been selected over the entire visible disk of the Moon for our measurements. They have been chosen to represent various types of the lunar grounds. Most of these regions are easy to locate by reference to some nearby small craters or other features. Eighteen lunar features representing different types of features and including some details of particular interest, have been measured every night of observations whenever possible. The coordinates are determined to the nearest half a degree (selenocentric) from the position of the points on a USAF Lunar Reference Mosaic and are given in Table III. These lunar regions are marked on the map shown on Figure 1. One area-centre of Plato- has been selected as the standard lunar region for frequent observation during each night. This was useful not only as a check on the reliability of the values obtained, but also for other investigations such as colour differences from standard region or the ratio of reflectivity and its variation with wavelength.

The observed magnitudes of the lunar regions have been determined with respect to phase angle and have been corrected for the dark current and atmospheric extinction obtained from stellar measurements. They have been reduced to the same level with reference to the stars. At the two wavelengths 5538 Å and 4035 Å where instantaneous photometric measurements have been carried out are given in Table IVa. Again, the photometric data of the instantaneous measurements at the wavelengths 4765 Å, 7922 Å and 6692 Å are given in Table IVb. On an arbitrary scale, a magnitude of 0.0 value corresponds to an intensity of 100. To obtain the intensity that corresponds to the tabulated magnitude, Pogson's formula can be used

$$I = \text{Anti log } \frac{5 - m}{2.5},$$

where I is the intensity value corresponds to a magnitude m. The intensity can be

TABLE III

The observed lunar regions

No. of region	Name of the region	Longitude	Latitude
1.	Mare Crisium	+54°00′	+14°00′
2.	Environs of Mare Crisium	+46 00	+22 00
3.	Mare Fecunditatis	+52 00	−06 30
4.	Western boundary of Mare Fecunditatis	+41 30	−06 00
5.	Gutenberg	+40 30	−09 00
6.	Between Mare Fecunditatis & Mare Nectaris	+39 30	−10 00
7.	Langrenus	+61 30	−10 00
8.	Petavius	+60 15	−25 00
9.	Stevinus	+55 00	−33 00
10.	Mare Tranquillitatis	+40 15	+04 30
11.	Mare Tranquillitatis near Maskelyne	+31 15	+02 00
12.	Mare Tranquillitatis near Palus Somniorum	+38 30	+11 30
13.	Mare Tranquillitatis near Northern boundary of the Mare	+30 00	+16 00
14.	Mare Tranquillitatis	+28 00	+11 30
15.	Mare Tranquillitatis	+20 45	+06 00
16.	Mare Tranquillitatis	+21 00	+11 45
17.	Mare Nectaris (near centre)	+34 00	−17 00
18.	Theophilus	+26 30	−10 45
19.	Mare Serenitatis near Haemus Mountains	+10 30	+19 30
20.	Mare Serenitatis near Haemus Mountains	+12 30	+19 00
21.	Mare Serenitatis near Menelaus	+15 00	+16 45
22.	Linné (Mare Serenitatis)	+12 30	+27 30
23.	Le Monnier	+30 30	+27 00
24.	Taurus Mountains	+36 30	+27 30
25.	Lacus Somniorum	+33 00	+35 00
26.	Upper limb of Posidonius	+29 30	+33 00
27.	Aristoteles	+18 00	+50 00
28.	Mare Frigoris	+00 15	+59 45
29.	North limb	−10 00	+70 00
30.	Near Alps	−03 45	+50 00
31.	Near Plato	−12 30	+52 00
32.	Aristillus, north limb	+01 30	+34 45
33.	Mare Imbrium near Aristillus	−00 15	+35 00
34.	Mare Imbrium near Aristillus	+02 45	+36 00
35.	Centre of Aristillus	+01 30	+34 00
36.	Centre of Autolycus	+02 00	+30 30
37.	Centre of Archimedes	−04 00	+29 30
38.	Palus Putredinis	+03 30	+26 30
39.	Mare Imbrium	−16 00	+32 00
40.	Mare Imbrium	−21 30	+40 00
41.	Mare Imbrium near Delisle	−34 00	+28 00
42.	Sinus Iridum	−34 00	+43 00
43.	Sinus Iridum	−27 00	+45 30
44.	Northern bright limb near Sinus Roris	−50 00	+56 00
45.	Near Sinus Roris	−41 30	+52 00
46.	Jura Mountains	−37 00	+47 00
47.	Aristarchus	−47 30	+23 00
48.	Aristarchus' Peak	−49 30	+24 00
49.	Wood's region	−51 30	+26 30
50.	Wood's region	−50 30	+26 30
51.	Oceanus Procellarum	−48 00	+15 30
52.	Oceanus Procellarum	- 49 00	+12 00

Table III (Continued)

No. of region	Name of the region	Longitude	Latitude
53.	Oceanus Procellarum near Reiner	−59°00′	+07°00′
54.	Kepler	−38 30	+08 30
55.	Kepler's ray system	−37 30	+07 30
56.	Kepler's ray system	−38 30	+06 30
57.	Kepler's ray system	−36 45	+09 00
58.	Kepler's ray system	−40 30	+11 00
59.	Grimaldi	−68 30	−07 00
60.	Copernicus	−20 30	+10 30
61.	Copernicus environs	−23 00	+09 30
62.	Carpathians	−21 00	+14 00
63.	Bright limb	−63 00	+40 30
64.	Bright limb near Wood's region	−63 00	+23 15
65.	Bright limb to the west	−69 00	+07 00
66.	Bright limb near Grimaldi	−78 00	−07 45
67.	Bright limb west of Mare Humorum	−66 00	−25 30
68.	Bright limb near Schickard	−64 00	−43 00
69.	Bright limb south of Schiller	−52 00	−59 00
70.	Mare Humorum	−36 00	−22 30
71.	Gassendi	−39 00	−18 00
72.	Bullialdus	−22 30	−21 15
73.	Mare Nubium	−17 30	−17 30
74.	Circular notch in ther ray between Mare Nubium and Oceanus Procellarum	−30 30	−17 00
75.	Mare Nubium west of Straight wall	−12 00	−22 00
76.	Boundary ray between Mare Nubium and Oceanus Procellarum	−25 00	−15 00
77.	Alphonsus, south	−04 00	−15 00
78.	Alphonsus, north	−03 30	−13 30
79.	Ptolemaeus	−02 00	−08 30
80.	Fra Mauro	−17 15	−06 30
81.	Oceanus Procellarum near Riphaeus	−27 30	−05 00
82.	Boundary Oceanus Procellarum	−24 30	−12 00
83.	Albategnius	+05 00	−12 00
84.	Sinus Aestuum	−04 00	+12 00
85.	Sinus Aestuum South Apennines	−07 30	+15 00
86.	Manilius in Mare Vaporum	+09 00	+14 30
87.	Mare Vaporum	+06 00	+14 00
88.	Tycho	−12 00	−44 00
89.	Tycho, south rim	−12 00	−45 00
90.	South bright limb	−26 30	−72 00
91.	Highlands near Mare Nubium	−07 00	−32 00
92.	Lexell	−04 00	−36 30
93.	Southern Highland	+05 00	−38 00
94.	Stöfler	+05 30	−42 00
95.	Southern Highland	+08 30	−38 00
96.	Gemma Frisius	+13 00	−34 00
97.	Wilkins	+20 00	−29 30
98.	Zagut	+23 00	−33 00
99.	Southern Highlands near Zagut	+24 00	−31 30
100.	Southern Highlands	+23 30	−46 00
101.	Southern Highlands	+25 00	−51 00
102.	Highlands south of Mare Nectaris	+29 30	−28 00
103.	Piccolomini	+32 00	−29 00
104.	Centre of Plato	−09 00	+52 30

defined as the radiation from a particular projected area of the lunar surface corresponds to a solid angle 1.474×10^{-6} square degree.

The photometric measurements of the lunar regions have been observed over a long period of lunation and can be affected by libration of the Moon both in longitude and latitude. The present results are corrected for the mean libration in longitude using Peacock's method (1968).

The method is based on using the curves published by Minnaert (1961) for the distribution of the radiance along the equator for different phase angles. Along the

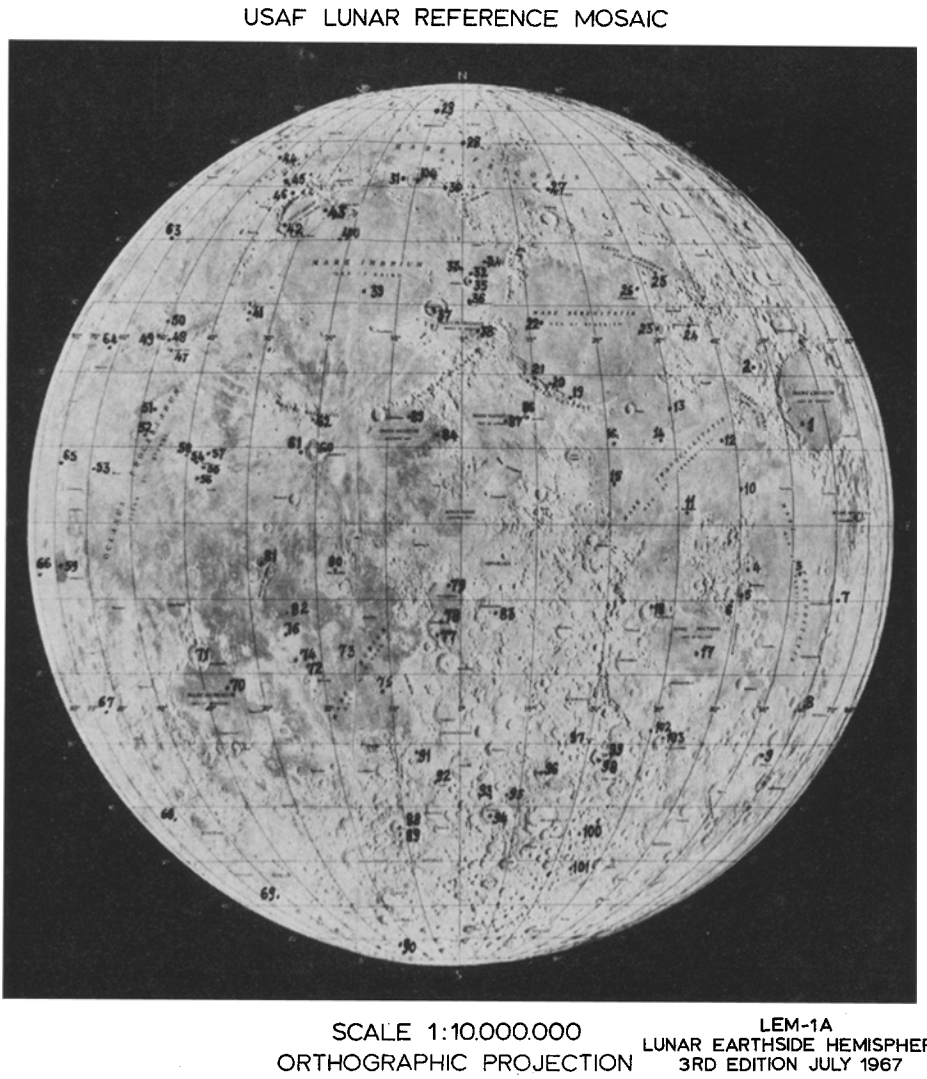

Fig. 1. The observed regions marked on the lunar map.

equator, the angle of reflection is equivalent to the longitude. The isophotes show approximate meridians and the distribution of intensity is taken as applying to any line of latitude and reading angle of reflection as longitude. For certain phase angle, the libration in longitude can vary the distance of any detail from the terminator and produce a range of possible brightness. Thus, the gradient of the distribution of the intensity of the requisite phase will give the expected intensity change per degree of libartion. Thus the correction L to mean libration is equal $L_0 G(\varrho_0/\varrho)$, where L_0 is the selenographic longitude of the Earth corrected for topocentric values, G is the gradient at the requisite longitude and phase angle and ϱ_0/ϱ is the ratio of the observed radiance to the radiance obtained from the intensities distribution at the same phase angle and longitude of the region.

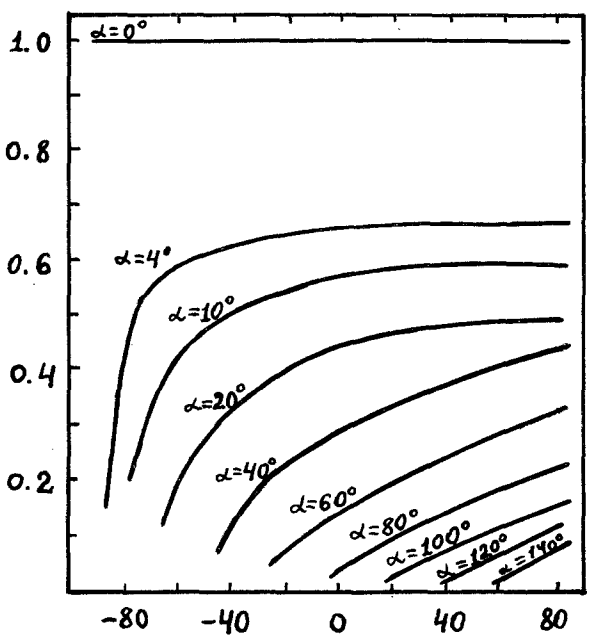

Fig. 2. Distribution of radiance along the equator.

The present data are reduced to the mean libration by applying the previously mentioned method but using the modern curves for the distribution of the radiance along the equator for difference phase angles, as given by Morozhenko and Yanovitsky (1971), Figure 2, on the basis of the data by Gehrels *et al.* (1964). For the observation carried out before and after full Moon, the same curves of distribution are used. Before full Moon, the brightest regions of the lunar surface will be at positive longitudes and will have higher radiances. After full Moon, the brightest regions of the lunar surface will be at negative longitudes but will possess higher radiances. The correction to mean libration may be positive or negative. For negative phase angles a positive libration moves a lunar feature into a position of diminishing inten-

sity. Thus a correction of intensity to mean libration will have positive value. A negative libration requires negative value.

In addition, the data have been normalized using the same method mentioned by Gehrels *et al.* (1964). The correction to the mean Earth-Sun distance is applied by taking the distance R of the Sun to the Earth in astronomical units as it is published in the Nautical Almanac. The small corrections for the position of the Moon with respect to the Earth can be ignored. To correct for the light scattered into the lunar aureole, mainly by the Earth's atmosphere, the values given by previous workers are used. Gehrels *et al.* (1964) used the analysis of scattered sunlight which have been made by Pierce (1954); they have made several measurements of the lunar aureole and published a table for the scattered light at various distances from the centre of the lunar disk. The correction values given by Gehrels *et al.* (1964) for the 82″ reflector of McDonald Observatory at Cassegrain focus of the scale 7″.4 mm^{-1} is used in the present correction for the observations of the 74″ reflector of the Kottamia Observatory at the Cassegrain focus of scale 6″.17 mm^{-1}. Actually, the relative intensity of the aureole differs by different telescope but the differences are small as shown in the table given by Gehrels *et al.* (1964).

The corrections for the mean libration in longitude L are given in Tables IVa and IVb while both the corrections for the mean Earth-Sun distance and that of the scattered light are included in the corrected intensity $I(c)$ given for each wavelength. In view of any possible correction that may be proposed in future, the arbitrary magnitudes at each wavelength referred to the same scale corrected only for dark current and extinction are tabulated in separate columns. The first six columns of Table IVa list, respectively, the regions, date of observations, Greenwich mean time, phase angle of incidence and angle of reflection. The following three columns list for each of the wavelengths 5538 Å and 4035 Å, the magnitudes m corrected for dark current and extinction, the correction L for mean libration in longitude, and the intensity $I(c)$ including all the previous mentioned corrections. Table IVb lists for the first four columns observed regions, dates of observation, Greenwich mean time and phase angles. Each of the following three columns lists for the wavelengths 4765, 6692 and 7922 respectively, the magnitudes of observations m corrected for background and extinction, the correction L for mean libration in longitude and the intensity $I(c)$ corrected for all the previous mentioned corrections. The last column of Table IVb lists L_0, the selenographic longitude of the Earth corrected for the topocentric values. Due to the small differences in the observational time between Table IVa and Table IVb, the values of the angles of incidence and reflection of Table IVa, can be used for the measurements of Table IVb.

At each wavelength, the arbitrary intensity values $I(c)$ of Tables IVa and IVb can be converted into absolute units by multiplying each value of intensity by the corresponding brightness units given before in Table II, in ergs $cm^{-2}\ s^{-1}\ Å^{-1}$ for a region of 4″.936 apparent diameter on the Moon (at 1 AU from the Sun). The date and time of observations are given in the data for any possible dependence of the brightness or the colour on the solar activities.

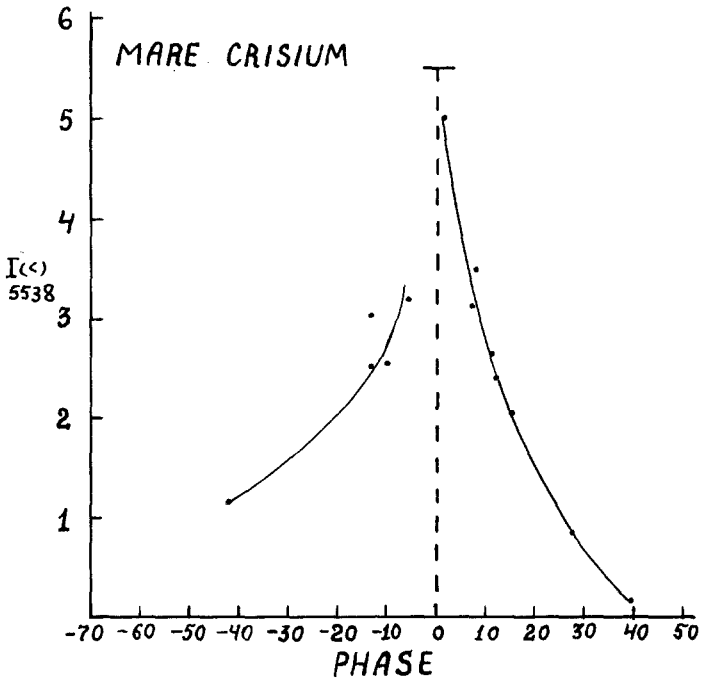

Fig. 3. Intensity-phase curve for Mare Crisium.

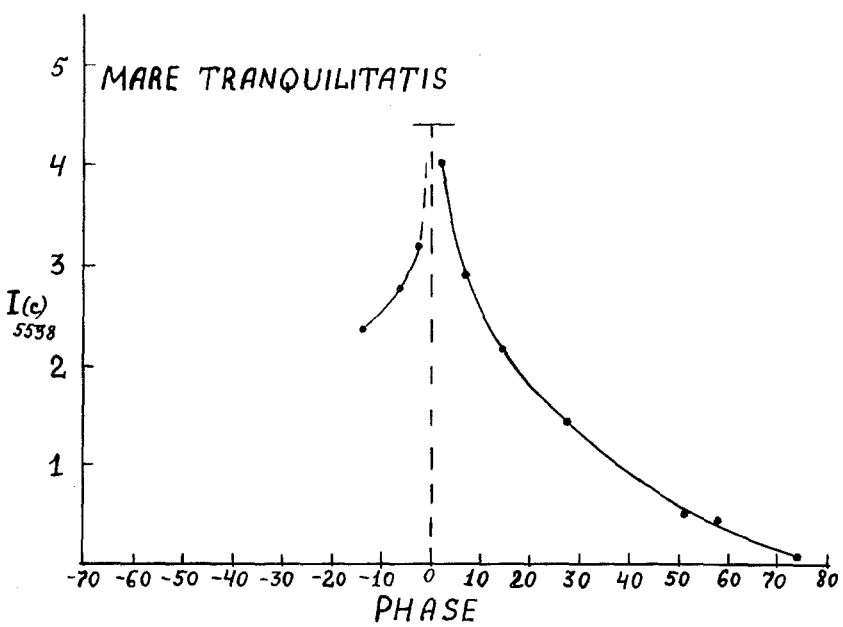

Fig. 4. Intensity-phase curve for Mare Tranquillitatis

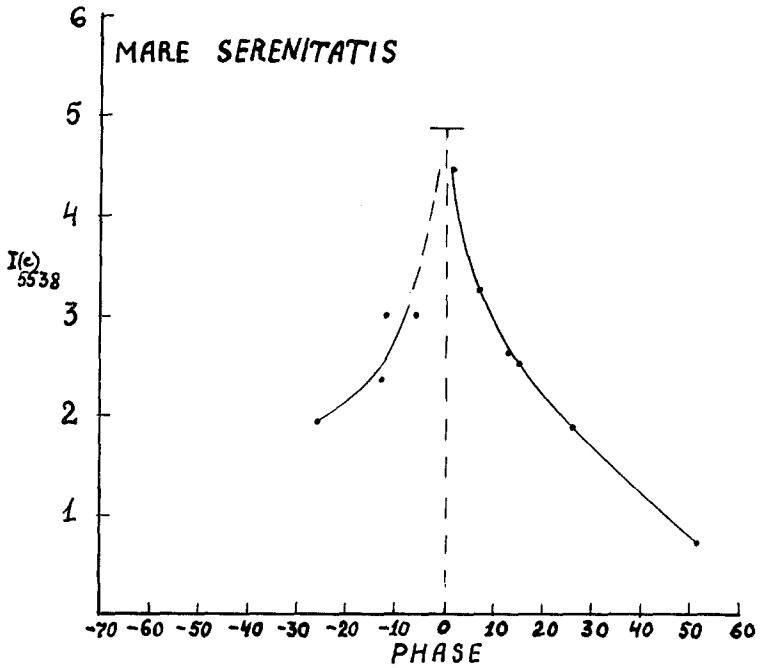

Fig. 5. Intensity-phase curve for Mare Serenitatis.

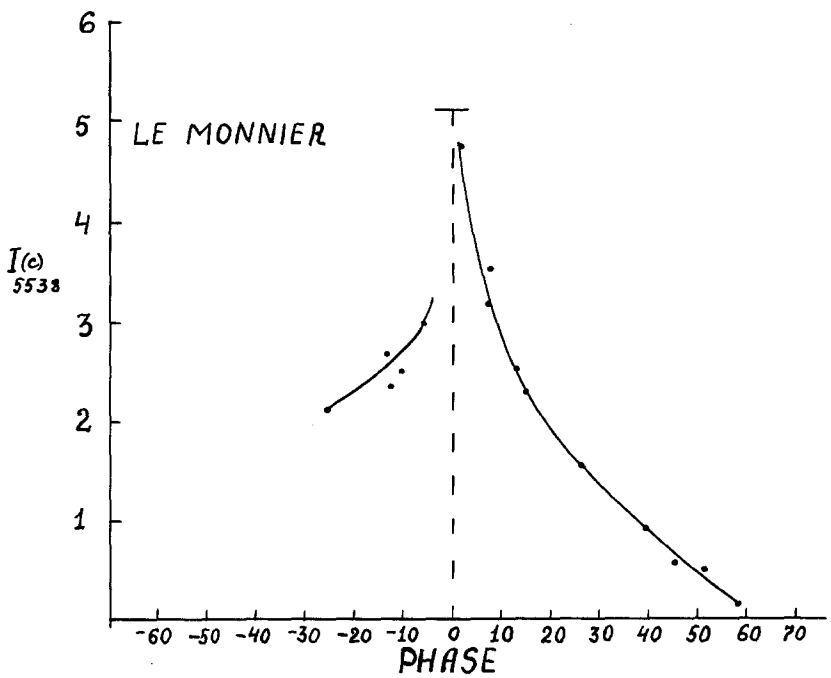

Fig. 6. Intensity-phase curve for Le Monnier.

The phase angles are computed for the time of observations using the formula

$$\cos\alpha = \sin B_0 \sin B_\odot + \cos B_0 \cos B_\odot \sin(C_\odot + L_0),$$

where α is the phase angle, B_0 and L_0 are the selenographic latitude and longitude of the Earth corrected for topocentric values as explained by Kopal (1962), $C_\odot$ is the complement of the Sun's selenographic longitude and $B_\odot$ is the Sun's selenographic latitude. The phase angles are positive after full Moon and negative before.

The angles of incidence and reflections are computed from the equations

$$\cos i = \sin B_\odot \sin B_p + \cos B_\odot \cos B_p \cos(\lambda + \lambda_\odot),$$
$$\cos\varepsilon = \sin B_0 \sin B_p + \cos B_0 \cos B_b \cos(\lambda_p + L_0),$$

where i and ε are the angles of incidence and reflections, $\lambda_\odot$ is selenographic longitude of the Sun and B_p and λ_p are selenographic latitudes and longitudes of the observed point p on the surface of the Moon.

2.4. Errors

The errors affecting our observations can stem from a variety of sources. On few

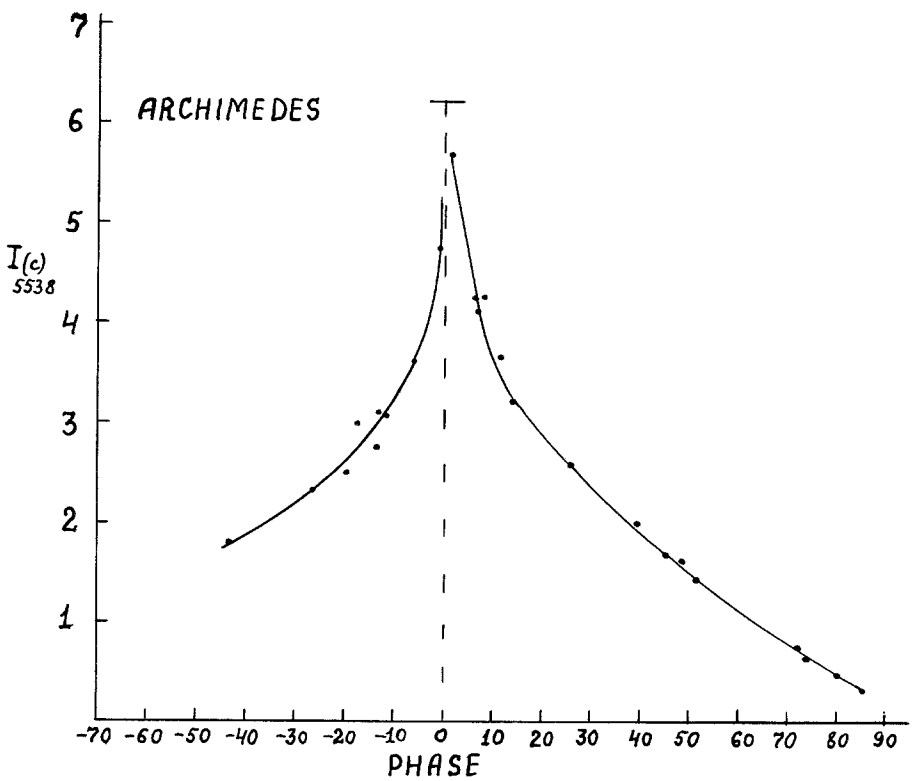

Fig. 7. Intensity-phase curve for Archimedes.

nights, the atmospheric conditions have been far from ideal. However, the extinction coefficients detected from two different stars observed on many nights of observations showed an error of $\pm 0^{m}.01$. An error is expected in the detected values of the stars magnitudes at zero atmosphere. Some lunar regions are actually found to be rather nonuniform. This causes an additional scatter in the measurements. This lack of uniformity of lunar regions occurs especially in the region of Aristarchus. In fact, some fluctuations may be ascribed to the macrostructure, of the observed region, inclination of its ground, luminescence or variation in the solar activities. Some of the regions lack distinct landmarks to re-set on each night and each observing period – such as Grimaldi. Errors become more important when comparison from night to night have to be made. The probable error may vary from one wavelength to an other. As the observations are carried out over a long period of time, and for above – mentioned reasons, the probable error of each point may have risen to almost $\pm 0^{m}.035$.

Apart from minor irregularities, the intensity measurements are ideal for the series of measurements in December and May. All the present data can be investigated for colour differences of lunar surface. As the error of the colour index of each point of observation is almost that of the standard region when observed under the same observing conditions, the error for the colour differences investigation from that of the standard region will not exceed one per cent.

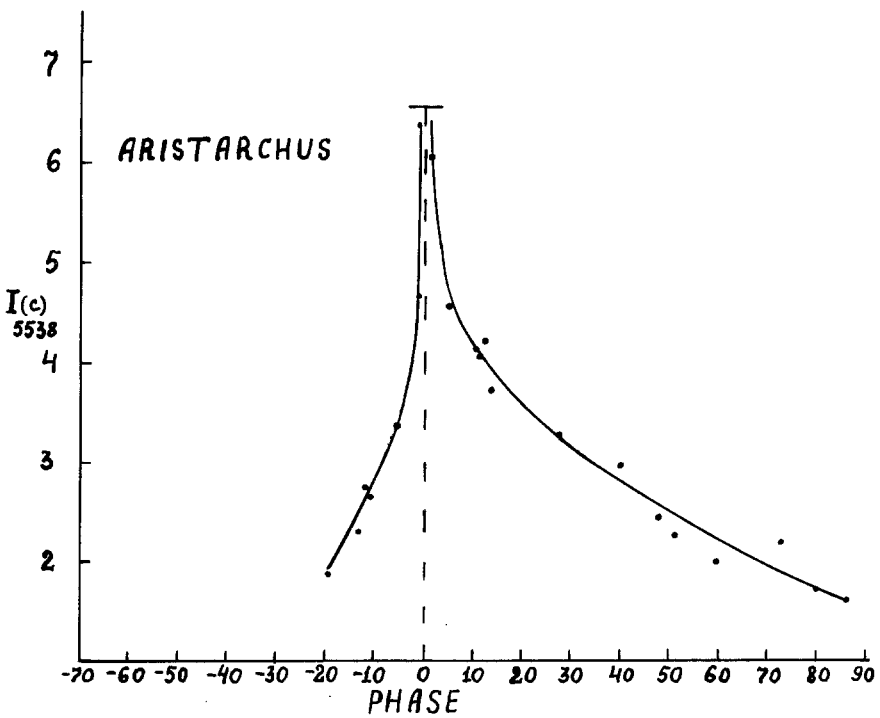

Fig. 8. Intensity-phase curve for Archimedes.

3. Comparison with Previous Investigations

Variations of intensities of lunar features with phase angles are given in Tables IVa and IVb (see pp. 163–195) for the specific narrow band filters. The intensities at the wavelength 5538 Å have been plotted in Figures 3–15. The observations are mostly

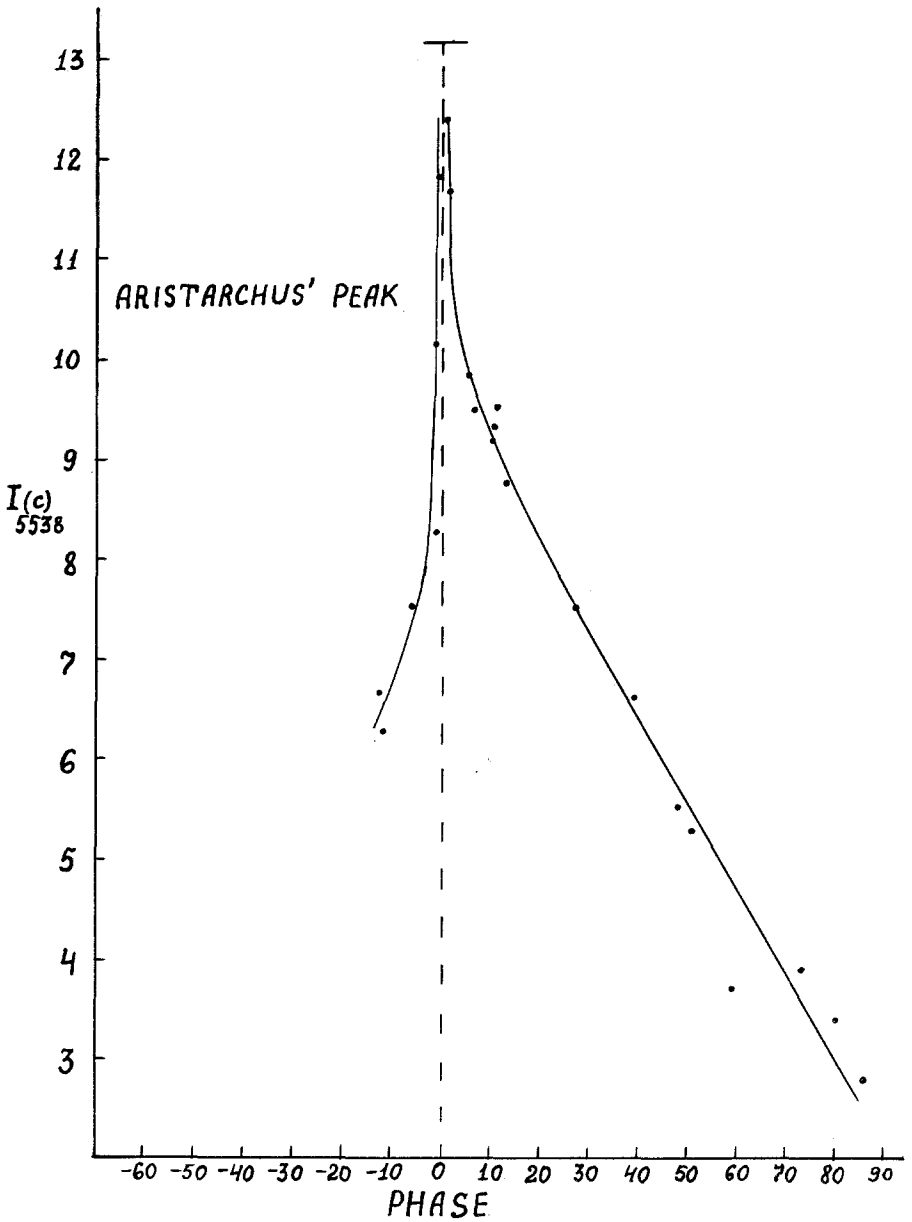

Fig. 9. Intensity-phase curve for Aristarchus' peak.

well distributed over phase angles between $-43°$ and $+86°$. They show the shape of the change and in particularly near full Moon. Some of the points show an amount of scatter about the mean. However, the mean light curves are sufficient to show the nature of the change. Similar curves can be obtained at different wavelengths for possible investigation.

Obviously, the behaviour of the light curves varies from region to region and depends on the phase range. The phase factors differ from region to region and the smaller values of phase factors are mostly detected for region of low albedos.

The opposition effect which is the steep increase in the brightness near full Moon detected by Gehrels *et al.* (1964), appears also in the present representation and for all wavelengths. The two bright craters – centre of Tycho and Aristarchus peak – show the steepest rise towards full Moon. The opposition effect shows up at different phase angles and mostly in the range of 10° on both sides of full Moon.

All the features reach their maximum intensity at full Moon. This is contrary to

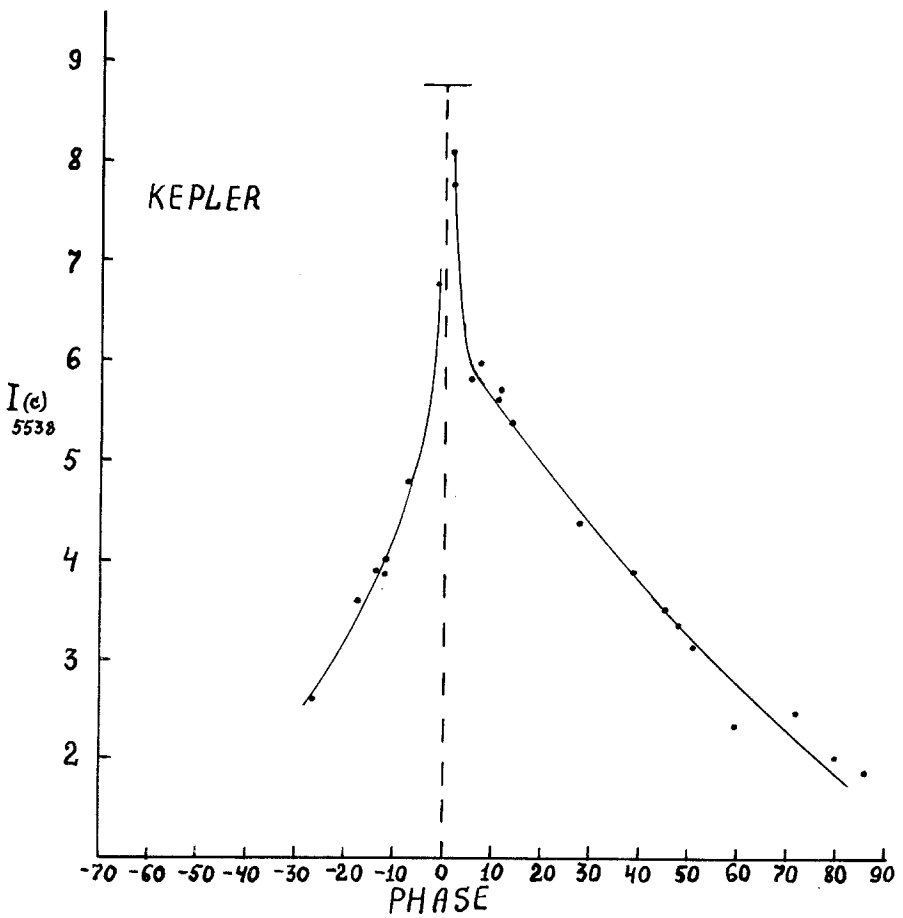

Fig. 10. Intensity-phase curve for Kepler.

what was detected for some regions by Fedoretz (1952). However, Gehrels *et al.* (1964) as well as Van Diggelen (1965) have not confirmed Fedoretz finding.

Asymmetry in the light curves are often detected. Regions to the east like Mare Crisium show increase to full Moon after which the brightness fall rapidly from its maximum. This is reversed for the details to the west. Lunar details near the centre of the disk – like Archimedes – gives more symmetrical variation along zero phase. This asymmetry has been detected also by previous workers. The reason for the asymmetric light curves before and after the effect is clearly due to the conditions obtaining on the lunar grounds. The angles of incidence and reflections as well as the longitude of the regions play the great role in the behaviour of the light curves. According to the symmetry principle (Minnaert, 1961), two points symmetric with respect to the central meridian will have the same radiance if measured at phases symmetric with respect to full Moon, but their light curves will of course show opposite symmetries.

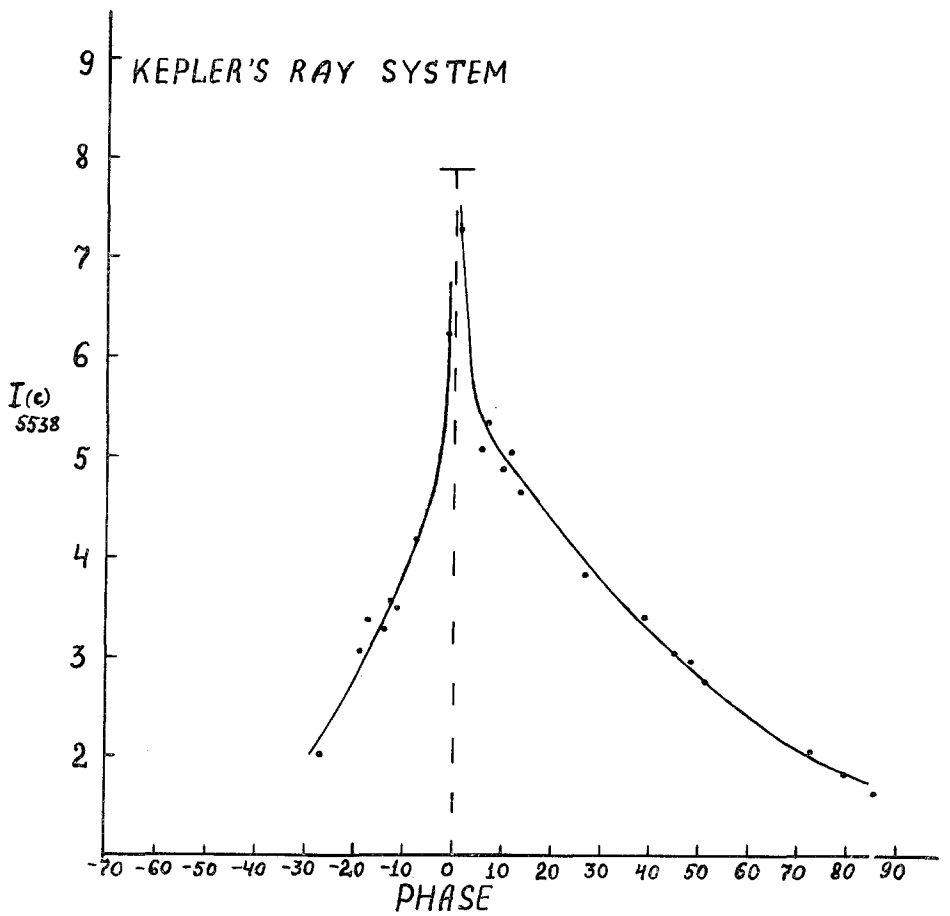

Fig. 11. Intensity-phase curve for Kepler's ray system.

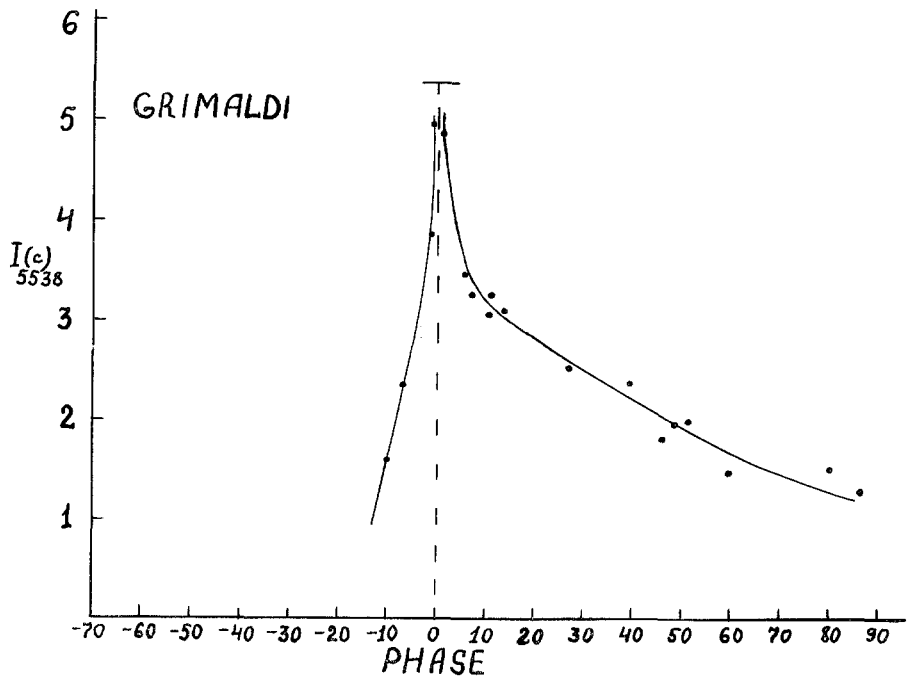

Fig. 12. Intensity-phase curve for Grimaldi.

The arbitrary magnitudes of the ligt curves of the present data are compared with the photoelectric data of Gehrels *et al.* (1964). The comparison has been made for the light curves of centre of Plato and centre of Tycho. As can be seen on Figure 16, the two investigations are in good agreement for most phase angles. However, the absolute comparison between the two data are different. The reason is not clear. Gehrels *et al.* (1964) estimated 100% increase in the radiance as phase angle decreases from 5° to 0°.

The radiance factors at zero phase obtained by Gehrels *et al.* (1964) are quite high. They determined two radiance factors at zero phase for their two periods of observations. The values obtained by them for centre of Plato are 0.138 for the period of 1956/57 and 0.106 for the period of 1963/64. The absolute transformation of the present data gives radiance factor for the centre of Plato equals 0.071 at $\lambda = 5538$ Å. The present value is comparable with that of Orlova (1954) which determine a radiance factor equals 0.076. Again the results of Sytinskaya (1953) and that of Fedoretz (1952) give for centre of plato radiance factor of 0.068 and 0.072, repectively. As stated by Hapke (1971), the quantitative agreement with different investigators are reasonable except for the values given by Gehrels *et al.* (1964) and van Diggelen (1965).

The present data shows an increase in the radiance from five to zero degree phase angle according to the wavelength of the measurements. For the wavelength 4765 Å, it gives an increase of 17% for the centre of Tycho, 31% for Aristarchus peak, 33% for Copernicus north, 33% for centre of Plato and 37% for Archimedes. The other

regions show higher values. Mare Tranquillitatis gives 40% Mare Crisium 41%, Le Monnier 41%, Aristarchus 46%, Kepler 47%, Mare Sevenitatis 47%, Grimaldi 51% and Kepler's ray system 52%. These previous values are comparable with what obtained from the investigation of Pohn *et al.* (1969) for the photographs of Apollo 8. Without giving a particular location on lunar grounds, Pohn *et al.* (1969) detected an increase in the radiance from five to zero degree phase equals 44%. The variations in the gradient of the intensity of lunar grounds from 5° to zero phase are expected due to porosity of lunar grounds which varies from region to other.

Few results are obtained previously from the present data. The eighteen lunar regions measured frequently at different phase are investigated for the colour indices variation with phase (Mikhail, 1968, 1970). The results proved to be comparable with previous investigators and more complete. Again the reddening factors obtained by Lane and Irvine (1972), for the lunar disk showed to be consistent with the results obtained from the present data.

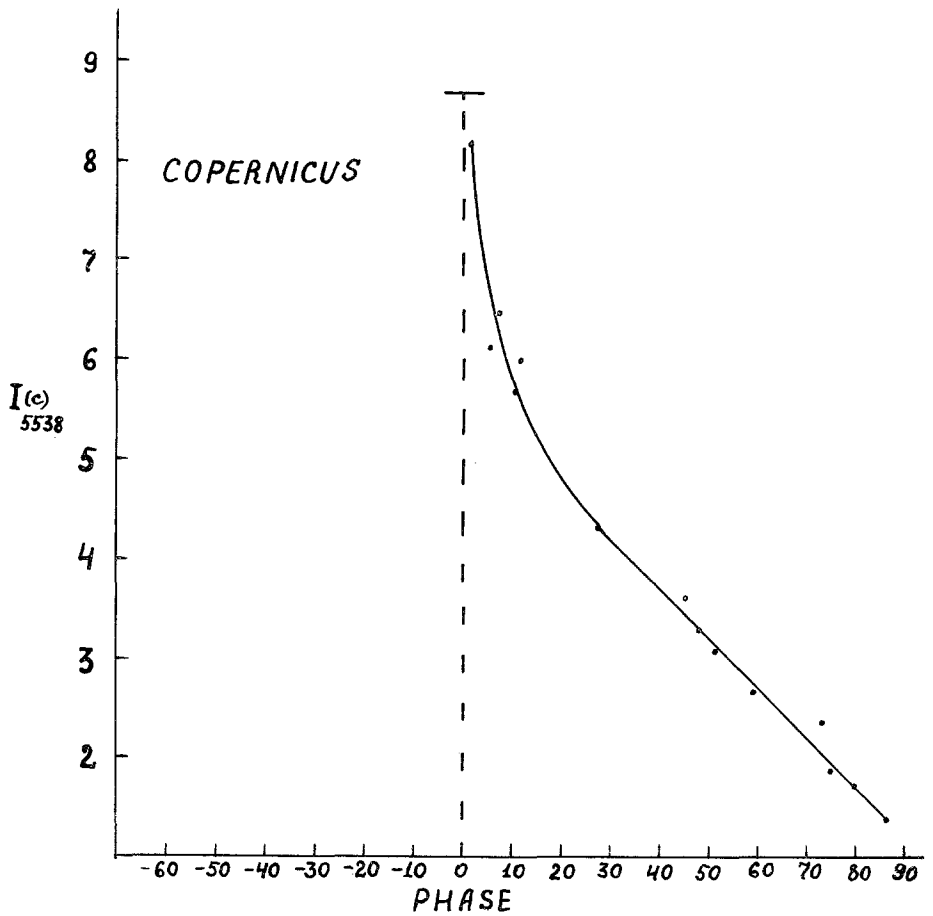

Fig. 13. Intensity-phase curve for Copernicus.

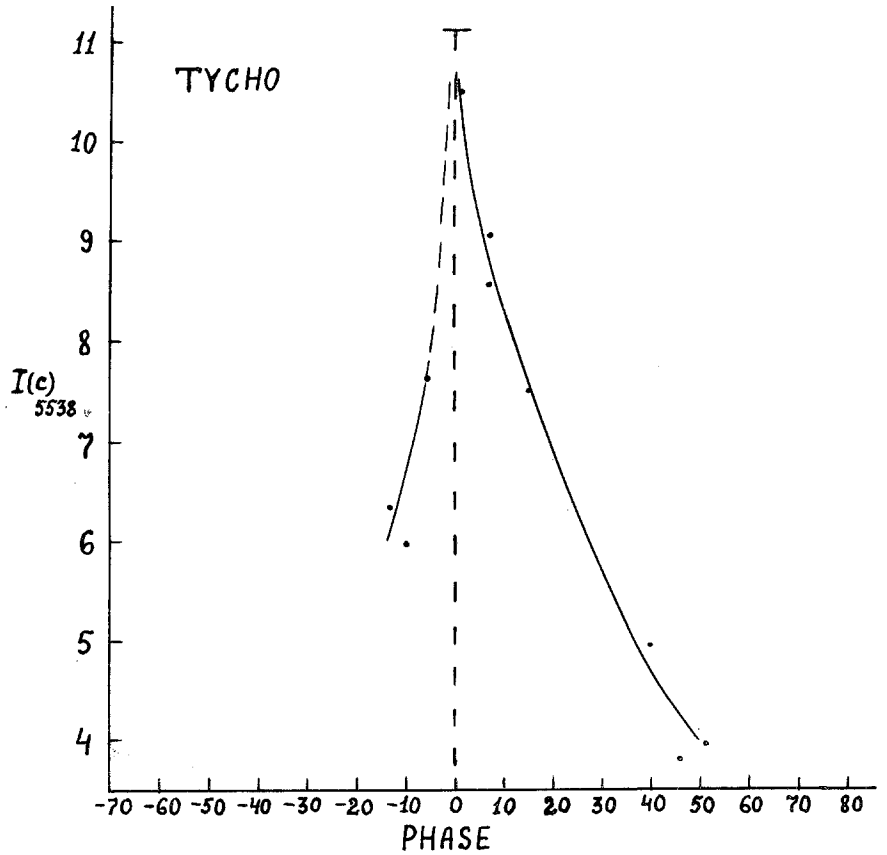

Fig. 14. Intensity-phase curve for Tycho.

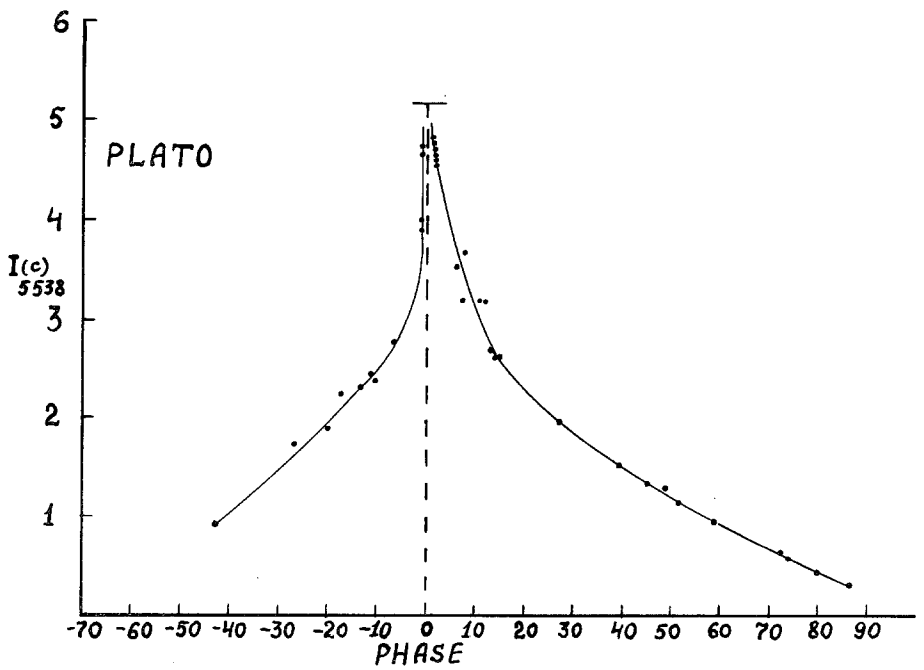

Fig. 15. Intensity-phase curve for Plato.

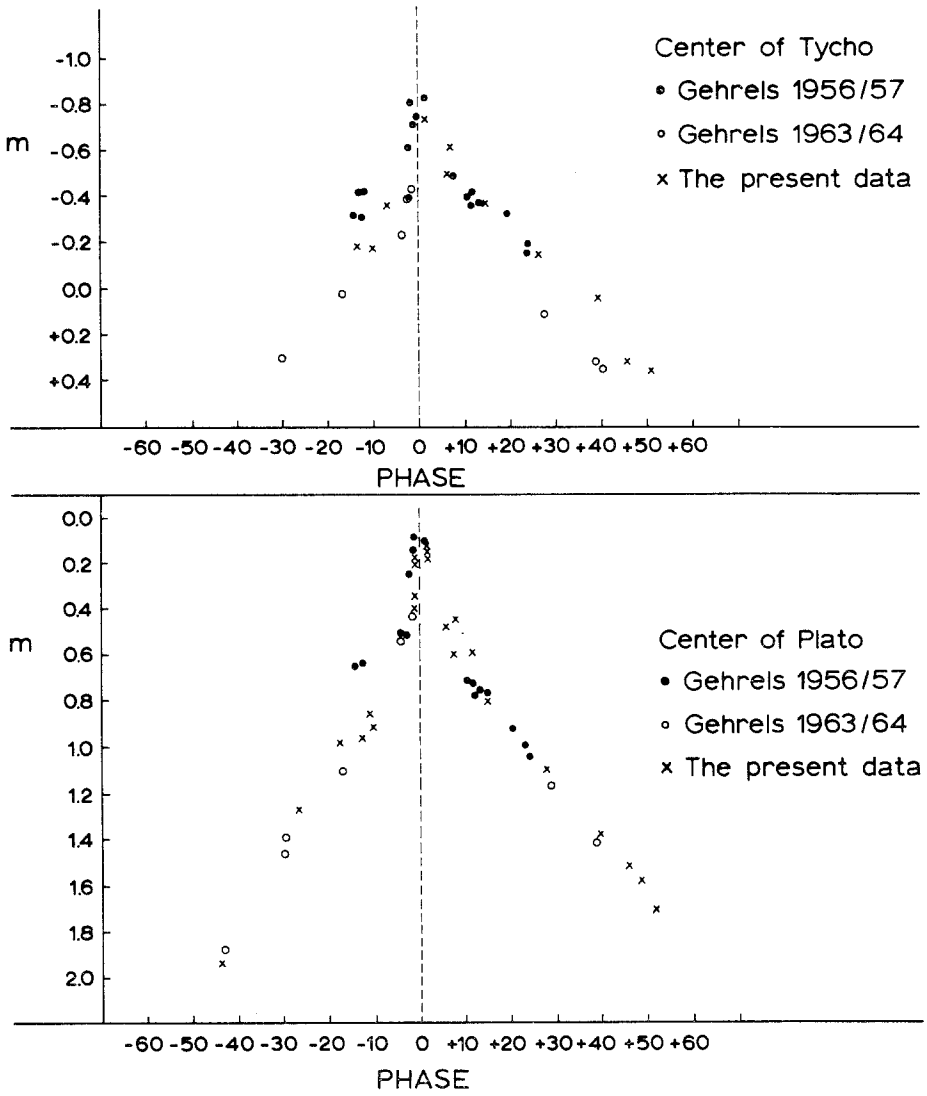

Fig. 16. Comparison of light curves of Plato and Tycho obtained from the present data and that of Gehrels *et al.* (1964).

4. Conclusions

Data attempted to constitute one of the most comprehensive photoelectric sets of measurements available up to the present. They have been given in the form of absolute intensity measurements at different wavelengths in order to provide the first direct evidence for a wavelength dependence of selected grounds of lunar surface on phase.

The instantaneous photoelectric measurements obtained by a three-beam photoelectric photometer provided highly accurate results. The reproducibility of a part of

these data showed that an expected error of less than two per cent magnitude can easily be obtained for the investigation of colour indices variation with phase (Mikhail, 1968, 1970).

The colour differences from a standard region measured under the same observational conditions are subject to errors of less than one percent. This high accuracy is necessary to establish in view of the small nature of the colour differences. A substantial data of the colour differences of lunar grounds are much needed to explain the physical nature of different types of the lunar ground. It is interesting to study the spectral gradient of lunar regions that characterize the reflection properties of the Moon as well as for morphological studies. Further study is clearly required for the estimation of the opposition effect as well as other possible investigations.

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TABLE IVa

Arbitrary photoelectric intensity data measured instantaneously at the two wavelengths 5538 and 4035 Å

Region	Date	UT	Phase	i	ε	m_{5538}	L	$I(c)_{5538}$	m_{4035}	L	$I(c)_{4035}$
1	6.10.65	23.00	−42.498	18.89	55.95	4.849	−0.008	1.150	0.752	−0.350	50.385
Mare Crisium	7.01.66	22.10	+10.807	66.31	58.22	3.924	+0.030	2.661	0.281	+0.849	76.304
	8.01.66	00.75	+11.839	67.60	58.61	4.035	+0.027	2.404	0.370	+0.783	70.648
	5.02.66	02.33	−10.205	49.89	59.97	3.961	−0.005	2.549	0.335	−0.147	72.309
	6.02.66	01.62	+7.558	61.06	57.90	3.625	+0.004	3.484	−0.093	+0.108	107.595
	3.05.66	21.17	−12.963	39.75	52.41	4.023	+0.002	2.511	0.175	+0.085	87.610
	4.05.66	23.75	+1.344	52.39	51.15	3.273	0.000	5.025	−0.441	0.000	154.760
	6.05.66	01.63	+14.988	64.96	50.20	4.195	−0.095	2.051	0.552	−2.704	59.317
	7.05.66	01.53	+27.565	76.67	49.41	5.054	−0.126	0.848	1.454	−3.486	23.578
	7.05.66	23.50	+29.213	87.47	48.63	6.791	−0.030	0.166	3.005	−0.980	5.488
	1.08.66	01.55	−6.114	48.20	51.22	3.774	0.000	3.201	0.119	0.000	93.459
	1.08.66	21.15	+7.029	57.74	51.24	3.779	−0.049	3.137	0.068	−1.503	96.412
	29.08.66	19.59	−13.639	39.89	51.07	3.831	+0.021	3.026	0.223	+0.570	84.626
2	6.10.65	22.82	−42.564	21.53	49.23	3.475	−0.033	4.066	−0.272	−1.028	129.259
3	6.05.66	00.77	+14.684	61.79	47.60	4.240	−0.091	1.966	0.554	−2.702	59.217
4	6.05.66	00.83	+14.707	51.37	37.22	3.932	−0.102	2.623	0.264	−2.979	77.231
5	6.05.66	00.87	+14.718	50.70	36.90	3.736	−0.211	3.147	0.080	−3.530	91.507
6	6.05.66	00.97	+14.752	49.92	36.25	3.325	−0.178	4.591	−0.282	−4.927	127.864
7	6.05.66	00.71	+14.664	71.35	57.38	3.707	−0.197	3.171	0.062	−5.668	91.652
8	6.05.66	21.42	+26.247	81.16	59.34	4.718	−0.224	1.104	1.063	−6.499	32.323
9	6.05.66	21.52	+26.282	77.46	58.36	3.820	−0.513	2.517	0.220	−14.124	69.997
10	12.12.65	22.52	+57.936	84.55	39.27	7.291	−0.012	0.107	5.193	−0.318	0.440
11	12.12.65	22.45	+57.909	86.48	29.93	7.053	−0.012	0.135	—	—	—
	6.05.66	00.62	+14.633	40.85	26.28	4.021	−0.074	2.436	0.333	−2.208	73.107
12	7.01.66	22.21	+10.847	51.05	43.10	4.000	−0.023	2.421	0.280	−0.695	74.638
	8.01.66	00.63	+11.790	52.23	43.48	3.987	−0.023	2.451	0.283	−0.694	74.450
13	6.05.66	00.49	+14.591	42.22	28.67	4.144	−0.060	1.982	0.433	−2.013	66.660
14	12.12.65	22.76	+58.035	83.59	31.15	6.324	−0.027	0.260	2.641	−0.790	7.785
15	12.12.65	22.30	+57.846	76.02	22.09	5.719	−0.041	0.459	2.088	−1.169	13.067
	6.05.66	00.57	+14.616	30.87	16.40	4.009	−0.052	2.481	0.303	−1.588	75.525
	8.05.66	23.25	+50.937	66.32	15.43	5.300	−0.172	0.602	1.657	−4.933	17.281

Table IVa (Continued)

Region	Date	UT	Phase	i	ε	m_{5538}	L	$I(c)_{5538}$	m_{4035}	L	$I(c)_{4035}$
16	12.12.65	22.27	+57.823	76.48	25.75	5.875	−0.013	0.421	2.202	−0.395	12.424
Mare	11.02.66	00.38	+73.925	87.08	18.82	7.690	−0.002	0.080	4.062	−0.057	2.268
Tranquillitatis	5.05.66	00.73	+1.695	21.79	20.38	3.510	0.000	4.015	−0.254	0.000	128.296
	6.05.66	00.50	+14.593	32.50	18.86	4.167	−0.045	2.145	0.440	−1.400	66.597
	7.05.66	01.63	+27.598	44.53	17.86	4.567	−0.088	1.430	0.908	−2.556	41.677
	8.05.66	23.21	+50.925	66.93	17.18	5.479	−0.147	0.509	1.815	−4.285	14.911
	1.08.66	01.63	−6.099	17.24	19.10	3.934	−0.005	2.749	0.240	−0.152	82.595
	1.08.66	21.28	+7.061	25.94	19.14	3.881	−0.019	2.882	0.129	−0.595	91.052
	29.08.66	20.45	−13.427	11.52	19.14	4.086	+0.004	2.367	0.430	+0.121	68.885
17	6.05.66	1.17	+14.822	46.27	34.07	3.864	−0.100	2.800	0.200	−2.911	82.201
18	6.05.66	1.05	+14.781	37.54	24.66	3.351	−0.114	4.534	−0.260	−3.176	126.632
19	2.05.66	20.20	−26.903	27.06	24.68	4.311	+0.023	1.937	0.598	+0.692	59.399
Mare	3.05.66	20.45	−13.227	20.82	22.88	4.102	+0.011	2.330	0.368	+0.356	72.894
Serenitatis	5.05.66	00.58	+1.639	21.26	20.74	3.406	0.000	4.442	−0.354	0.000	141.440
	6.05.66	01.73	+15.024	28.28	18.94	4.004	−0.045	2.499	0.342	−1.313	73.083
	6.05.66	21.28	+26.196	35.86	17.50	4.269	−0.110	1.883	0.623	−3.155	54.336
	8.05.66	23.08	+50.948	28.20	16.35	5.143	−0.163	0.732	1.536	−4.521	20.336
	3.07.66	20.67	+12.846	26.03	15.89	3.971	−0.034	2.626	0.321	−0.989	75.999
	1.08.66	01.70	−6.086	18.09	15.69	3.837	−0.006	2.997	0.277	−0.155	79.812
	1.08.66	21.20	+7.041	22.38	15.77	3.745	−0.021	3.259	0.001	−0.669	102.443
	30.08.66	00.67	−12.371	18.17	15.88	3.828	+0.007	3.005	0.176	+0.204	87.068
20	13.01.66	00.12	+80.137	85.57	23.95	7.299	−0.004	0.113	3.714	−0.105	3.069
Mare Serenitatis	5.02.66	01.52	−10.527	20.66	28.88	4.115	−0.009	2.196	0.446	−0.265	64.433
	6.02.66	01.80	+7.633	26.51	28.23	3.648	0.000	3.384	−0.110	0.000	108.332
	9.02.66	02.75	+48.479	57.28	23.88	4.864	−0.170	0.935	1.227	−4.843	26.656
	11.02.66	00.17	+73.845	78.75	21.23	6.173	−0.008	0.322	2.540	−0.231	9.203
	2.05.66	20.37	−26.841	25.29	24.25	4.441	+0.023	1.723	0.711	+0.727	53.633
	3.05.66	20.60	−13.170	19.43	22.41	4.158	+0 015	2.220	0.390	+0.489	71.629
	6.05.66	01.77	+15.036	28.72	18.50	4.051	−0.034	2.403	0.369	−0.997	71.608
	8.05.66	23.32	+50.958	59.38	15.93	5.054	−0.124	0.848	1.424	−3.502	24.069
21	13.01.66	00.02	+80.097	85.57	23.95	6.777	−0.006	0.184	3.237	−0.162	4.754
Mare Serenitatis	5.02.66	01.62	−10.488	20.66	28.88	3.957	−0.010	2.538	0.315	−0.299	72.700
	6.02.66	01.83	+7.646	26.51	28.23	3.649	0.000	3.386	−0.063	0.000	103.543
	9.02.66	02.82	+48.504	60.12	23.17	5.071	−0.154	0.758	1.453	−4.301	21.275

	11.02.66	00.13	+73.832	81.89	20.23	6.232	−0.008	0.306	2.685	−0.202	8.043
	2.05.66	20.43	−26.816	21.57	24.10	4.255	+0.026	2.043	0.584	+0.759	60.208
	3.05.66	20.63	−13.159	16.90	22.16	4.259	+0.012	2.020	0.504	+0.377	64.389
	6.05.66	01.82	+15.057	30.36	18.41	4.003	−0.038	2.509	0.364	−1.072	71.841
	6.05.66	21.20	+26.169	38.79	16.79	4.298	−0.101	1.842	0.656	−2.898	52.888
	8.05.66	23.33	+50.963	62.30	16.02	5.051	−0.139	0.835	1.481	−3.733	22.430
22	7.05.66	23.65	+39.259	52.02	24.14	4.295	−0.145	1.802	0.654	−4.161	51.714
23	12.12.65	00.63	+45.010	76.55	43.87	5.533	−0.026	0.570	1.941	−0.703	15.637
Le Monnier	12.12.65	22.87	+58.079	86.56	43.13	6.975	−0.004	0.155	3.315	−0.123	4.489
	5.02.66	01.35	−10.590	36.58	46.40	3.982	−0.005	2.490	0.336	−0.147	71.715
	6.02.66	01.67	+7.578	44.97	45.24	3.604	0.000	3.536	−0.091	0.000	106.571
	2.05.66	19.98	−26.984	27.39	41.05	4.206	+0.017	2.130	0.517	+0.497	63.957
	3.05.66	20.38	−13.252	30.28	39.06	4.087	+0.005	2.363	0.352	+0.145	74.033
	4.05.66	23.67	+1.316	37.94	37.13	3.328	0.000	4.759	−0.372	0.000	144.202
	6.05.66	00.35	+14.543	47.06	35.44	4.082	−0.070	2.304	0.424	−2.031	67.248
	6.05.66	21.17	+26.157	55.58	33.85	4.449	−0.147	1.547	0.786	−4.315	45.340
	7.05.66	23.53	+39.223	66.99	32.87	4.975	−0.122	0.922	1.325	−3.512	26.817
	8.05.66	23.38	+50.978	77.61	30.27	5.784	+0.014	0.511	2.172	+ 0.379	14.271
	3.07.66	20.59	+12.824	45.31	33.57	4.021	−0.049	2.497	0.404	−1.372	70.237
	1.08.66	01.48	−6.127	34.86	33.97	3.842	−0.004	2.990	0.190	−0.118	86.837
	1.08.66	21.09	+7.014	41.01	34.00	3.761	−0.025	3.210	0.061	−0.756	97.147
	29.08.66	20.28	−13.469	29.36	33.97	3.956	+0.003	2.672	0.359	+0.086	73.756
24	9.02.66	02.65	+48.442	80.15	43.66	4.847	−0.345	0.779	1.349	−8.663	19.625
	7.05.66	23.60	+39.244	72.35	37.48	4.348	−0.255	1.607	0.686	−7.440	47.170
25	12.12.65	00.72	+45.040	79.79	51.09	5.421	−0.029	0.631	1.896	−0.633	16.306
26	2.05.66	20.08	−26.947	33.38	44.89	3.728	+0.025	3.312	0.086	+0.721	95.062
27	13.12.65	00.36	+58.649	80.24	58.22	5.004	−0.080	0.892	1.401	−2.202	24.838
	6.02.66	02.03	+7.730	55.39	59.18	3.045	0.000	5.926	−0.676	0.000	183.900
	9.02.66	03.15	+48.629	72.94	55.55	4.438	−0.430	1.218	0.824	−11.984	34.751
28	13.12.65	00.23	+58.603	74.19	66.36	—	—	—	1.114	−2.151	33.350
	10.02.66	23.98	+73.775	79.39	62.51	5.295	−0.229	0.522	1.765	−5.904	13.703
29	8.05.66	00.93	+39.638	72.01	66.41	3.685	−0.144	3.319	0.053	−4.093	95.351
30	6.10.65	19.10	−43.673	62.16	44.03	5.033	−0.021	0.955	1.360	−0.629	28.376
	9.10.65	00.15	−19.721	60.42	43.99	—	—	—	−0.463	−2.757	152.243
	5.05.66	21.07	+13.446	50.39	49.72	3.678	−0.034	3.331	0.057	−0.948	96.770
31	6.10.65	19.13	−43.664	67.87	46.85	4.622	−0.047	1.379	0.975	−1.344	39.976
		22.68	−42.611	66.90	46.42	4.520	−0.051	1.514	—	—	—
	12.12.65	00.37	+44.915	58.72	59.00	4.048	−0.019	2.333	0.530	−0.491	59.882
	15.12.65	00.87	+85.688	77.21	60.57	5.006	−0.179	0.794	1.487	−4.576	20.407
	5.01.66	23.80	−17.660	56.92	54.89	3.551	−0.121	3.956	−0.152	−3.344	109.909

Table IVa (Continued)

Region	Date	UT	Phase	i	ε	m_{5538}	L	$I(c)_{5538}$	m_{4035}	L	$I(c)_{4035}$
32	12.12.65	00.58	+44.992	55.22	40.72	4.197	−0.021	2.017	0.571	−0.591	56.972
	4.02.66	22.02	−11.713	36.77	40.92	3.547	−0.021	3.689	−0.122	−0.604	108.811
	5.02.66	20.07	+ 5.787	36.45	41.21	3.188	0.000	5.171	−0.516	0.000	157.300
	2.05.66	19.78	−27.059	43.76	38.72	3.970	+0.041	2.662	0.283	+1.233	79.822
33	14.12.65	02.70	+73.049	73.43	42.13	4.731	−0.192	1.052	1.155	−5.177	28.382
	15.12.65	00.35	+85.480	82.30	41.99	5.154	−0.200	0.641	1.570	−5.416	17.500
34	2.05.66	19.75	−27.072	44.03	39.98	4.160	+0.035	2.235	0.475	+1.033	66.897
35	6.10.65	19.34	−43.609	49.81	28.15	4.476	−0.028	1.591	0.787	−0.823	47.385
Aristillus	12.12.65	00.52	+44.971	54.83	28.07	4.200	−0.021	2.012	0.612	−0.569	54.877
	5.01.66	23.42	−17.815	36.46	37.14	3.533	−0.077	3.666	−0.093	−2.179	103.866
	4.02.66	21.93	−11.739	36.04	40.17	3.523	−0.023	3.773	−0.138	−0.681	110.595
	5.02.66	20.03	+ 5,779	35.70	40.45	3.217	0.000	5.031	−0.456	0.000	148.891
	2.05.66	19.65	−27.109	43.96	37.99	3.836	+0.047	3.014	0.170	+1.368	88.786
	3.05.66	19.24	−13.688	37.50	36.70	3.645	+0.031	3.575	−0.045	+0.938	107.165
	5.05.66	21.38	+13.557	35.39	33.26	3.513	−0.051	3.954	−0.101	−1.427	110.653
	6.05.66	20.98	+26.090	39.68	31.77	3.737	−0.122	3.140	0.096	−3.479	90.006
	8.05.66	23.11	+50.894	55.58	30.29	4.388	−0.144	1.647	0.827	−3.829	43.921
	1.08.66	01.94	− 6.041	32.84	28.12	3.503	−0.010	4.082	—	—	—
	1.08.66	20.95	+ 6.980	32.74	28.25	3.282	−0.021	4.999	−0.417	−0.646	151.447
	29.08.66	20.04	−13.528	35.01	28.16	3.600	+0.016	3.720	+0.004	+0.448	102.214
36	6.10.65	19.28	−43.626	47.65	27.73	4.712	−0.022	1.282	1.038	−0.653	37.973
Autolycus	12.12.65	00.50	+44.962	53.56	36.46	4.274	−0.021	1.878	0.714	−0.570	49.895
	5.01.66	23.37	−17.831	33.01	33.81	3.647	−0.070	3.304	0.037	−1.933	92.138
	4.02.66	21.91	−11.747	32.52	36.73	3.611	−0.018	3.502	−0.034	−0.516	100.408
	5.02.66	19.94	+5.757	32.29	36.97	3.288	0.000	4.714	−0.378	0.000	138.562
	2.05.66	19.62	−27.122	40.46	34.49	3.919	+0.043	2.791	0.250	+1.272	82.293
	3.05.66	19.17	−13.718	34.21	33.18	3.740	+0.026	3.272	0.043	+0.769	98.801
	5.05.66	21.17	+13.481	32.15	29.74	3.610	−0.047	3.618	−0.012	−1.315	101.975
	6.05.66	20.96	+26.081	37.11	28.26	3.836	−0.114	2.856	0.109	−3.265	82.252
	8.05.66	23.09	+50.888	54.38	26.76	4.526	−0.131	1.447	0.957	−3.520	38.859
	1.08.66	20.93	+6.976	29.34	24.74	3.361	−0.020	4.407	−0.334	−0.598	140.309
	29.08.66	20.07	−13.520	31.66	24.65	3.663	+0.014	3.508	0.067	+0.376	96.378
37	6.10.65	19.25	−43.633	51.84	23.59	4.324	−0.052	1.814	1.098	−1.019	35.547
Archimedes	8.10.65	23.89	−19.777	40.96	23.57	3.988	−0.046	2.492	0.265	−1,410	77.151
	12.12.65	00.43	+44.936	48.51	35.72	4.380	−0.016	1.705	0.815	−0.425	45.861

	14.12.65	00.52	+72.266	68.16	37.12	5.049	−0.143	0.783	1.493	−3.793	20.796
	15.12.65	00.68	+85.613	78.63	37.21	5.839	−0.106	0.342	2.254	−2.884	9.346
	5.01.66	23.51	−17.778	34.25	32.10	3.750	−0.076	2.994	0.152	−2.087	82.577
	7.01.66	21.97	+10.758	30.28	34.99	3.563	+0.011	3.649	−0.081	+0.323	105.212
	12.01.66	23.39	+79.838	72.07	36.23	5.330	−0.236	0.478	1.800	−6.100	12.438
	4.02.66	21.83	−11.774	33.14	35.50	3.749	−0.022	3.057	0.117	−0.629	87.165
	5.02.66	19.91	+5.750	30.99	36.14	3.404	0.000	4.239	−0.264	0.000	124.721
	6.02.66	02.33	+7.858	34.63	36.68	3.397	0.000	4.267	−0.330	0.000	132.470
	9.02.66	02.32	+48.320	48.01	35.44	4.361	−0.115	1.644	0.745	−3.221	46.014
	11.02.66	00.82	+74.082	66.66	33.89	5.037	−0.290	0.653	1.478	−7.688	17.388
	2.05.66	19.53	−27.153	43.77	34.09	4.114	+0.048	2.344	0.438	+1.403	69.541
	3.05.66	19.15	−13.725	36.25	33.03	3.926	+0.032	2.761	0.207	+0.992	85.260
	4.05.66	18.78	−0.879	31.18	31.81	3.327	0.000	4.750	−0.319	0.000	137.183
		23.80	+1.361	30.55	30.93	3.132	0.000	5.687	−0.573	0.000	173.346
	5.05.66	21.11	+13.461	30.00	30.00	3.731	−0.039	3.196	0.097	−1.098	92.327
	6.05.66	20.85	+26.042	33.35	28.65	3.959	−0.083	2.589	0.320	−2.382	73.665
	8.05.66	00.23	+39.433	41.06	26.76	4.221	−0.091	1.992	0.575	−2.650	57.533
	8.05.66	23.04	+50.873	49.29	27.08	4.548	−0.105	1.438	0.972	−2.818	38.977
	1.08.66	1.82	−6.064	29.79	23.40	3.642	−0.009	3.596	0.230	−0.218	83.426
	1.08.66	20.87	+ 6.960	27.98	24.54	3.491	−0.016	4.123	−0.195	−0.479	123.507
	29.08.66	20.14	−13.503	33.52	24.49	3.796	+0.018	3.102	0.194	+0.502	85.940
38	14.12.65	00.67	+72.318	74.14	33.35	5.418	−0.102	0.559	1.882	−2.649	14.565
	11.02.66	00.95	+74.129	72.45	29.17	5.408	−0.247	0.424	1.890	−6.314	10.881
39	14.12.65	00.49	+72.252	59.13	39.60	5.025	−0.057	0.893	1.464	−1.506	23.890
		01.83	+72.743	59.66	43.17	5.013	−0.057	0.903	1.454	−1.520	24.104
	11.01.66	01.47	+74.307	58.13	41.15	4.945	−0.221	0.805	1.418	−5.690	20.832
	8.05.66	00.28	+39.447	36.31	34.24	4.358	−0.072	1.765	0.690	−2.119	52.022
40	5.05.66	20.73	+13.326	42.32	46.26	4.003	−0.012	2.538	0.345	−0.349	74.140
	29.08.66	19.46	−13.673	51.19	40.52	4.146	+0.021	2.259	—	—	— —
41	11.02.66	01.57	+74.341	42.82	50.44	4.305	−0.241	1.626	0.805	−6.051	40.698
42	3.05.66	19.39	−13 530	63 14	56.97	4.219	+0.047	2.142	0.507	+1.442	65.958
	5.05.66	20.81	+13.353	49.32	55.01	3.853	−0.009	2.930	0.253	−0.253	81.341
	29.08.66	19.38	−13.692	60.64	49.29	4.099	+0.028	2.376	0.541	+0.729	63.477
43	12.12.65	02.92	+45.863	49.01	57.75	4.357	−0.009	1.759	0.810	−0.237	46.394
Sinus Iridum	14.12.65	00.38	+72.211	58.71	59.75	4.743	−0.073	1.165	1.202	−1.917	30.556
	15.12.65	00.75	+85.639	65.81	60.12	5.095	−0.097	0.796	1.604	−2.419	20.009
	5.01.66	23.89	−17.622	58.51	52.33	4.100	−0.099	2.139	0.498	−2.719	59.319
	7.01.66	21.30	+10.514	49.30	56.40	3.683	+0.003	3.285	0.061	+0.093	92.897
		23.74	+11.428	48.98	56.47	3.657	+0.003	3.363	0.046	+0.010	94.156
	12.01.66	23.44	+79.859	—	—	4.915	−0.157	0.896	1.419	−3.925	22.612

Table IVa (Continued)

Region	Date	UT	Phase	i	ε	m_{5538}	L	$I(c)_{5538}$	m_{4035}	L	$I(c)_{4035}$
43	5.02.66	01.81	−10.414	56.07	56.88	4.025	−0.032	2.374	0.424	−0.880	65.867
Sinus Iridum		19.21	+5.592	52.37	57.92	3.541	0.000	3.760	−0.085	0.000	106.765
(Continued)	9.02.66	01.73	+48.110	49.21	58.77	4.370	−0.082	1.674	0.784	−2.234	45.746
	11.02.66	02.20	+74.551	58.69	57.40	4.796	−0.153	1.027	1.299	−3.840	26.046
	3.05.66	19.37	−13.639	60.87	55.99	4.202	+0.042	2.170	0.688	+1.276	55.983
	5.05.66	20.70	+13.313	49.46	53.68	3.884	−0.009	2.744	0.283	−0.231	79.132
	7.05.66	01.78	+27.657	46.44	51.55	4.147	−0.039	2.206	0.569	−1.066	59.992
	7.05.66	22.50	+38.898	46.43	50.89	4.312	−0.062	1.864	0.682	−1.761	53.300
	9.05.66	00.63	+51.348	48.98	50.67	4.539	−0.063	1.503	0.992	−1.644	39.858
	31.07.66	20.50	−7.022	54.95	48.67	3.905	−0.014	2.820	0.278	−0.387	80.332
	1.08.66	21.48	+7.111	49.27	47.81	3.723	−0.007	3.355	0.044	−0.211	99.931
	29.08.66	19.37	−13.696	58.36	47.92	4.071	+0.023	2.430	—	—	—
44	7.05.66	22.56	+38.918	57.90	68.09	3.616	−0.075	3.615	−0.010	−2.119	103.262
45	5.05.66	20.93	+13.298	59.49	64.46	3.494	−0.013	4.075	−0.100	−0.351	111.821
46	9.02.66	02.56	+48.409	48.73	63.92	5.475	−0.028	0.605	1.859	−0.776	17.054
	5.05.66	20.85	+13.368	53.78	59.14	3.238	−0.016	5.156	−0.356	−0.444	141.695
47	9.10.65	00.22	−19.698	64.35	44.97	4.248	−0.150	1.856	0.420	−5.094	63.630
Aristarchus	13.12.65	02.60	+59.460	25.33	56.77	4.218	−0.035	1.975	0.565	−1.011	57.496
	14.12.65	02.22	+72.879	31.62	58.17	4.076	−0.098	2.183	0.503	−2.642	58.885
	15.12.65	01.72	+86.004	40.31	59.18	4.366	−0.115	1.590	0.826	−2.990	42.676
	7.01.66	21.19	+10.474	43.06	53.35	3.434	0.000	4.126	−0.233	0.000	121.635
		21.75	+10.678	— —	—	3.452	0.000	4.058	−0.211	0.000	119.215
		23.88	+11.484	41.98	53.18	3.396	0.000	4.269	−0.287	0.000	127.811
	12.01.66	23.82	+80.015	33.95	60.36	4.283	−0.176	1.713	0.767	−4.488	43.939
	4.02.66	22.47	−11.570	59.30	52.59	3.908	−0.057	2.627	0.209	−1.733	81.893
	5.02.66	19.37	+5.626	50.16	55.08	3.330	0.000	4.563	−0.343	0.000	135.320
	9.02.66	01.80	+48.134	25.06	59.04	3.974	−0.105	2.422	0.332	−3.019	69.754
	3.05.66	19.58	−13.555	67.11	56.27	4.157	+0.072	2.289	0.402	+2.279	73.337
	4.05.66	18.45	−0.994	56.72	56.63	3.303	0.000	4.663	−0.368	0.000	144.761
		21.75	−0.746	—	—	3.013	0.000	6.387	−0.720	0.000	200.820
		23.40	+1.227	54.52	55.65	3.063	0.000	6.064	−0.694	0.000	195.494
	5.05.66	21.54	+13.612	44.90	55.94	3.558	−0.008	3.695	−0.089	−0.217	105.492
	7.05.66	01.20	+27.457	33.96	54.81	3.737	−0.029	3.253	0.053	−0.858	97.416
	7.05.66	22.73	+38.974	27.16	54.75	3.824	−0.062	2.966	0.134	−1.866	89.727
	8.05.66	22.87	+50.820	23.30	54.55	4.106	−0.082	2.252	0.485	−2.304	63.738
	1.08.66	01.35	−6.151	56.98	51.13	3.706	−0.054	3.359	0.045	+1.497	98.549

	29.08.66	23.95	−12.575	62.81	50.24	3.959	+0.047	2.717	0.223	+1.466	85.524
48	13.12.65	02.58	+59.452	25.61	58.85	3.535	−0.066	3.692	−0.155	−1.972	111.740
Aristarchus' Peak	14.12.65	02.26	+72.894	31.14	60.25	3.442	−0.176	3.923	−0.175	−4.932	110.546
	15.12.65	01.74	+86.013	39.32	61.25	3.773	−0.198	2.824	0.160	−5.525	79.393
	7.01.66	21.05	+10.422	45.21	55.43	2.546	0.000	9.336	−1.224	0.000	304.100
		21.63	+10.636	—	—	2.565	0.000	9.180	−1.217	0.000	301.100
		23.85	+11.471	44.68	55.27	2.525	0.000	9.520	−1.252	0.000	311.100
	12.01.66	23.72	+79.974	33.83	62.42	3.539	−0.350	3.394	−0.160	−10.542	103.258
	4.02.66	22.52	−11.554	61.32	54.68	2.958	−0.138	6.274	−0.802	−4.402	202.098
	5.0.266	19.42	+5.637	52.21	57.16	2.502	0.000	9.831	−1.289	0.000	323.800
	9.02.66	01.93	+48.182	26.47	61.10	3.081	−0.241	5.525	−0.398	−5.914	136.560
	3.05.66	19.60	−13.549	69.09	58.31	3.060	+0.197	6.286	−0.684	+6.197	199.493
	4.05.66	18.42	−1.006	58.77	58.69	2.508	0.000	10.153	−1.219	0.000	317.140
		19.13	−0.772	—	—	2.730	0.000	8.280	−0.968	0.000	251.715
		21.73	−0.741	—	—	2.343	0.000	11.821	−1.289	0.000	338.277
		23.37	+1.216	56.57	57.70	2.291	0.000	12.394	−1.363	0.000	362.140
	5.05.66	00.37	+1.560	56.13	57.51	2.355	0.000	11.689	−1.461	0.000	396.264
	5.05.66	21.52	+13.603	46.98	57.98	2.667	−0.017	8.761	−1.052	−0.527	271.423
	7.05.66	01.13	+27.438	36.03	56.82	2.825	−0.059	7.528	−0 874	−1 790	229.007
	7.05.66	22.72	+38.969	29.03	56.76	2.948	−0.139	6.629	−0.793	−4.358	209.847
	8.05.66	22.86	+50.815	24.54	56.57	3.200	−0.189	5.302	−0.528	−5.852	162.308
	1.08.66	01.22	−6.175	59.05	53.17	2.828	−0.123	7.529	−0.921	−3.876	240.232
	1.08.66	21.75	+7.177	42.92	52.99	2.593	0.000	9.512	−1.196	0.000	314.493
	29.08.66	23.90	−12.589	64.81	52.25	2.982	+0.115	6.686	−0.689	+3.397	198.384
49	4.02.66	22.72	−11.491	62.81	56.34	4.044	−0.041	2.323	0.406	−1.170	66.724
	5.02.66	19.55	+5.669	53.80	58.82	3.441	0.000	4.121	−0.209	0.000	119.674
50	4.02.66	22.83	−11.453	62.75	56.63	4.081	−0.040	2.246	0.444	−1.129	64.388
	5.02.66	19.65	+5.690	53.92	59.07	3.493	0.000	3.926	−0.133	0.000	111.599
51	8.05.66	00.12	+39.398	21.16	53.74	4.246	−0.044	2.003	0.565	−1.307	59.952
52	8.05.66	00.07	+39.386	19.56	54.44	4.310	−0.042	1.888	0.620	−1.243	57.014
53	7.05.66	23.93	+39.344	26.40	64.26	3.775	−0.062	3.099	0.146	−1.749	88.313
54	12.12.65	01.01	+45.146	10.72	41.52	3.605	−0.018	3.496	0.008	−0.496	96.537
Kepler	13.12.65	03.11	+59.648	21.03	43.09	4.026	−0.047	2.329	0.380	−1.339	67.504
	14.12.65	01.96	+72.787	31.86	44.70	3.927	−0.129	2.488	0.356	−3.458	66.907
	15.12.65	01.17	+85.800	43.20	45.91	4.192	−0.175	1.876	0.635	−4.626	49.765
	5.01.66	23.62	−17.735	51.44	34.77	3.518	−0.211	3.593	−0.098	−5.912	100.879
	7.01.66	21.51	+10.592	29.08	39.66	3.095	+0.006	5.623	−0.588	+0.173	167.582
	8.01.66	00.03	+11.544	27.82	39.42	3.078	+0.006	5.710	−0.596	+0.173	168.936
	12.01.66	23.58	+79.915	35.42	47.65	4.083	−0.027	1.995	0.552	−6.979	51.647

Table IVa (Continued)

Region	Date	UT	Phase	i	ε	m_{5538}	L	$I(c)_{5538}$	m_{4035}	L	$I(c)_{4035}$
54	4.02.66	22.29	−11.626	47.55	38.64	3.456	−0.058	3.989	−0.232	−1.733	119.469
Kepler	5.02.66	18.88	+5.522	37.50	41.37	3.058	0.000	5.839	−0.630	0.000	175.100
(Continued)	9.02.66	02.08	+48.236	10.74	46.22	3.613	−0.154	3.351	−0.033	−4.431	96.705
	2.05.66	19.12	−27.311	68.58	42.94	4.035	+0.100	2.586	0.315	+3.067	79.509
	3.05.66	19.78	−13.478	56.24	43.72	3.565	+0.086	3.905	−0.126	+2.584	116.848
	4.05.66	18.58	−0.941	44.89	44.58	2.945	0.000	6.768	−0.729	0.000	200.400
		23.48	+1.255	42.47	43.72	2.754	0.000	8.075	−0.973	0.000	250.400
	5.05.66	00.45	+1.591	41.98	43.54	2.798	0.000	7.750	−0.919	0.000	238.701
	5.05.66	21.68	+13.661	31.58	44.47	3.195	−0.016	5.363	−0.453	−0.455	154.911
	7.05.66	01.02	+27.401	18.68	43.91	3.398	−0.074	4.387	−0.207	−2.056	121.753
	7.05.66	23.87	+39.324	10.38	43.99	3.513	−0.118	3.892	−0.132	3.387	112.151
	8.05.66	22.95	+50.844	11.06	43.93	3.746	−0.121	3.123	0.197	−3.170	82.703
	31.07.66	20.28	−7.067	42.84	41.92	3.332	−0.026	4.772	−0.336	−0.763	140.478
	1.08.66	21.62	+7.144	35.71	40.69	3.094	−0.009	5.964	−0.590	−0.258	178.317
	29.08.66	23.60	−12.669	52.35	40.04	3.563	+0.045	3.884	−0.021	+1.220	105.754
55	9.10.65	00.27	−19.677	52.59	33.06	3.733	−0.132	3.083	0.023	−4.015	94.336
Kepler's ray system	12.12.65	01.02	+45.152	10.51	40.15	3.752	−0.016	3.055	0.191	−0.420	81.532
	14.12.65	02.07	+72.826	32.59	43.26	4.128	−0.107	2.069	0.557	−2.873	55.567
	15.12.65	01.57	+85.952	44.21	44.60	4.324	−0.155	1.661	0.769	−4.089	43.986
	5.01.66	23.65	−17.721	50.32	33.52	3.640	−0.189	3.413	0.023	−5.286	90.178
	7.01.66	21.58	+10.618	27.81	38.37	3.245	+0.005	4.886	−0.423	+0.148	144.685
	8.01.66	00.08	+11.564	26.60	38.14	3.210	+0.005	5.051	−0.453	+0.152	155.003
	12.01.66	23.68	+79.960	36.18	46.42	4.171	−0.248	1.841	0.618	−6.567	48.573
	4.02.66	22.33	−11.613	46.38	37.35	3.597	−0.051	3.502	−0.066	−1.488	102.596
	5.02.66	18.96	+5.539	36.25	40.09	3.202	0.000	5.119	−0.453	0.000	148.700
	9.02.66	02.10	+48.242	10.19	45.00	3.749	−0.136	2.957	0.128	−3.823	83.238
	2.05.66	19.20	−27.279	67.49	41.70	4.285	+0.079	2.044	0.591	+2.378	61.660
	3.05.66	19.85	−13.453	55.11	42.53	3.754	+0.072	3.277	0.071	+2.155	97.850
	4.05.66	18.67	−0.918	43.72	43.43	3.035	0.000	6.233	−0.623	0.000	181.644
		23.50	+1.260	41.32	42.57	2.869	0.000	7.261	−0.848	0.000	223.636
	5.05.66	21.75	+13.683	30.32	43.37	3.350	−0.014	4.653	−0.273	−0.386	130.568
	7.05.66	01.08	+27.422	71.30	42.83	3.545	−0.065	3.832	−0.059	−1.795	106.228
	7.05.66	23.88	+39.329	8.63	42.94	3.661	−0.103	3.394	0.025	−2.931	97.048
	8.05.66	22.96	+50.847	10.90	42.88	3.884	−0.106	2.745	0.316	−2.842	73.798
	31.07.66	20.35	−7.053	47.22	40.90	3.474	−0.023	4.188	−0.190	−0.667	122.791
	1.08.66	21.68	+7.161	34.54	39.69	3.219	−0.008	5.321	−0.475	−0.232	160.446

	29.08.66	23.63	−12.660	51.27	39.03	3.660	+0.041	3.551	+0.052	+1.144	98.846
56	2.05.66	19.30	−27.241	68.36	42.43	4.414	+0.070	1.816	0.715	+2.121	55.025
	3.05.66	19.98	−13.402	55.93	43.29	3.749	+0.073	3.295	0.089	+2.119	96.191
	29.08.66	23.72	−12.636	52.14	40.03	3.721	+0.039	3.359	0.127	+1.068	92.268
57	2.05.66	19.22	−27.270	66.70	41.39	4.310	+0.077	1.998	0.622	+2.311	59.931
	3.05.66	19.97	−13.408	54.48	42.13	3.768	+0.072	3.235	0.098	+2.101	95.409
	29.08.66	23.79	−12.618	50.58	38.27	3.741	+0.038	3.296	0.151	+1.044	90.220
58	2.05.66	19.33	−27.229	70.47	45.49	4.531	+0.063	1.575	0.779	+2.001	51.901
	3.05.66	19.90	−13.434	58.43	46.22	3.961	+0.060	2.708	0.234	+1.854	84.180
59	12.12.65	03.22	+45.987	23.90	68.21	4.340	−0.007	1.800	0.714	−0.207	51.497
Grimaldi	13.12.65	02.72	+59.502	12.91	69.87	4.561	−0.022	1.453	0.911	−0.648	42.474
	15.12.65	01.62	+85.967	14.20	72.77	4.612	−0.074	1.333	1.030	−2.015	36.651
	7.01.66	21.33	+10.526	57.78	66.84	3.767	0.000	3.056	0.088	0.000	91.854
	7.01.66	23.52	+11.340	56.67	66.53	3.699	0.000	3.254	0.029	0.000	96.979
	13.01.66	00.17	+80.157	7.38	75.29	4.460	−0.122	1.449	0.913	−3.194	39.798
	5.02.66	01.88	−10.385	74.77	65.20	4.444	−0.035	1.612	0.792	−1.012	47.154
	5.02.66	20.33	+5.853	65.52	68.04	3.641	0.000	3.452	−0.043	0.000	104.345
	9.02.66	02.98	+48.566	26.28	73.88	4.233	−0.075	1.929	0.578	−2.173	56.724
	3.05.66	20.17	−13.333	85.54	72.22	5.221	+0.042	0.884	1.548	+1.227	26.397
	4.05.66	18.55	−0.958	74.28	73.68	3.569	0.000	3.849	−0.104	0.000	114.720
		21.83	−0.765	72.63	73.28	3.292	0.000	4.957	−0.416	0.000	153.322
	5.05.66	00.05	+1.448	71.52	72.94	3.320	0.000	4.842	−0.411	0.000	152.600
	5.05.66	21.65	+13.649	60.66	74.29	3.804	−0.003	3.089	0.135	−0.088	92.174
	7.05.66	00.88	+27.359	47.00	74.33	4.026	−0.020	2.503	0.411	−0.548	71.031
	8.05.66	00.42	+39.486	35.27	74.68	4.080	−0.047	2.362	0.429	−1.335	68.421
	9. 5.66	00.07	+51.181	23.65	74.38	4.259	−0.063	1.977	0.666	−1.732	55.000
	31. 7.66	20.38	−7.046	78.30	73.02	4.083	−0.086	2.336	0.403	−2.553	70.418
	1. 8.66	21.83	+7.198	65.50	71.89	3.767	0.000	3.244	0.035	0.000	102.334
60	9.10.65	00.55	−19.577	36.25	16.70	3.436	−0.123	4.098	−0.293	−3.799	127.333
Copernicus	12.12.65	01.12	+45.185	26.17	26.64	3.573	−0.020	3.595	−0.011	−0.555	97.478
	13.12.65	01.25	+58.972	37.56	28.36	3.879	−0.079	2.661	0.316	−2.093	70.663
	14.12.65	02.15	+72.855	49.68	29.63	3.936	−0.226	2.364	0.351	−6.154	64.296
	15.12.65	01.00	+85.736	60.96	30.63	4.476	−0.232	1.343	0.930	−6.070	35.151
	5.01.66	23.54	−17.765	34.67	19.89	3.274	−0.181	4.578	−0.354	−5.128	129.372
	7.01.66	21.69	+10.657	14.92	24.88	3.090	+0.012	5.641	−0.550	+0.332	161.443
	8.01.66	00.27	+11.638	14.13	24.78	3.028	+0.012	5.976	−0.631	+0.358	173.958
	12.01.66	23.53	+79.898	53.16	31.77	4.144	−0.422	1.713	0.575	−11.301	45.871
	4.02.66	22.11	−11.684	30.99	24.32	3.326	−0.056	4.500	−0.310	−1.597	128.146

Table IVa (Continued)

Region	Date	UT	Phase	i	ε	m_{5538}	L	$I(c)_{5538}$	m_{4035}	L	$I(c)_{4035}$
60	5.02.66	19.00	+5.548	21.70	26.66	3.008	0.000	6.098	−0.632	0.000	174.866
Copernicus	9.02.66	02.18	+48.272	24.83	30.36	3.634	−0.155	3.281	0.027	−4.293	91.128
(Continued)	11.01.66	02.15	+74.535	46.46	31.03	4.077	−0.444	1.844	0.525	−11.717	48.612
	3.05.66	20.82	−13.091	38.57	27.39	3.513	+0.075	4.072	−0.150	+2.067	118.687
	4.05.66	23.97	+1.419	25.72	27.02	2.743	0.000	8.142	−0.945	0.000	243.117
	7.05.66	01.85	+27.668	10.85	26.53	3.417	−0.094	4.275	−0.166	−2.564	116.295
	8.05.66	23.01	+50.862	26.87	26.54	3.768	−0.119	3.048	0.210	−3.213	80.985
	1.08.66	21.57	+7.132	20.95	23.20	3.004	−0.016	6.463	−0.664	−0.480	190.073
	29.08.66	23.50	−12.695	35.13	22.52	3.329	+0.044	4.796	−0.254	+1.201	130.361
61	13.12.65	01.34	+59.005	35.19	29.82	3.712	−0.085	3.094	0.096	−2.379	86.704
	15.12.65	01.04	+85.752	58.43	32.22	4.288	−0.231	1.643	0.675	−6.447	45.796
62	12.12.65	01.18	+45.209	66.33	28.53	3.749	−0.016	3.062	0.158	−0.432	83.696
63	7.05.66	22.65	+38.947	49.03	71.25	4.169	−0.043	2.168	0.563	−1.191	61.080
64	7.05.66	23.80	+39.304	37.04	68.65	4.029	−0.049	2.466	0.407	−1.375	70.433
65	7.05.66	23.88	+39.359	36.15	74.16	3.563	−0.075	3.800	−0.082	−2.158	110.493
66	7.05.66	00.95	+27.380	56.41	83.77	3.411	−0.032	4.424	−0.171	−0.878	121.451
	8.05.66	00.43	+39.491	44.67	84.10	3.460	−0.083	4.175	−0.156	−2.308	118.284
67	8.05.66	00.51	+39.513	40.02	75.28	3.175	−0.107	5.430	−0.428	−2.967	152.199
68	8.05.66	00.58	+39.535	50.57	78.18	3.459	−0.083	4.181	−0.146	−2.288	117.157
69	8.05.66	00.68	+39.562	60.46	77.76	3.561	−0.075	3.806	−0.048	−2.091	107.135
70	13.12.65	02.80	+59.533	29.81	39.76	4.843	−0.022	1.101	1.178	−0.642	32.293
	5.02.66	02.03	−10.326	46.11	35.78	4.223	−0.029	1.970	0.574	−0.825	56.852
	5.02.66	20.47	+5.886	38.29	38.29	3.735	0.000	3.129	0.047	0.000	93.936
	11.02.66	01.75	+74.403	38.15	47.28	4.731	−0.201	1.053	1.166	−5.363	28.128
	6.05.66	01.48	+14.934	33.68	46.42	3.923	−0.009	2.736	0.233	−0.258	82.335
	30.08.66	00.25	−12.492	53.70	46.70	4.168	+0.026	2.221	0.549	+0.724	62.282
71	13.12.65	02.90	+59.570	24.75	41.40	4.326	−0.035	1.781	0.670	−1.026	51.649
	11.02.66	01.70	+74.386	31.56	50.53	4.176	−0.271	1.822	0.625	−7.139	48.030
	9.05.66	00.77	+51.381	19.18	48.68	4.522	−0.057	1.530	0.906	−1.606	42.960
	30.08.66	00.15	−12.520	55.08	46.87	3.811	+0.036	3.086	0.225	+0.976	84.300
72	9.05.66	00.82	+51.395	31.30	36.96	3.749	−0.123	3.102	0.219	−3.186	80.265
73	6.10.65	23.21	−42.421	59.42	28.14	4.068	−0.085	2.277	0.421	−2.443	65.593
	11.02.66	01.98	+74.480	50.73	29.35	4.888	−0.236	0.846	1.344	−6.175	22.130
74	9.05.66	00.83	+51.400	28.00	35.17	4.287	−0.077	1.888	0.707	−2.086	51.179
75	9.05.66	00.45	+51.291	39.69	30.92	4.185	−0.123	2.035	0.645	−3.203	53.250
76	11.02.66	01.88	+74.447	43.47	34.37	4.355	−0.284	1.491	0.806	−7.470	39.302
	9.05.66	00.88	+51.414	25.72	35.31	4.093	−0.092	2.257	0.539	−2.435	59.770

77	11.01.66	00.67	+74.028	62.49	17.48	4.632	−0.449	0.930	1.092	−11.709	24.450
78	11.02.66	00.63	+74.016	63.58	16.09	4.662	−0.437	0.903	1.136	−11.242	23.476
79	11.02.66	00.53	+73.980	63.87	11.90	4.818	−0.379	0.782	1.292	−9.739	20.334
80	9.05.66	00.98	+51.442	29.75	22.34	4.157	−0.104	2.111	0.609	−2.740	55.612
81	9.05.66	01.02	+51.451	19.42	33.71	4.441	−0.069	1.637	0.852	−1.870	44.796
82	9.05.66	00.90	+51.418	24.64	33.46	4.594	−0.058	1.425	0.970	−1.637	40.230
83	6.02.66	01.32	+7.438	14.84	07.40	3.359	0.000	4.412	−0.387	0.000	138.832
	11.01.66	00.48	+73.962	70.88	10.18	5.111	−0.325	0.560	1.572	−8.466	14.776
84	15.12.65	00.57	+85.567	77.00	20.73	6.499	−0.058	0.186	2.886	−1.612	5.210
85	15.12.65	00.43	+85.510	73.75	25.00	5.886	−0.093	0.336	2.299	−2.526	9.186
86	14.12.65	02.46	+72.952	78.88	22.14	4.648	−0.290	1.053	1.081	−7.761	28.117
	5.02.66	01.45	−10.552	16.12	23.96	3.397	−0.017	4.243	−0.229	−0.482	119.956
	7.05.66	01.67	+27.609	34.26	12.15	3.670	−0.180	3.286	0.092	−4.870	88.793
	30.08.66	00.81	−12.329	13.59	11.05	3.291	+0.015	4.712	−0.288	+0.417	133.744
87	14.12.65	02.51	+72.982	75.79	21.11	4.616	−0.256	1.126	1.026	−6.997	31.752
	11.02.66	00.27	+73.882	72.61	16.56	5.599	−0.207	0.355	2.027	−5.565	9.568
	7.05.66	01.72	+27.627	31.42	11.06	4.420	−0.082	1.654	0.777	−2.344	47.528
	30.08.66	00.83	−12.322	14.30	08.93	3.944	+0.008	2.699	0.342	+0.234	74.786
88	12.12.65	03.09	+45.933	52.75	39.29	3.517	−0.027	3.798	−0.112	−0.776	107.888
Centre of Tycho	5.02.66	02.09	−10.302	45.51	38.37	3.026	−0.055	5.965	−0.624	−1.599	172.702
	6.02.66	01.12	+7.359	42.94	38.50	2.583	0.000	9.051	−1.187	0.000	292.900
	9.02.66	03.03	+48.585	50.52	42.45	4.756	−0.069	1.155	−0.223	−6.757	113.985
	3.05.66	20.98	−13.030	50.54	43.94	3.013	+0.094	6.351	−0.654	+2.741	189.841
	5.05.66	00.10	+1.466	45.65	46.01	2.465	0.000	10.531	−1.271	0.000	330.900
	6.05.66	01.42	+14.910	43.66	47.84	2.829	−0.052	7.488	−0.818	−1.487	216.513
	7.05.66	00.83	+27.344	45.10	49.44	3.050	−0.163	5.992	−0.563	−4.535	167.865
	8.05.66	00.82	+39.604	47.97	50.80	3.242	−0.207	4.955	−0.412	−5.994	144.006
	9.05.66	00.13	+51.200	53.17	50.39	3.538	−0.204	3.960	−0.60	−5.599	102.869
	1.08.66	02.00	−6.029	48.49	51.60	2.832	−0.037	7.576	−0.870	−1.114	235.464
	1.08.66	21.88	+7.211	46.18	51.48	2.702	−0.024	8.560	−0.991	−0.722	257.199
89	12.12.65	03.12	+45.943	53.50	40.22	3.460	−0.029	3.996	−0.159	−0.810	112.467
	5.02.66	02.20	−10.259	46.40	39.39	3.361	−0.041	4.380	−0.248	−1.131	122.103
	6.02.66	01.23	+7.405	43.92	39.46	2.888	0.000	6.839	−0.858	0.000	116.400
90	8.05.66	00.75	+39.584	71.94	79.06	3.526	−0.117	3.860	0.099	−3.287	109.547
91	9.05.66	00.23	+51.229	48.58	37.79	3.761	−0.360	2.834	0.166	−9.868	77.764
92	9.05.66	00.17	+51.210	53.10	41.37	3.300	−0.335	4.542	−0.297	−0.198	125.161
93	9.05.66	00.35	+51.262	60.12	41.98	4.015	−0.285	2.242	0.413	−7.865	62.260
94	9.05.66	00.30	+51.248	62.26	45.96	4.099	−0.264	2.074	0.533	−7.042	55.758
95	9.05.66	00.37	+51.267	62.64	42.08	4.112	−0.331	1.981	0.558	−8.732	52.603
96	9.05.66	00.47	+51.296	64.64	38.69	4.252	−0.291	1.741	0.668	−7.893	47.568

Table IVa (Continued)

Region	Date	UT	Phase	i	ε	m_{5538}	L	$I(c)_{5538}$	m_{4035}	L	$I(c)_{4035}$
97	8.05.66	01.20	+39.716	59.28	36.69	3.933	−0.318	2.403	0.302	−9.009	68.539
98	8.05.66	01.18	+39.711	62.85	40.97	4.084	−0.277	2.091	0.451	−7.854	59.708
99	8.05.66	01.13	+39.696	63.16	40.05	4.063	−0.282	2.132	0.429	−8.014	60.918
100	8.05.66	01.35	+39.760	68.10	52.92	4.052	0.285	2.162	0.435	−7.975	61.097
101	8.05.66	01.32	+39.752	71.07	57.90	4.145	−0.262	1.984	0.510	−7.439	57.012
102	7.05.66	00.67	+27.292	56.33	39.90	3.727	−0.287	3.008	0.149	−7.760	81.433
	8.05.66	01.05	+39.672	66.80	39.88	4.159	−0.339	1.872	0.524	−9.624	53.535
103	7.05.66	00.62	+27.276	58.70	40.87	3.729	−0.287	3.002	0.149	−7.759	81.427
	8.05.66	01.09	+39.684	69.18	42.07	4.248	−0.312	1.723	0.603	−8.951	49.808
104	6.10.65	18.90	−43.726	66.35	46.90	5.188			1.508		
Centre of Plato		22.27	−42.753			5.080			—		
		22.61	−42.637			5.074			1.392		
		23.11	−42.458			5.016			1.333		
		23.59	−42.275	65.14	46.40	5.047			1.321		
		means	−42.770			5.081	−0.025	0.922	1.388	−0.753	27.552
	8.10.65	23.93	−19.779	55.04	46.66	4.289	−0.041	1.898	0.595	−1.221	57.614
	12.12.65	00.30	+44.891	60.48	59.00	4.612			1.105		
		00.80	+45.071			4.636			1.098		
		02.86	+45.840	61.02	59.21	4.644			1.079		
		means	+45.267			4.631	−0.011	1.358	1.094	−0.292	35.595
	12.12.65	22.16	+57.786	65.72	59.86	4.930			1.359		
		22.92	+58.099			4.788			1.206		
	13.12.65	00.28	+58.622			4.825			1.241		
		01.39	+59.023			4.958			1.361		
		02.35	+59.368			5.073			1.470		
		03.21	+59.685	66.66	60.06	5.232			1.623		
		means	+58.764			4.968	−0.043	0.974	1.378	−1.162	26.696
	14.12.65	00.12	+72.108	72.25	60.34	5.350			1.825		
		00.23	+72.154			5.280			1.747		
		01.78	+72.725			5.262			1.707		
		02.33	+72.920	72.86	60.70	5.321			1.672		
		means	+72.477			5.281	−0.085	0.667	1.738	−2.182	17.691

15.12.65	00.22	+85.426	79.23	60.38	5.968			2.418		
	00.60	+85.580			5.915			2.337		
	00.82	+85.665			5.922			2.353		
	01.43	+85.900			5.966			2.432		
	01.83	+86.046			5.937			2.375		
	02.55	+86.301			5.955			2.392		
	03.07	+86.481	80.08	60.43	5.963			2.397		
	means	+85.914			5.947	−0.084	0.326	2.386	−2.220	8.702
5.01.66	23.14	−17.922	56.47	55.15	4.071			0.451		
	23.73	−17.687	56.40	55.15	4.069			0.454		
	means	−17.804			4.070	−0.064	2.252	0.452	−1.780	62.922
7.01.66	20.80	+10.330	—	—	3.747			0.109		
	21.52	+10.590			3.637			0.105		
	22.03	+10.782			3.739			0.116		
	22.25	+10.862			3.740			0.112		
	means	+10.634			3.716	+0.007	3.191	0.110	+0.182	88.856
7.01.66	23.67	+11.398	—	—	3.718			0.095		
8.01.66	00.38	+11.686			3.714			0.092		
	00.85	+11.867	—	—	3.719			0.094		
	means	+11.654			3.717	+0.007	3.184	0.103	+0.182	90.264
12.01.66	23.28	+79.791	75.23	59.21	5.542			2.025		
	23.95	+80.070			5.525			2.019		
13.01.66	00.25	+80.190	75.51	59.10	5.520			2.017		
	means	+80.017			5.887	−0.172	0.425	2.020	−4.356	10.927
4.02.66	21.48	−11.882	55.94	58.69	3.981			0.347		
	21.67	−11.821			3.981			0.398		
	22.93	−11.421			3.987			0.319		
	means	−11.708			3.983	−0.021	2.482	0.334	−0.588	71.879
5.02.66	01.25	−10.627			4.012			0.384		
	01.68	−10.466			4.024			0.406		
	02.52	−10.129	55.43	59.29	4.041			0.453		
	means	−10.407			4.027	−0.021	2.383	0.414	−0.546	66.825

Table IVa (Continued)

Region	Date	UT	Phase	i	ε	m_{5538}	L	$I(c)_{5538}$	m_{4035}	L	$I(c)_{4035}$
104	5.02.66	18.81	+5.509	54.28	59.43	3.659			0.046		
Centre of Plato		19.13	+5.576			3.587			−0.055		
(Continued)		19.75	+5.713			3.559			−0.094		
		20.27	+5.836			3.592			−0.059		
		20.58	+5.915			3.658			0.028		
		means	+5.710			3.611	0.000	3.528	0.069	+0.010	101.415
	6.02.66	01.05	+7.334			3.523			−0.177		
		01.93	+7.688			3.554			−0.150		
		02.20	+7.800			3.564			−0.130		
		02.52	+7.837	54.04	59.97	3.589			−0.097		
		means	+7.690			3.558	0.000	3.704	−0.138	+0.010	112.214
	9.02.66	01.58	+48.056	60.69	58.63	4.622			1.027		
		02.25	+48.296			4.596			1.013		
		02.87	+48.526			4.624			1.034		
		03.18	+48.642	61.01	58.39	4.615			1.016		
		means	+48.380			4.637	−0.084	1.314	1.022	−2.301	35.651
	10.02.66	23.80	+73.705	71.60	56.88	5.253			1.698		
	11.02.66	00.75	+74.058			5.257			1.712		
		01.33	+74.262			5.280			1.750		
		02.30	+74.584	72.28	56.46	5.308			1.790		
		means	+74.152			5.274	−0.186	0.577	1.738	−4.847	15.109
	2.05.66	18.97	−27.369	62.02	57.35	4.474			0.762		
		19.47	−27.178			4.440			0.735		
		19.90	−27.015			4.433			0.749		
		20.58	−26.760	61.67	57.18	4.423			0.723		
		means	−27.080			4.442	+0.042	1.749	0.742	+1.262	53.233

3.05.66	19.05	−13.765	57.35	56.22	4.188			0.453		
	19.28	−13.672			4.176			0.443		
	19.72	−13.504			4.131			0.406		
	20.33	−13.272			4.158			0.432		
	20.72	−13.128			4.091			0.367		
	21.33	−12.902	56.96	55.84	4.017			0.329		
	means	−13.374			4.149	+0.031	2.315	0.405	+0.965	71.886
4.05.66	18.33	−1.037	53.71	54.01	3.542	0.000	3.919	−0.117	0.000	114.706
	18.72	−0.901			3.518	0.000	4.004	−0.136	0.000	116.719
	21.60	−0.710			3.349	0.000	4.675	−0.324	0.000	138.905
	21.88	−0.777			3.339	0.000	4.727	−0.330	0.000	139.775
	23.28	+1.186			3.313	0.000	4.837	−0.375	0.000	145.643
	23.60	+1.294			3.315	0.000	4.827	−0.365	0.000	144.337
	23.90	+1.396			3.337	0.000	4.733	−0.348	0.000	142.018
5.05.66	00.23	+1.513			3.347	0.000	4.693	−0.345	0.000	141.662
	00.53	+1.621			3.357	0.000	4.649	−0.336	0.000	140.494
	00.78	+1.713	53.67	53.95	3.369	0.000	4.601	−0.326	0.000	139.164
5.05.66	20.62	+13.283	52.77	53.07	3.976			0.343		
	20.97	+13.410			3.954			0.330		
	21.42	+13.569			3.942			0.319		
	21.78	+13.695	52.75	52.88	3.945			0.314		
	means	+13.489			3.954	−0.020	2.624	0.326	−0.589	75.237
6.05.66	00.25	+14.510	52.75	52.52	3.960			0.326		
	01.20	+14.833			3.950			0.311		
	01.57	+14.967			3.951			0.308		
	0.185	+15.067	52.76	52.37	3.967			0.335		
	means	+14.844			3.957	−0.020	2.633	0.320	−0.596	76.071
6.05.66	20.79	+26.019	53.49	51.56	—			0.580		
	21.32	+26.211			4.211			0.576		
	21.62	+26.317	53.56	51.43	4.207			0.577		
7.05.66	00.33	+27.188	53.77	51.03	4.240			0.634		
	01.23	+27.470			4.268			0.673		
	01.50	+27.555			4.272			0.682		
	01.78	+27.647	53.89	50.90	4.288			0.691		
	means	+26.915			4.243	−0.060	1.984	0.630	−1.680	56.087

Table IVa (Continued)

Region	Date	UT	Phase	i	ε	m_{5538}	L	$I(c)_{5538}$	m_{4035}	L	$I(c)_{4035}$
104	7.05.66	22.43	+38.874	56.33	49.90	4.502			0.856		
Centre of Plato		22.92	+39.033			4.515			0.873		
(Continued)		23.33	+39.162			4.490			0.846		
		23.70	+39.274	56.53	49.72	4.491			0.862		
	8.05.66	00.20	+39.423	56.61	49.66	4.494			0.860		
		00.33	+39.462			4.491			0.855		
		00.87	+39.621			4.515			0.874		
		01.47	+39.797	56.80	49.54	4.518			0.887		
		means	+39.331			4.502	−0.070	1.546	0.864	−1.939	44.648
	8.05.66	22.77	+50.786	60.73	50.02	4.854			1.282		
		23.17	+50.912			4.844			1.281		
		23.43	+50.993	60.85	49.99	4.825			1.261		
	9.05.66	00.02	+51.166	60.99	49.96	4.817			1.262		
		00.63	+51.341			4.812			1.241		
		01.11	+51.477			4.804			—		
	9.05.66	01.33	+51.540	61.26	49.85	4.802			1.242		
		means	+51.174			4.823	−0.068	1.141	1.262	−1.815	30.595
	3.07.66	20.55	+12.812	51.30	48.69	3.962			0.357		
		20.86	+12.901			3.941			0.368		
		20.98	+12.937	51.30	48.67	3.945			0.375		
		means	+12.883			3.949	−0.015	2.713	0.367	−0.392	74.218

31.07.66	20.22	−7.079	53.28	48.22	3.966			0.338		
	20.53	−7.016	53.25	48.20	3.924			0.277		
1.08.66	01.12	−6.194	52.70	47.65	3.922			0.269		
	01.44	−6.134			3.901			0.269		
	01.75	−6.077	52.64	47.57	3.885			0.258		
	means	−6.500			3.920	−0.013	2.778	0.282	−0.386	80.100
1.08.66	20.82	+6.947	51.22	47.70	3.762			0.083		
	21.04	+7.002			3.738			0.054		
	21.45	+7.103			3.762			0.073		
	22.00	+7.240			3.780			0.086		
	22.08	+7.262	51.18	47.59	3.792			0.094		
	means	+7.111			3.766	−0.009	3.213	0.076	−0.279	96.709
29.08.66	19.28	−13.718	55.03	47.65	4.026			0.469		
	19.48	−13.667			4.072			0.502		
	19.97	−13.546			4.098			0.514		
	20.21	−13.487			4.077			0.599		
	20.60	−13.394			4.099			0.515		
	23.44	−12.710	54.31	47.18	4.136			0.550		
30.08.66	00.00	−12.561			4.076			0.505		
	00.57	−12.401			4.003			0.430		
	00.96	−12.284	54.17	47.10	3.904			0.338		
	means	−13.085			4.055	+0.014	2.469	0.480	+0.386	66.865

TABLE IVb

Arbitrary photoelectric intensity data measured instantaneously at the three wavelengths 4765, 7922 and 6692 Å

Region	Date	UT	Phase	m_{4765}	L	$I(c)_{4765}$	m_{7922}	L	$I(c)_{7922}$	m_{6692}	L	$I(c)_{6692}$	L_0
1	6.10.65	23.02	−42.492	4.792	−0.008	1.219	2.776	−0.054	7.749	6.504	−0.002	0.249	−2.442
Mare Crisium	7.01.66	22.12	+10.816	3.883	+0.031	2.778	2.395	+0.121	10.861	6.096	+0.004	0.358	−1.337
	8.01.66	00.72	+11.825	3.989	+0.028	2.524	2.457	+0.114	10.250	6.184	+0.004	0.332	−1.657
	5.02.66	02.37	−10.191	3.892	−0.006	2.735	2.283	−0.024	11.933	6.072	−0.001	0.364	−2.784
	6.02.66	01.58	+7.544	3.469	+0.004	4.045	2.122	+0.014	13.902	5.840	0.000	0.451	−0.408
	3.05.66	21.15	−12.969	3.935	+0.003	2.741	2.416	+0.011	11.051	6.120	0.000	0.365	3.736
	4.05.66	23.73	+1.339	3.179	0.000	5.519	1.813	0.000	19.270	5.509	0.000	0.640	4.410
	6.05.66	01.65	+14.994	4.139	−0.099	2.175	2.706	−0.374	8.089	6.462	−0.012	0.256	4.826
	7.05.66	01.55	+27.571	5.009	−0.132	0.891	3.501	−0.529	3.541	7.282	−0.016	0.109	5.190
	7.05.66	23.48	+39.208	6.621	−0.035	0.195	5.204	−0.129	0.721	9.064	−0.004	0.025	5.653
	1.08.66	01.54	−6.116	3.725	0.000	3.380	2.230	0.000	13.266	5.961	0.000	0.429	2.549
	1.08.66	21.13	+7.025	3.719	−0.052	3.346	2.259	−0.200	12.730	6.001	−0.006	0.408	2.554
	29.08.66	19.58	−13.641	3.826	+0.021	3.059	2.326	+0.082	12.118	6.072	+0.003	0.386	2.705
2	6.10.65	22.84	−42.555	3.446	−0.033	4.208	1.793	−0.153	19.140	5.544	−0.005	0.605	−2.418
3	6.05.66	00.78	+14.689	4.147	−0.099	2.159	2.716	−0.369	8.022	6.479	−0.012	0.250	4.965
4	6.05.66	00.82	+14.701	3.889	−0.106	2.736	2.416	−0.410	10.600	6.175	−0.013	0.333	4.960
5	6.05.66	00.89	+14.727	3.722	−0.123	3.200	2.274	−0.468	12.089	6.021	−0.015	0.384	4.947
6	6.05.66	00.95	+14.747	3.353	−0.173	4.490	1.889	−0.669	17.283	5.632	−0.021	0.550	4.937
7	6.05.66	00.68	+14.655	3.652	−0.208	3.357	2.192	−0.797	12.798	5.945	−0.025	0.404	4.983
8	6.05.66	21.39	+26.238	4.628	−0.244	1.207	3.227	−0.886	4.351	6.954	−0.029	0.139	5.999
9	6.05.66	21.54	+26.291	3.724	−0.560	2.782	2.227	−2.224	10.924	5.944	−0.072	0.357	5.974
10	12.12.65	22.56	+57.954	7.347	−0.012	0.100	5.855	−0.046	0.396	9.613	−0.001	0.013	2.508
11	12.12.65	27.39	+57.884	6.935	−0.013	0.151	5.421	−0.054	0.604	9.233	−0.002	0.017	2.523
	6.05.66	00.64	+14.641	3.951	−0.079	2.607	2.501	−0.300	9.887	6.258	−0.009	0.312	4.990
12	7.01.66	22.18	+10.837	3.927	−0.024	2.600	2.476	−0.092	9.840	6.164	−0.003	0.328	−1.344
	8.01.66	00.67	+11.804	3.945	−0.024	2.555	2.451	−0.094	10.068	6.182	−0.003	0.324	−1.652
13	6.05.66	00.45	+14.577	4.056	−0.072	2.367	2.658	−0.259	8.555	6.420	−0.008	0.268	5.024
14	12.12.65	22.79	+58.049	6.277	−0.028	0.272	4.792	−0.109	1.068	8.590	−0.003	0.033	2.486
15	12.12.65	22.32	+57.853	5.689	−0.042	0.473	4.185	−0.170	1.891	7.978	−0.005	0.057	2.529
	6.05.66	00.55	+14.000	3.941	−0.056	2.646	2.525	−0.205	9.743	6.278	−0.006	0.308	5.006
	8.05.66	23.29	+50.950	5.237	−0.182	0.640	3.737	0.727	2.538	7.524	−0.022	0.078	5.406
16	12.12.65	22.24	+57.821	5.848	−0.014	0.430	4.346	−0.055	1.721	8.149	−0.002	0.051	2.535
Mare	11.02.66	00.42	+73.938	7.583	−0.002	0.089	6.168	−0.008	0.324	9.949	0.000	0.010	8.242
Tranquilitatis	5.05.66	00.72	+1.689	3.389	0.000	4.323	2.056	0.000	15.311	5.749	0.000	0.510	4.265

16	6.05.66	00.52	+14.599	4.081	−0.049	2.324	2.666	−0.180	8.566	6.418	−0.006	0.270	5.012
Mare Tranquilitatis	7.05.66	01.55	+27.595	4.537	−0.090	1.473	3.046	−0.357	5.803	6.815	−0.011	0.180	5.176
(Continued)	8.05.66	23.22	+50.927	5.400	−0.158	0.550	3.905	−0.625	2.167	7.692	−0.019	0.066	5.409
	1.08.66	01.65	−6.096	3.863	−0.005	2.934	2.444	−0.020	10.835	6.155	−0.001	0.356	2.534
	1.08.66	21.27	+7.057	3.787	−0.020	3.133	2.378	−0.075	11.450	6.115	−0.002	0.368	2.523
	29.08.66	20.47	−13.425	4.045	+0.004	2.463	2.615	+0.016	9.189	6.348	+0.001	0.296	2.500
17	6.05.66	1.14	+14.813	3.844	−0.102	2.862	2.361	−0.398	11.191	6.120	−0 012	0 352	4.905
18	6.05.66	1.07	+14.787	3.321	−0.117	4.678	1.868	−0.448	17.776	5.592	−0.014	0.577	4.918
19	2.05.66	20.23	−26.891	4.278	+0.023	2.001	2.728	+0.097	8.335	6.489	+0.003	0.261	2.521
Mare	3.05.66	20.43	−13.234	4.078	+0.012	2.390	2.516	+0.049	10.060	6.245	+0.002	0.325	3.840
Serenitatis	5.05.66	00.62	+1.652	3.290	0.000	4.930	1.935	0.000	17.122	5.627	0.000	0.572	4.278
	6.05.66	01.72	+15.018	3.974	−0.046	2.574	2.526	−0.176	9.761	6.275	−0.006	0.309	4.816
	6.05.66	21.25	+26.187	4.257	−0.111	1.908	2.784	−0.431	7.411	6.526	−0.014	0.235	6.022
	8.05.66	23.29	+50.950	5.102	−0.169	0.762	3.599	−0.676	3.029	7.367	−0.021	0.094	5.394
	3.07.66	20.63	+12.836	3.885	−0.037	2.848	2.423	−0.143	10.948	6.199	−0.004	0.338	3.903
	1.08.66	01.67	−6.092	3.794	−0.004	3.130	2.340	−0.023	11.920	6.067	−0.001	0.387	2.532
	1.08.66	21.22	+7.045	3.660	−0.023	3.424	2.239	−0.085	13.011	5.980	−0.003	0.416	2.535
	30.08.66	00.64	−12.379	3.720	+0.008	3.331	2.369	+0.007	11.509	6.122	+0.001	0.365	1.616
20	13.01.66	00.07	+80.120	7.226	−0.003	0.122	5.791	−0.015	0.453	9.554	0.000	0.014	7.367
Mare Serenitatis	5.02.66	01.55	−10.514	3.993	−0.010	2.462	2.472	−0.041	9.955	6.228	−0.001	0.313	−2.801
	6.02.66	01.76	+7.615	3.336	0.000	4.523	2.014	0.000	15.252	5.722	0.000	0.500	−0.424
	9.02.66	02.76	+48.482	4.839	−0.174	0.958	3.362	−0.678	3.737	5.614	−0.085	0.468	5.826
	11.02.66	00.18	+73.851	5.958	−0.010	0.394	4.601	−0.035	1.375	8.352	−0.001	0.044	8.274
	2.05.66	20.33	−26.853	4.442	+0.023	1.723	2.836	+0.103	7.556	6.614	+0.003	0.233	2.507
	3.05.66	20.58	−13.182	4.094	+0.016	2.359	2.578	+0.065	9.524	6.332	+0.002	0.300	3.828
	6.05.66	01.78	+15.042	3.954	−0.037	2.631	2.535	−0.136	9.721	6.285	−0.004	0.308	4.806
	8.05.66	23.30	+50.953	5.050	−0.124	0.853	3.567	−0.487	3.334	7.320	−0.015	0.105	5.392
21	13.01.66	00.05	+80.110	6.779	−0.006	0.183	4.033	−0.078	2.228	7.774	−0.002	0.074	7.270
Mare Serenitatis	5.02.66	01.58	−10.501	3.882	−0.011	2.725	2.293	−0.048	11.741	6.060	−0.002	0.363	−2.801
	6.02.66	01.85	+7.653	3.500	0.000	3.890	2.128	0.000	13.746	5.848	0.000	0.446	−0.427
	9.02.66	02.78	+48.492	5.029	−0.160	0.790	3.473	−0.669	3.311	7.274	−0.020	0.100	5.825
	11.02.66	00.10	+73.820	6.223	−0.008	0.309	4.687	−0.032	1.266	8.462	−0.001	0.039	8.285
	2.05.66	20.45	−26.810	4.194	+0.027	2.164	2.600	+0.119	9.384	6.392	+0.004	0.286	2.489
	3.05.66	20.46	−13.150	4.121	+0.013	2.299	2.646	+0.056	9.615	6.298	+0.002	0.310	3.813
	6.05.66	01.80	+15.048	3.953	−0.039	2.631	2.508	−0.149	9.954	6.257	−0.005	0.315	4.804
	6.05.66	21.22	+26.178	4.244	−0.106	1.938	2.739	−0.425	7.748	6.494	−0.013	0.244	6.026
	8.05.66	23.36	+50.970	5.050	−0.140	0.836	3.479	−0.599	3.540	7.252	−0.018	0.110	5.382
22	7.05.66	23.67	+39.264	4.255	−0.151	1.871	2.752	−0.603	7.475	6.512	−0.019	0.233	5.615

Table IVb (Continued)

Region	Date	UT	Phase	m_{4765}	L	$I(c)_{4765}$	m_{7922}	L	$I(c)_{7922}$	m_{6692}	L	$I(c)_{6692}$	L_0
23	12.12.65	00.65	+45.016	5.537	−0.026	0.568	3.938	−0.112	2.481	7.785	−0.003	0.072	0.577
Le Monnier	12.12.65	22.85	+58.072	6.965	−0.004	0.157	5.404	−0.018	0.653	9.262	−0.001	0.018	2.480
	5.02.66	01.38	−10.580	3.901	−0.006	2.693	2.329	−0.023	11.398	6.095	−0.001	0.355	−2.800
	6.02.66	01.69	+7.588	3.445	0.000	4.108	2.097	0.000	14.180	5.814	0.000	0.460	−0.422
	2.05.66	20.00	−26.978	4.173	+0.017	2.202	2.605	+0.073	9.307	6.374	+0.002	0.289	2.556
	3.05.66	20.40	−13.246	4.045	+0.005	2.462	2.486	+0.020	10.332	6.212	+0.001	0.334	3.853
	4.05.66	23.68	+1.322	3.234	0.000	5.206	1.847	0.000	18.610	5.554	0.000	0.612	4.418
	6.05.66	00.37	+14.549	4.013	−0.074	2.463	2.542	−0.289	9.526	6.314	−0.009	0.296	5.039
	6.05.66	21.15	+26.151	4.389	−0.156	1.639	2.889	−0.622	6.501	6.645	−0.020	0.203	6.038
	7.05.66	23.55	+39.228	4.927	−0.127	0.969	3.393	−0.523	3.953	7.190	−0.016	0.119	5.639
	8.05.66	23.37	+50.973	5.756	+0.014	0.525	4.193	+0.059	2.203	7.983	+0.002	0.067	5.379
	3.07.66	20.62	+12.831	4.054	−0.048	2.437	2.469	−0.205	10.440	6.240	−0.006	0.325	3.906
	1.08.66	01.50	−6.123	3.798	−0.004	3.130	2.309	−0.017	12.283	6.051	−0.001	0.393	2.554
	1.08.66	21.10	+7.016	3.715	−0.026	3.360	2.238	−0.102	13.033	5.988	−0.003	0.414	2.562
	29.08.66	20.27	−13.473	3.942	+0.003	2.716	2.419	+0.013	11.016	6.177	0.000	0.346	2.547
24	9.02.66	02.62	+48.430	4.747	−0.379	0.860	3.247	−1.507	3.399	7.016	−0.047	0.077	5.844
	7.05.66	23.58	+39.239	4.360	−0.252	1.597	2.855	−1.010	6.357	6.627	−0.031	0.196	5.632
25	12.12.65	00.70	+45.034	5.456	−0.028	0.613	—	—	—	7.681	−0.004	0.079	0.570
26	2.05.66	20.05	−26.959	3.727	+0.025	3.326	2.200	+0.103	13.520	5.950	+0.003	0.428	2.548
27	13.12.65	00.38	+58.655	5.052	−0.076	0.861	3.487	−0.322	3.616	7.299	−0.010	0.107	2.293
	6.02.66	02.07	+7.744	2.887	0.000	6.906	1.537	0.000	23.737	5.209	0.000	0.807	−0.432
	9.02.66	03.13	+48.623	4.350	−0.466	1.334	2.854	−1.847	5.233	6.605	−0.058	0.166	5.779
28	13.12.65	00.25	+58.609	4.718	−0.078	1.206	3.132	−0.335	5.138	6.933	−0.010	0.156	−2.310
	10.02.66	00.02	+73.788	5.308	−0.226	0.524	3.737	−0.961	2.193	—	—	—	8.296
29	8.05.66	00.92	+39.633	3.658	−0.148	3.450	2.164	−0.586	13.453	5.920	−0.018	0.424	5.344
30	6.10.65	19.08	−43.679	5.006	−0.022	0.986	—	—	—	7.070	−0.003	0.147	−1.674
	9.10.65	00.18	−19.713	3.190	−0.095	5.267	1.664	−0.389	21.307	5.479	−0.011	0.625	−4.220
	5.05.66	21.05	+13.440	3.640	−0.035	3.578	2.129	−0.141	13.889	5.884	−0.004	0.450	5.645
31	6.10.65	19.15	−43.660	4.634	−0.046	1.373	2.943	−0.219	6.472	6.705	−0.007	0.202	−1.692
		22.66	−42.619	4.488	−0.053	1.571	2.808	−0.248	7.322	6.540	−0.008	0.235	−2.392
	12.12.65	00.34	+44.906	4.107	−0.018	2.224	2.537	−0.077	9.361	6.285	−0.002	0.297	0.623
	15.12.65	00.90	+85.698	4.960	−0.187	0.832	3.363	−0.813	3.600	7.165	−0.024	0.109	4.974
	5.01.66	23.83	−17.646	3.416	−0.125	4.114	1.902	−0.505	16.460	5.630	−0.016	0.531	−5.463
32	12.12.65	00.57	+44.986	4.151	−0.022	2.113	2.661	−0.086	8.292	6.399	−0.003	0.265	0.590
	4.02.66	21.99	−11.721	3.440	−0.023	4.134	1.929	−0.091	16.386	5.669	−0.003	0.523	−2.548
	5.02.66	20.12	+5.799	3.015	0.000	6.090	1.630	0.000	21.687	5.302	0.000	0.737	0.110

	2.05.66	19.80	−27.053	3.955	+0.042	2.707	2.434	+0.170	10.966	6.178	+0.005	0.345	2.585
33	14.12.65	02.68	+73.044	4.743	−0.190	1.045	3.122	−0.846	4.632	6.915	−0.026	0.141	3.467
	15.12.65	00.32	+85.470	5.125	−0.205	0.662	3.554	−0.871	2.804	7.343	−0.027	0.086	5.035
34	2.05.66	19.72	−27.084	4.115	+0.036	2.338	2.556	+0.152	9.702	6.320	+0.005	0.307	2.597
35	6.10.65	19.33	−43.613	4.533	−0.026	1.505	2.906	−0.117	6.756	6.637	−0.004	0.218	−1.732
Aristillus	12.12.65	00.54	+44.977	4.223	−0.020	1.977	2.692	−0.084	8.050	6.453	−0.003	0.251	0.594
	5.01.66	23.44	−17.805	3.470	−0.082	3.897	1.994	−0.318	15.139	5.717	−0.010	0.490	−5.424
	4.02.66	21.96	−11.731	3.421	−0.026	4.157	1.914	−0.103	16.622	5.644	−0.003	0.535	−2.544
	5.02.66	20.01	+5.773	3.111	0.000	5.578	1.682	0.000	20.677	5.346	0.000	0.707	0.120
	2.05.66	19.67	−27.103	3.802	+0.048	3.123	2.328	+0.187	12.092	6.051	+0.006	0.393	2.604
	3.05.66	19.22	−13.698	3.629	+0.032	3.631	2.129	+0.127	14.425	5.834	+0.004	0.476	4.023
	5.05.66	21.36	+13.548	3.485	−0.052	4.068	2.014	−0.203	15.722	5.745	−0.007	0.505	5.593
	6.05.66	21.00	+26.097	3.693	−0.127	3.277	2.250	−0.478	12.322	5.946	−0.016	0.410	6.061
	8.05.66	23.12	+50.896	4.373	−0.146	1.673	2.828	−0.606	6.928	6.588	−0.019	0.217	5.429
	1.08.66	01.92	−6.045	3.441	−0.011	4.334	—	—	—	5.671	−0.001	0.555	2.501
	1.08.66	20.98	+6.988	3.252	−0.022	5.162	1.796	−0.084	19.623	5.530	−0.003	0.630	2.588
	29.08.66	20.03	−13.532	3.592	+0.021	4.705	2.076	+0.067	15.133	5.794	+0.002	0.492	2.604
36	6.10.65	19.30	−43.620	4.723	−0.022	1.275	3.089	−0.099	5.709	6.826	−0.003	0.183	−1.727
Autolycus	12.12.65	00.47	+44.950	4.312	−0.021	1.817	2.728	−0.089	7.776	6.507	−0.003	0.240	0.605
	5.01.66	23.35	−17.841	3.587	−0.074	3.503	2.064	−0.299	14.200	5.815	−0.009	0.448	−5.414
	4.02.66	21.88	−11.755	3.538	−0.019	3.737	2.004	−0.079	15.302	5.743	−0.003	0.487	−2.535
	5.02.66	19.97	+5.765	3.204	−0.000	5.114	1.757	0.000	19.417	5.438	0.000	0.651	0.123
	2.05.66	19.58	−27.134	3.868	+0.045	2.938	2.368	+0.181	11.660	6.096	+0.006	0.353	2.616
	3.05.66	19.18	−13.712	3.708	+0.026	3.378	2.197	+0.106	13.527	5.904	+0.003	0.425	4.027
	5.05.66	21.14	+13.472	3.571	−0.048	3.764	2.093	−0.189	14.598	5.836	−0.006	0.465	5.612
	6.05.66	20.93	+26.072	3.795	−0.118	2.978	2.284	−0.476	11.946	6.020	−0.015	0.384	6.071
	8.05.66	23.08	+50.886	4.532	−0.131	1.441	2.954	−0.560	6.152	6.726	−0.017	0.191	5.435
	1.08.66	20.92	+6.972	3.315	−0.021	4.860	1.858	−0.025	19.498	5.601	−0.003	0.591	2.604
	29.08.66	20.08	−13.517	3.646	+0.014	3.568	2.131	+0.056	14.377	5.865	+0.002	0.462	2.591
37	6.10.65	19.23	−43.637	4.777	−0.034	1.202	3.108	−0.160	5.557	6.852	−0.005	0.177	−1.711
Archimedes	8.10.65	22.97	−20.114	4.085	−0.042	2.287	2.458	−0.187	10.196	6.190	−0.006	0.328	−4.041
	12.12.65	00.45	+44.945	4.402	−0.016	1.676	2.826	−0.067	7.122	6.596	−0.002	0.222	0.607
	14.12.65	00.58	+72.287	5.102	−0.136	0.750	3.488	−0.604	3.307	7.296	−0.018	0.100	3.771
	15.12.65	00.67	+85.607	5.860	−0.104	0.338	4.273	−0.449	1.451	8.065	−0.014	0.043	5.000
	5.01.66	23.48	−17.788	3.747	−0.076	3.009	2.187	−0.320	12.617	5.939	−0.010	0.397	−5.428
	7.01.66	21.98	+10.764	3.522	+0.012	3.808	2.015	+0.047	15.212	5.724	+0.002	0.498	−1.318
	12.01.66	23.37	+79.827	5.320	−0.238	0.486	3.717	−1.043	2.114	7.549	−0.031	0.062	7.332
	4.02.66	21.85	−11.667	3.699	−0.023	3.217	2.139	−0.098	13.505	5.880	−0.003	0.429	−2.531

Table IVb (Continued)

Region	Date	UT	Phase	m_{4765}	L	$I(c)_{4765}$	m_{7922}	L	$I(c)_{7922}$	m_{6692}	L	$I(c)_{6692}$	L_0
37	5.02.66	19.88	+5.742	3.301	0.000	4.672	1.866	0.000	17.487	5.570	0.000	0.577	0.132
Archimedes	6.02.66	02.37	+7.872	3.260	0.000	4.859	1.877	0.000	17.309	5.590	0.000	0.566	−0.435
(Continued)	9.02.66	02.30	+48.314	4.302	−0.122	1.742	2.772	−0.498	7.091	6.500	−0.016	0.229	5.887
	11.02.66	00.83	+74.088	5.040	−0.289	0.654	3.463	1.236	2.978	7.271	−0.037	0.083	8.180
	2.05.66	19.55	−27.147	4.095	+0.048	2.391	2.539	+0.203	10.005	6.296	+0.006	0.314	2.621
	3.05.66	19.13	−13.731	3.909	+0.033	2.818	2.360	+0.137	11.693	6.094	+0.004	0.375	4.033
	4.05.66	18.77	−0.885	3.280	0.000	4.984	1.807	0.000	19.267	5.531	0.000	0.624	5.175
		23.83	+1.373	3.046	0.000	6.178	1.694	0.000	21.390	5.371	0.000	0.723	4.394
	5.05.66	21.12	+13.463	3.692	−0.040	3.369	2.201	−0.158	13.244	5.961	−0.005	0.416	5.634
	6.05.66	20.88	+26.055	3.951	−0.084	2.594	2.440	−0.338	10.413	6.176	−0.011	0.334	6.078
	8.05.66	0.25	+39.437	4.164	−0.097	2.107	2.624	−0.401	8.682	6.403	−0.012	0.268	5.489
	8.05.66	23.06	+50.878	4.525	−0.107	1.475	2.963	−0.450	6.192	6.732	−0.014	0.192	5.440
	1.08.66	1.80	−6.067	3.615	−0.010	3.696	2.336	−0.032	11.955	5.849	−0.001	0.471	2.515
	1.08.66	20.88	+6.964	3.471	−0.016	4.214	1.997	−0.064	16.306	5.736	−0.002	0.523	2.611
	29.08.66	20.13	−13.507	3.804	+0.018	3.088	2.284	+0.073	12.508	6.021	+0.002	0.400	2.581
38	14.12.65	00.68	+72.324	5.384	−0.105	0.579	3.759	−0.470	2.579	—	—	—	3.758
	11.02.66	00.92	+74.117	5.435	−0.241	0.415	3.827	−1.061	1.820	7.661	−0.031	0.053	8.167
39	14.12.65	00.48	+72.246	5.063	−0.055	0.868	3.434	−0.245	3.875	7.237	−0.007	0.117	3.785
		01.85	+72.749	5.021	−0.057	0.902	3.395	−0.254	4.016	7.197	−0.008	0.121	3.594
	11.02.66	01.43	+74.296	4.979	−0.214	0.784	3.391	−0.924	3.383	7.210	−0.028	0.100	8.083
	8.05.66	00.27	+39.445	4.297	−0.076	1.874	2.755	−0.316	7.732	6.543	−0.010	0.235	5.481
40	5.05.66	20.75	+13.332	3.965	−0.012	2.639	2.490	−0.048	10.248	6.248	−0.002	0.322	5.694
	29.08.66	19.44	−13.677	4.152	+0.021	2.250	2.621	+0.078	8.414	6.376	+0.003	0.292	2.738
41	11.02.66	01.58	+74.347	4.352	−0.231	1.554	2.764	−0.995	6.673	6.554	−0.030	0.204	8.058
42	3.05.66	19.42	−13.620	4.055	+0.055	2.506	2.568	+0.216	9.817	6.308	−0.007	0.313	3.996
	5.05.66	20.78	+13.344	3.836	−0.009	2.998	2.290	−0.039	12.377	6.058	−0.001	0.387	5.687
	29.08.66	19.40	−13.688	4.137	+0.027	2.308	—	—	—	6.314	+0.004	0.311	2.749
43	12.12.65	02.94	+45.873	4.398	−0.009	1.705	2.773	−0.039	7.554	6.614	−0.001	0.221	0.260
Sinus Iridum	14.12.65	00.41	+72.221	4.784	−0.071	1.129	3.151	−0.318	5.042	6.943	−0.010	0.153	3.793
	15.12.65	00.77	+85.646	5.201	−0.088	0.729	3.566	−0.397	3.266	7.362	−0.012	0.099	4.989
	5.01.66	23.97	−17.629	4.075	−0.101	2.202	2.491	−0.434	9.401	6.227	−0.014	0.301	−5.466
	7.01.66	21.28	+10.504	3.667	+0.003	3.334	2.087	+0.014	14.289	5.828	0.000	0.453	−0.188
		23.76	+11.434	3.641	+0.003	3.439	2.094	+0.014	14.194	5.832	0.000	0.452	−1.551
	12.01.66	23.46	+79.866	4.940	−0.153	0.881	3.317	−0.683	3.911	7.168	−0.020	0.113	7.325
	5.02.66	01.77	−10.431	3.962	−0.034	2.535	2.334	−0.151	11.255	6.095	−0.005	0.352	−2.800
		19.24	+ 5.599	3.466	0.000	4.057	1.971	0.000	15.963	5.692	0.000	0.518	0.181

	9.02.66	01.71	+48.101	4.335	−0.085	1.741	2.739	−0.369	7.512	6.486	−0.012	0.237	5.969
	11.02.66	02.23	+74.562	4.808	−0.152	1.029	3.205	−0.663	4.470	7.029	−0.020	0.131	7.942
	3.05.66	19.35	−13.646	4.061	+0.047	2.485	2.576	+0.187	9.718	6.315	+0.006	0.310	4.005
	5.05.66	20.68	+13.307	3.888	−0.008	2.856	2.334	−0.035	11.893	6.104	−0.001	0.370	5.702
	7.05.66	01.81	+27.655	4.083	−0.042	2.351	2.533	−0.175	9.751	6.303	−0.005	0.304	5.143
	7.05.66	22.51	+38.901	4.286	−0.064	1.922	2.709	−0.272	8.327	6.473	−0.009	0.255	5.849
	9.05.66	00.66	+51.350	4.525	−0.064	1.534	2.925	−0.277	6.651	6.711	−0.008	0.203	5.100
	31.07.66	20.50	−7.025	3.862	−0.014	2.958	2.349	−0.057	11.833	6.100	−0.002	0.375	3.591
	1.08.66	21.50	+7.115	3.686	−0.007	3.492	2.177	−0.030	13.904	5.924	−0.001	0.442	2.468
	29.08.66	19.35	−13.701	4.105	+0.022	2.372	2.521	+0.098	10.151	6.265	+0.003	0.323	2.760
44	7.05.66	22.54	+38.912	3.549	−0.080	3.874	2.067	−0.313	15.028	5.775	−0.010	0.495	5.842
45	5.05.66	20.92	+13.392	3.468	−0.013	4.185	1.982	−0.052	16.379	5.715	−0.002	0.526	5.662
46	9.02.66	02.58	+48.418	5.387	−0.030	0.662	3.882	−0.120	2.631	7.702	0.004	0.078	5.849
	5.05.66	20.88	+13.380	3.213	−0.017	5.294	1.753	−0.064	20.245	5.472	−0.002	0.658	5.671
47	9.10.65	00.19	−19.707	4.097	−0.173	2.153	2.708	−0.619	7.674	6.370	−0.021	0.263	−4.223
Aristarchus	13.12.65	02.62	+59.469	4.251	−0.034	1.932	2.724	−0.138	7.808	6.489	−0.004	0.245	1.971
	14.12.65	02.23	+72.885	4.056	−0.100	2.238	2.513	−0.415	9.208	6.204	−0.014	0.307	3.536
	15.12.65	01.68	+85.992	4.428	−0.108	1.550	2.888	−0.448	6.368	6.639	−0.014	0.201	4.873
	7.01.66	21.13	+10.453	3.398	0.000	4.290	1.922	0.000	16.609	5.624	0.000	0.548	−1.208
		21.73	+10.672	3.408	0.000	4.252	1.940	0.000	16.324	5.637	0.000	0.541	−1.285
		23.93	+11.504	3.323	0.000	4.605	1.884	0.000	17.199	5.597	0.000	0.562	−1.572
	12.01.66	23.79	+80.005	4.330	−0.169	1.673	2.771	−0.709	6.888	6.538	−0.022	0.215	7.296
	4.02.66	22.43	−11.851	3.799	−0.063	2.922	2.320	−0.248	11.318	6.035	−0.008	0.368	−2.600
	5.02.66	19.33	+5.617	3.241	0.000	4.984	1.840	0.000	18.002	5.502	0.000	0.618	0.175
	9.02.66	01.83	−48.146	3.890	−0.114	2.635	2.418	−0.442	10.146	6.104	−0.015	0.340	5.952
	3.05.66	19.55	−13.568	4.125	+0.074	2.373	2.612	+0.298	9.518	6.321	+0.010	0.313	3.978
	4.05.66	18.47	−0.988	3.236	0.000	5.236	1.817	0.000	19.192	5.490	0.000	0.652	5.203
		21.77	−0.750	2.923	0.000	6.996	1.607	0.000	23.360	5.274	0.000	0.797	4.242
		23.42	+1.233	2.961	0.000	6.734	1.654	0.000	22.331	5.317	0.000	0.765	4.462
	5.05.66	21.59	+13.629	3.454	−0.008	4.040	2.050	−0.030	15.471	5.774	−0.001	0.502	5.554
	7.05.66	01.18	+27.451	3.699	−0.030	3.386	2.288	−0.109	12.328	5.998	−0.004	0.405	5.262
	7.05.66	22.76	+38.982	3.690	−0.070	3.390	2.261	−0.261	12.522	5.971	−0.009	0.411	5.801
	8.05.66	22.90	+50.827	4.032	−0.088	2.424	2.563	−0.340	9.440	6.286	−0.011	0.303	5.471
	1.08.66	01.37	−6.148	3.645	−0.054	3.587	2.203	−0.205	13.398	5.913	−0.007	0.440	2.573
	29.08.66	23.93	−12.580	3.882	+0.050	3.696	2.581	+0.167	9.686	6.306	+0.005	0.313	1.734
48	13.12.65	02.57	+59.450	3.493	−0.068	3.949	2.124	−0.240	13.530	5.828	−0.008	0.446	1.964
Aristarchus' Peak	14.12.65	02.28	+72.902	3.389	−0.185	4.152	1.983	−0.676	15.066	5.657	−0.023	0.510	3.532
	15.12.65	01.77	+86.022	3.739	−0.204	2.935	2.374	−0.720	10.269	6.053	−0.024	0.346	4.862
	7.01.66	21.08	+10.431	2.462	0.000	10.163	1.151	0.000	33.679	4.800	0.000	1.171	−1.201

Table IVb (Continued)

Region	Date	UT	Phase	m_{4765}	L	$I(c)_{4765}$	m_{7922}	L	$I(c)_{7922}$	m_{6692}	L	$I(c)_{6692}$	L_0
48		21.68	+10.654	2.439	0.000	10.381	1.132	0.000	34.280	4.778	0.000	1.190	−1.278
Aristarchus' Peak		23.83	+11.461	2.407	0.000	10.693	1.108	0.000	35.059	4.768	0.000	1.207	−1.559
(Continued)	12.01.66	23.74	+79.984	3.456	−0.377	3.694	2.095	−1.321	12.842	5.800	−0.044	0.422	+7.287
	4.01.66	22.55	−11.544	2.790	−0.161	7.357	1.475	−0.540	24.505	5.119	−0.019	0.855	−2.615
	5.02.66	19.44	+5.643	2.352	0.000	11.326	1.106	0.000	35.219	4.728	0.000	1.256	0.166
	9.02.66	01.88	+48.164	2.988	−0.275	6.351	1.603	−0.938	21.409	5.239	−0.033	0.753	+5.936
	3.05.66	19.63	−13.536	3.001	+0.208	6.657	1.779	+0.641	20.451	5.409	+0.023	0.722	+3.966
	4.05.66	18.39	−1.015	2.399	0.000	11.310	1.151	0.000	35.496	4.786	0.000	1.246	+5.209
		19.17	−0.763	2.661	0.000	8.886	—	—	—	5.037	0.000	0.989	5.132
		21.69	−0.731	2.182	0.000	13.798	1.017	0.000	40.163	4.643	0.000	1.430	4.756
		23.35	+1.211	2.146	0.000	14.260	0.987	0.000	41.273	4.605	0.000	1.472	4.473
	5.05.66	00.35	+1.554	2.186	0.000	13.750	1.033	0.000	39.559	4.654	0.000	1.407	4.316
	5.05.66	21.50	+13.598	2.564	−0.019	9.699	1.331	−0.059	30.039	4.991	−0.002	1.032	5.569
	7.05.66	1.16	+27.446	2.710	−0.066	8.433	1.442	−0.212	26.957	5.099	−0.007	0.943	5.265
	7.05.66	22.70	+38.963	2.818	−0.157	7.529	1.574	−0.493	23.559	5.214	−0.017	0.825	5.812
	8.05.66	22.84	+50.810	3.060	−0.215	5.956	1.827	−0.669	18.394	5.456	−0.024	0.650	5.482
	1.08.66	01.19	−6.180	2.730	−0.134	8.317	1.467	−0.430	26.480	5.022	−0.016	1.002	2.598
	1.08.66	21.77	+7.182	2.479	0.000	10.632	1.224	0.000	33.673	4.878	0.000	1.167	2.446
	29.08.66	23.92	−12.584	2.938	+0.120	7.012	1.697	+0.377	21.873	5.363	+0.013	0.747	1.738
49	4.02.66	22.75	−11.480	3.938	−0.045	2.581	2.420	−0.183	10.365	6.120	−0.006	0.343	−2.635
	5.02.66	19.58	+5.674	3.383	0.000	4.379	1.945	0.000	16.342	5.634	0.000	0.546	0.156
50	4.02.66	22.80	−11.464	4.011	−0.042	2.413	2.485	−0.172	9.756	6.185	−0.006	0.323	−2.640
	5.02.66	19.62	+5.682	3.448	0.000	4.123	1.992	0.000	15.653	5.690	0.000	0.519	0.153
51	8.05.66	00.13	+39.403	4.186	−0.047	2.130	2.682	−0.186	8.471	6.459	−0.006	0.261	5.515
52	8.05.66	00.06	+39.381	4.208	−0.046	2.087	2.697	−0.183	8.351	6.476	−0.006	0.257	5.531
53	7.05.66	23.92	+39.339	3.739	−0.064	3.233	2.258	−0.250	12.533	5.987	−0.008	0.405	5.561
54	12.12.65	01.00	+45.143	3.608	−0.018	3.499	2.168	−0.068	13.153	5.890	−0.002	0.427	0.525
Kepler	13.12.65	03.12	+59.654	4.007	−0.047	2.394	2.473	−0.195	9.779	6.242	−0.006	0.304	1.895
	14.12.65	01.93	+72.775	3.937	−0.128	2.476	2.375	−0.539	10.384	6.147	−0.017	0.318	3.582
	15.12.65	01.13	+85.787	4.214	−0.171	1.845	2.675	−0.707	7.575	6.440	−0.002	0.236	4.947
	5.01.66	23.61	−17.738	3.449	−0.225	3.845	1.992	−0.862	14.654	5.711	−0.028	0.476	−5.446
	7.01.66	21.54	+10.599	3.039	+0.006	5.938	1.572	+0.024	22.798	5.277	+0.001	0.753	−1.239
	8.01.66	00.00	+11.530	3.020	+0.006	6.048	1.551	+0.024	23.247	5.256	+0.001	0.767	−1.580
	12.01.66	23.51	+79.887	4.100	−0.266	1.969	2.488	−1.173	8.654	6.276	−0.036	0.263	7.312
	4.02.66	22.27	−11.634	3.315	−0.066	4.557	1.836	−0.257	17.728	5.558	−0.008	0.576	−2.581
	5.02.66	18.91	+5.529	2.967	0.000	6.375	1.527	0.000	23.894	5.193	0.000	0.816	0.202

	9.02.66	02.05	+48.224	3.542	−0.165	3.590	2.056	−0.647	14.070	5.749	−0.022	0.469	5.921
	2.05.66	19.16	−27.295	3.997	+0.104	2.681	2.542	+0.396	10.225	6.267	+0.013	0.332	2.676
	3.05.66	19.82	−13.465	3.479	+0.093	4.241	2.045	+0.350	15.829	5.735	+0.012	0.530	3.940
	4.05.66	18.62	−0.934	2.873	0.000	7.261	1.498	0.000	25.692	5.168	0.000	0.875	5.189
		23.47	+1.249	2.659	0.000	8.834	1.353	0.000	29.367	5.015	0.000	1.006	4.453
	5.05.66	00.47	+1.597	2.686	0.000	8.619	1.386	0.000	28.489	5.055	0.000	0.971	4.299
	5.05.66	21.70	+13.666	3.138	0.017	5.670	1.753	−0.600	20.240	5.453	−0.002	0.670	5.534
	7.05.66	01.03	+27.406	3.352	−0.078	4.590	1.898	−0.296	17.459	5.605	−0.010	0.575	5.290
	7.05.66	23.85	+39.319	3.454	−0.125	4.125	1.983	−0.483	15.930	5.722	−0.015	0.510	5.576
	8.05.66	22.92	+50.834	3.727	−0.123	3.191	2.213	−0.495	12.803	5.938	0.016	0.416	5.467
	31.07.66	20.30	−7.148	3.254	−0.028	5.158	1.854	−0.102	18.613	5.562	−0.003	0.613	3.633
	1.08.66	21.63	+7.148	3.030	−0.009	6.349	1.610	−0.034	23.432	5.320	−0.001	0.769	2.437
	29.08.66	23.58	−12.673	3.528	+0.047	4.025	2.092	+0.175	15.047	5.812	+0.006	0.490	1.801
55	9.10.65	00.30	−19.668	3.658	−0.141	3.320	2.203	−0.539	12.631	5.859	−0.019	0.435	−4.236
Kepler's ray System	12.12.65	02.04	+45.525	3.746	−0.016	3.084	2.279	−0.061	11.870	5.957	−0.002	0.400	0.375
	14.12.65	02.09	+72.835	3.995	−0.121	2.350	2.423	−0.515	9.931	6.157	−0.017	0.317	3.557
	15.12.65	01.55	+85.943	4.337	−0.153	1.646	2.807	−0.625	6.699	6.531	−0.020	0.218	4.891
	5.01.66	23.67	−17.714	3.590	−0.198	3.374	2.113	−0.771	13.114	5.844	−0.025	0.421	−5.447
	7.01.66	21.56	+10.611	3.194	+0.005	5.149	1.710	+0.021	20.123	5.410	+0.001	0.665	−1.264
	8.01.66	00.12	+11.577	3.178	+0.005	5.222	1.683	+0.021	20.621	5.411	+0.001	0.665	−1.593
	12.01.66	23.66	+79.950	4.168	−0.250	1.852	2.591	−1.067	7.869	6.368	−0.033	0.243	7.308
	4.02.66	22.35	−11.607	3.490	−0.056	3.877	1.996	−0.223	15.302	5.713	−0.007	0.497	−2.590
	5.02.66	18.92	+5.532	3.118	0.000	5.548	1.641	0.000	21.511	5.314	0.000	0.731	0.201
	9.02.66	02.12	+48.248	3.661	−0.148	3.222	2.175	−0.580	12.636	5.872	−0.019	0.419	5.817
	2.05.66	19.18	−27.286	4.253	+0.082	2.114	2.725	+0.333	8.613	6.463	+0.011	0.276	2.673
	3.05.66	19.83	−13.459	3.707	+0.076	3.438	2.225	+0.296	13.398	5.917	+0.010	0.448	3.938
	4.05.66	18.63	−0.929	2.968	0.000	6.653	1.558	0.000	24.312	5.235	0.000	0.823	5.188
		23.52	+1.266	2.771	0.000	7.970	1.456	0.000	26.720	5.124	0.000	0.911	4.445
	5.05.66	21.73	+13.678	3.298	−0.014	4.898	1.878	−0.053	18.037	5.594	−0.002	0.588	5.528
	7.05.66	01.03	+27.406	3.504	−0.067	3.996	2.027	−0.263	15.461	5.743	−0.009	0.506	5.285
	7.05.66	23.89	+39.331	3.610	−0.108	3.574	2.113	−0.428	14.127	5.857	−0.014	0.449	5.567
	8.05.66	22.98	−50.852	3.855	−0.109	2.831	2.347	−0.447	11.308	6.076	−0.014	0.365	5.456
	31.07.66	20.33	−7.058	3.419	−0.024	4.413	1.983	−0.091	16.618	5.699	−0.003	0.540	3.628
	1.08.66	21.65	+7.152	3.185	−0.008	5.513	1.746	−0.030	20.664	5.475	−0.001	0.667	2.433
	29.08.66	23.65	−12.656	3.615	+0.043	3.716	2.221	+0.155	13.354	5.936	+0.005	0.437	1.788
56	2.05.66	19.28	−27.248	4.384	+0.072	1.873	2.825	+0.304	7.852	6.659	+0.010	0.250	2.659
	3.05.66	20.00	−13.396	3.747	+0.073	3.312	2.243	+0.292	13.188	5.939	+0.010	0.439	3.913
	29.08.66	23.74	−12.631	3.679	+0.041	3.504	2.264	+0.149	12.842	5.985	+0.005	0.419	1.771
57	2.05.66	19.25	−27.260	4.283	+0.079	2.055	2.750	+0.326	8.418	6.488	+0.010	0.268	2.664
	3.05.66	19.95	−13.415	3.728	+0.074	3.366	2.231	+0.295	13.335	5.926	+0.010	0.444	3.921

Table IVb (Continued)

Region	Date	UT	Phase	m_{4765}	L	$I(c)_{4765}$	m_{7922}	L	$I(c)_{7922}$	m_{6692}	L	$I(c)_{6692}$	L_0
	29.08.66	23.97	−12.625	3.714	+0.039	3.392	2.268	+0.149	12.789	6.022	+0.005	0.405	1.766
58	2.05.66	19.37	−27.216	4.483	+0.066	1.710	2.939	+0.274	7.064	6.698	+0.009	0.221	2.647
	3.05.66	19.92	−13.427	3.924	+0.062	2.810	2.420	+0.248	11.206	6.129	+0.008	0.369	3.926
59	12.12.65	02.20	+45.976	4.329	−0.007	1.845	2.783	−0.031	7.547	6.579	−0.001	0.229	0.232
Grimaldi	13.12.65	02.70	+59.496	4.573	−0.022	1.457	3.003	−0.094	6.100	6.818	−0.003	0.181	1.952
	15.12.65	01.63	+85.973	4.654	−0.072	1.300	3.100	−0.299	5.363	7.148	−0.007	0.129	4.880
	7.01.66	21.35	+10.532	3.716	0.000	3.252	2.234	0.000	12.549	5.937	0.000	0.414	−1.235
		23.54	+11.349	3.662	0.000	3.417	2.174	0.000	13.263	5.910	0.000	0.425	−1.524
	13.01.66	00.18	+80.163	4.494	−0.118	1.649	2.905	−0.509	6.250	6.745	−0.015	0.182	7.256
	5.02.66	01.93	−10.368	4.381	−0.037	1.729	2.852	−0.152	6.980	6.618	−0.005	0.217	−2.747
	5.02.66	20.37	+5.861	3.528	0.000	3.887	2.106	0.000	14.194	5.821	0.000	0.464	0.086
	9.02.66	02.97	+48.560	4.135	−0.082	2.143	2.647	−0.323	8.304	6.369	−0.010	0.270	5.799
	3.05.66	20.20	−13.320	5.164	+0.044	0.942	3.714	+0.167	3.534	7.446	+0.005	0.098	3.882
	4.05.66	18.52	−0.966	3.462	0.000	4.306	1.996	0.000	16.353	5.701	0.000	0.508	5.197
		21.82	−0.761	3.309	0.000	4.961	1.934	0.000	17.320	5.629	0.000	0.542	4.735
	5.05.66	00.03	+1.442	3.186	0.000	5.557	1.845	0.000	18.800	5.527	0.000	0.597	4.362
	5.05.66	21.63	+13.641	3.688	−0.003	3.495	2.224	−0.013	13.262	5.981	0.000	0.391	5.547
	7.05.66	00.90	+27.365	3.961	−0.021	2.694	2.416	−0.086	11.052	6.184	−0.003	0.343	5.316
	8.05.66	00.30	+39.479	4.044	−0.048	2.469	2.515	−0.197	9.974	6.292	−0.006	0.308	5.460
	9. 5.66	00.08	+51.186	4.239	−0.065	2.039	2.690	−0.269	8.393	6.471	−0.008	0.259	5.227
	31. 7.66	20.40	−7.042	3.981	−0.095	2.590	2.527	−0.361	9.811	6.270	−0.011	0.323	3.610
	1. 9.66	21.82	+7.194	−2.18	0.000	3.881	2.245	0.000	13.185	5.985	0.000	0.423	2.393
60	9.10.65	00.53	−19.584	3.411	−0.126	4.209	1.904	−0.502	16.799	5.587	−0.017	0.600	−4.265
Copernicus	12.12.65	01.10	+45.179	3.576	−0.019	3.595	2.071	−0.082	14.342	5.836	−0.003	0.447	0.510
	13.12.65	01.28	+58.984	3.830	−0.082	2.780	2.308	−0.334	11.267	—	—	—	2.161
	14.12.65	02.13	+72.849	3.921	−0.230	2.403	2.358	−0.968	10.106	6.105	−0.031	0.319	3.551
	15.12.65	00.97	+85.726	4.471	−0.232	1.347	2.903	−0.986	5.702	6.684	−0.030	0.177	4.965
	5.01.66	23.57	−17.755	3.231	−0.189	4.783	1.709	−0.767	19.333	5.454	−0.024	0.614	−5.437
	7.01.66	21.68	+10.650	3.052	+0.012	5.847	1.512	+0.050	24.092	5.245	+0.002	0.776	−1.278
	8.01.66	00.23	+11.624	2.997	+0.013	6.161	1.462	+0.052	25.190	5.214	+0.002	0.796	−1.606
	12.01.66	23.51	+79.887	4.157	−0.418	1.706	2.557	−1.822	7.377	6.344	−0.056	0.224	7.321
	4.02.66	22.12	−11.679	3.224	−0.062	4.938	1.674	−0.257	20.557	5.421	−0.008	0.653	−2.564
	5.02.66	19.04	+5.556	2.912	0.000	6.690	1.401	0.000	26.759	5.093	0.000	0.896	0.194
	9.02.66	02.17	+48.266	3.575	−0.163	3.471	2.040	−0.672	14.243	5.752	−0.022	0.466	5.905
	11.02.66	02.12	+74.524	4.037	−0.460	1.918	2.466	−1.959	8.122	6.257	−0.059	0.247	7.964
	3.05.66	20.85	−13.097	3.475	+0.073	4.217	1.983	+0.290	16.637	5.693	+0.010	0.547	3.784

	4.05.66	23.98	+1.425	2.643	0.00	8.942	1.293	0.000	31.006	4.980	0.000	1.038	4.371
	7.05.66	01.87	+27.674	3.397	−0.096	4.364	1.868	−0.394	17.816	5.602	−0.013	0.572	5.132
	8.05.66	23.00	+50.861	3.758	−0.123	3.084	2.204	−0.512	12.885	5.958	−0.016	0.407	5.460
	1.08.66	21.53	+7.121	2.948	−0.017	6.808	1.479	−0.067	26.385	5.216	−0.002	0.844	2.463
	29.08.66	23.52	−12.691	3.274	+0.047	5.058	1.852	+0.173	18.706	5.588	+0.006	0.600	1.814
61	13.12.65	01.32	+58.996	3.736	−0.083	3.034	2.228	−0.334	12.155	5.983	−0.011	0.380	2.156
	15.12.65	01.08	+85.768	4.243	−0.241	1.716	2.758	−0.946	6.706	6.528	−0.029	0.210	4.952
62	12.12.65	01.20	+45.215	3.745	−0.016	3.075	2.277	−0.061	11.879	6.020	−0.002	0.376	0.495
63	7.05.66	22.67	+38.953	4.097	−0.046	2.349	2.513	−0.198	9.989	6.257	−0.006	0.318	5.818
64	7.05.66	23.82	+39.309	3.990	−0.051	2.589	2.456	−0.208	10.521	6.216	−0.007	0.329	5.583
65	7.05.66	24.00	+39.363	3.521	−0.078	4.003	2.016	−0.312	15.776	5.765	−0.010	0.499	5.543
66	7.05.66	00.93	+27.375	3.405	−0.033	4.511	1.883	−0.132	18.059	5.621	−0.004	0.579	5.310
	8.05.66	00.45	+39.496	3.452	−0.083	4.269	1.902	−0.347	17.537	5.673	−0.011	0.544	5.446
67	8.05.66	00.50	+39.511	3.054	−0.120	6.157	1.549	−0.480	24.312	5.304	−0.015	0.765	5.435
68	8.05.66	00.59	+39.538	3.442	−0.084	4.305	1.900	−0.438	17.564	5.659	−0.011	0.551	5.415
69	8.05.66	00.67	+39.560	3.545	−0.076	3.918	2.002	−0.316	15.979	5.763	−0.010	0.500	5.398
70	13.12.65	02.82	+59.542	4.832	−0.022	1.116	3.264	−0.094	4.715	7.072	−0.003	0.141	1.936
	5.02.66	02.00	−10.339	4.124	−0.031	2.166	2.584	−0.130	8.894	—	—	—	−2.796
	5.02.66	20.42	+5.875	3.634	0.000	3.447	2.219	0.000	12.665	5.933	0.000	0.413	0.080
	11.02.66	01.77	+74.408	4.713	−0.204	1.074	3.190	−0.832	4.347	7.004	−0.025	0.130	8.026
	6.05.66	01.50	+14.940	3.873	−0.009	2.877	2.433	−0.034	10.809	6.184	−0.001	0.342	4.849
	30 08 66	00.28	−12.482	4.093	+0.028	2.388	2.696	+0.100	8.629	6.452	+0.003	0.271	1.674
71	13.12.65	02.88	+59.564	4.319	−0.036	1.795	2.551	−0.183	9.172	6.502	−0.005	0.261	1.928
	11.02.66	01.67	+74.375	4.146	−0.279	1.879	2.586	−1.173	7.865	6.367	−0.036	0.242	8.043
	9.05.66	00.78	+51.386	4.485	−0.059	1.588	2.961	−0.242	6.437	6.736	−0.007	0.200	5.071
	30.08.66	00.13	−12.527	3.682	+0.040	3.494	2.189	+0.160	13.748	5.956	+0.005	0.430	1.701
72	9.05.66	00.80	+51.90	3.746	−0.124	3.114	2.201	−0.514	12.914	5.989	−0.016	0.395	5.068
73	6.10.65	23.22	−42.415	3.967	−0.093	2.501	2.397	−0.396	10.606	6.101	−0.013	0.350	−2.468
	11.02.66	02.00	+74.486	4.876	−0.239	1.978	3.340	−0.982	3.520	7.166	−0.029	0.105	7.985
74	9.05.66	00.84	+51.402	4.266	−0.079	1.927	2.714	−0.329	8.050	6.476	−0.010	0.252	5.058
75	9.05.66	00.43	+51.286	4.170	−0.125	2.066	2.630	−0.514	8.532	6.396	−0.016	0.266	5.150
76	11.02.66	01.85	+74.436	4.360	−0.283	1.492	2.807	−1.183	6.193	6.609	−0.036	0.186	8.011
	9.05.66	0.87	+51.409	4.082	−0.093	2.284	2.541	−0.385	9.437	6.298	−0.012	0.298	5.053
77	11.02.66	00.68	+74.034	4.628	−0.451	0.943	3.077	−1.880	3.886	6.881	−0.057	0.117	8.203
78	11.02.66	00.62	+74.010	4.655	−0.440	0.919	3.098	−1.845	3.818	6.901	−0.056	0.115	8.213
79	11.02.66	00.57	+73.992	4.844	−0.370	0.772	3.259	−1.591	3.290	7.070	−0.048	0.099	8.220
80	9.05.66	00.97	+51.937	4.141	−0.106	2.147	2.584	−0.444	9.000	6.350	−0.014	0.280	5.035
81	9.05.66	01.03	+51.456	4.412	−0.070	1.685	2.874	−0.290	6.938	6.651	−0.009	0.214	5.015
82	9.05.66	00.83	+51.400	4.547	−0.061	1.489	3.028	−0.246	6.025	6.804	−0.008	0.185	5.060
83	6.02.66	01.34	+7.447	3.198	0.000	5.124	1.864	0.000	16.484	5.581	0.000	0.569	−0.408
	11.02.66	00.47	+73.956	5.110	−0.325	0.569	3.511	−1.418	2.450	7.330	−0.042	0.073	8.235

Table IVb (Continued)

Region	Date	UT	Phase	m_{4765}	L	$I(c)_{4765}$	m_{7922}	L	$I(c)_{7922}$	m_{6692}	L	$I(c)_{6692}$	L_0
84	15.12.65	00.48	+85.530	6.434	−0.062	0.199	4.820	−0.272	0.877	8.634	−0.008	0.026	5.020
85	15.12.65	00.44	+85.517	5.893	−0.092	0.335	4.316	−0.394	1.433	8.091	−0.012	0.044	5.024
86	14.12.65	02.43	+72.955	4.630	−0.295	1.073	3.017	−1.304	4.752	6.811	−0.040	0.144	3.505
	5.02.66	01.43	−10.561	3.306	−0.019	4.628	1.750	−0.078	19.353	5.516	−0.002	0.604	−2.800
	7.05.66	01.68	+27.614	3.651	−0.184	3.348	2.131	−0.744	13.549	5.860	−0.024	0.437	5.166
	30.08.66	00.79	−12.334	3.228	+0.016	5.238	1.802	+0.061	19.466	5.552	+0.002	0.586	1.593
87	14.12.65	02.52	+72.985	4.556	−0.271	1.195	2.972	−1.165	5.490	6.766	−0.035	0.157	3.493
	11.02.66	00.25	+73.876	5.605	−0.206	0.354	4.057	−0.858	1.473	7.865	−0.026	0.043	8.265
	7.05.66	01.70	+27.619	4.365	−0.086	1.745	2.840	−0.351	7.092	6.612	−0.011	0.219	5.162
	30.08.06	00.86	−12.314	3.892	+0.009	2.839	2.496	+0.032	10.260	6.270	+0.001	0.302	1.583
88	12.12.65	03.07	+45.923	3.497	−0.028	3.879	2.066	−0.104	14.442	5.822	−0.003	0.453	0.246
Centre of Tycho	5.02.66	02.12	−10.292	2.952	−0.059	6.412	1.422	−0.243	26.076	5.178	−0.008	0.821	−2.793
	6.02.66	01.15	+7.372	2.424	0.000	10.532	1.115	0.000	34.921	4.774	0.000	1.203	−0.398
	9.02.66	03.05	+48.592	3.336	−0.255	4.299	1.910	−0.947	15.900	5.587	0.032	0.602	5.789
	3.05.66	21.00	−13.024	2.929	+0.101	6.990	1.571	+0.353	24.463	5.222	+0.012	0.845	3.760
	5.05.66	00.12	+1.471	2.301	0.000	12.305	1.029	0.000	39.595	4.690	0.000	1.358	4.351
	6.05.66	01.38	+14.898	2.760	−0.055	8.010	1.398	−0.193	28.033	5.094	0.006	0.932	4.867
	7.05.66	00.82	+27.339	2.993	−0.171	6.331	1.569	−0.636	23.466	5.269	−0.021	0.778	5.333
	8.05.66	00.80	+39.599	3.185	−0.218	5.242	1.731	−0.833	19.928	5.465	−0.027	0.639	5.369
	9.05.66	00.12	+51.195	—	—	—	2.038	−0.811	14.834	5.762	−0.026	0.481	5.220
	1.08.66	02.03	−6.023	2.792	−0.038	7.891	1.363	−0.142	29.382	5.033	−0.005	1.000	2.488
	1.08.66	21.90	+7.215	2.647	−0.025	9.041	1.235	−0.093	31.020	4.939	−0 003	1 092	2.374
89	12.12.65	03.13	+45.949	3.449	−0.029	4.052	2.008	−0.110	15.225	5.751	−0.004	0.484	0.239
	5.02.66	02.17	−10.272	3.313	−0.043	4.597	1.705	−0.187	20.114	5.488	−0.006	0.617	−2.791
	6.02.66	01.18	+7.382	2.720	0.000	8.014	1.330	0.000	28.655	—	—	—	0.400
90	8.05.66	00.77	+39.589	3.477	−0.122	4.072	1.968	−0.940	16.214	5.721	−0.015	0.513	5.376
91	9.05.66	00.22	+51.224	3.713	−0.376	2.967	2.235	−1.474	11.587	5.972	−0.047	0.370	5.198
92	9.05.66	00.18	+51.214	3.246	−0.352	4.788	1.849	−1.275	17.302	5.544	−0.042	0.576	5.206
93	9.05.66	00.33	+51.258	3.986	−0.293	2.314	2.482	−1.170	9.227	6.232	−0.037	0.292	5.172
94	9.05.66	00.32	+51.253	4.067	−0.272	2.145	2.524	−1.125	8.873	6.281	−0.035	0.279	5.176
95	9.05.66	00.38	+51.272	4.079	−0.341	2.049	2.557	−1.385	8.302	6.307	−0.044	0.262	5.161
96	9.05.66	00.48	+51.300	4.213	−0.301	1.812	2.681	−1.236	7.409	6.448	−0.038	0.231	5.139
97	8.05.66	01.22	+39.721	3.863	−0.339	2.572	2.358	−1.356	10.261	6.112	−0.043	0.324	5.278
98	8.05.66	01.17	+39.706	4.025	−0.292	2.216	2.487	−1.204	9.113	6.273	−0.037	0.279	5.289
99	8.05.66	01.15	+39.701	4.006	−0.297	2.256	2.457	−1.238	9.366	6.237	−0.038	0.289	5.293
100	8.05.66	01.37	+39.765	4.013	−0.295	2.259	2.445	−1.252	9.516	6.225	−0.039	0.293	5.246

101	8.05.66	01.30	+39.745	4.099	−0.273	2.087	2.538	−1.149	8.735	6.325	−0.035	0.267	5.260
102	7.05.66	00.68	+27.297	3.693	−0.297	3.117	2.191	−1.183	12.355	5.913	−0.038	0.402	5.360
	8.05.66	01.07	+39.677	4.126	−0.349	1.936	2.589	−1.438	7.966	6.377	−0.044	0.243	5.311
103	7.05.66	00.60	+27.271	3.672	−0.302	3.177	2.201	−1.173	12.255	5.919	−0.038	0.400	5.376
	8.05.66	01.08	+39.682	4.204	−0.325	1.802	2.661	−1.345	7.448	6.458	−0.041	0.225	5.307
104	6.10.65	18.92	−43.721	5.172			3.501			7.241			−1.637
Centre of Plato		22.25	−42.759	5.034			3.420			7.161			−2.329
		22.62	−42.631	5.046			3.408			—			−2.387
		23.09	−42.464	5.007			3.362			7.116			−2.452
		23.57	−42.285	5.054			3.369			7.122			−2.508
		means	−42.772	5.063	−0.025	0.936	3.412	−0.117	4.233	7.160	−0.004	0.133	
	8.10.65	23.94	−19.767	4.175	−0.041	2.125	2.659	−0.182	8.573	6.358	−0.006	0.289	−4.183
	12.12.65	00.32	+44.900	4.634			3.043			6.812			0.626
		00.82	+45.080	4.645			3.068			6.832			0.551
		02.83	+45.830	4.674			3.077			—			0.273
		means	+45.270	4.651	−0.011	1.345	3.063	−0.048	5.776	6.822	−0.001	0.181	
	12.12.65	22.19	+57.800	4.805			3.210			7.007			2.539
		22.93	+58.106	4.805			3.207			7.002			2.471
	13.12.65	00.27	+58.615	4.896			3.284			7.098			2.308
		01.41	+59.029	4.975			3.362			7.188			2.143
		02.33	+59.362	5.112			3.478			7.311			2.006
		03.18	+59.676	5.187			3.556			7.389			1.887
		means	+58.765	4.963	−0.043	0.983	3.350	−0.189	4.382	7.166	−0.006	0.127	
	14.12.65	00.14	+72.118	5.358			3.774			7.553			3.825
		00.20	+72.141	5.327			3.704			7.530			3.818
		0.176	+72.716	5.298			3.639			7.469			3.607
		02.35	+72.926	5.231			3.586			7.405			3.518
		means	+72.475	5.304	−0.085	0.659	3.676	−0.367	2.945	7.489	−0.011	0.087	
	15.12.65	00.23	+85.433	5.973			4.333			8.153			5.044
		00.62	+85.587	5.926			4.322			8.130			5.005
		00.80	+85.659	5.960			4.350			8.133			4.980
		01.48	+85.918	6.007			4.390			8.190			4.905
		01.81	+86.037	5.963			4.343			8.131			4.856
		02.52	+86.289	5.958			4.366			8.166			4.752
		03.07	+86.484	5.972			4.411			8.203			4.664
		means	+85.915	5.966	−0.082	0.322	4.351	−0.361	1.405	8.158	−0.011	0.043	

Table IVb (Continued)

Region	Date	UT	Phase	m_{4765}	L	$I(c)_{4765}$	m_{7922}	L	$I(c)_{7922}$	m_{6692}	L	$I(c)_{6692}$	L_0
104	5.01.66	23.16	−17.916	4.040			2.469			6.229			−5.392
Centre of Plato		23.71	−17.698	4.033			2.468			6.211			−5.451
(Continued)		means	−17.807	4.036	−0.064	2.342	2.468	−0.278	9.749	6.220	−0.009	0.313	
	7.01.66	20.82	+10.336	3.707			2.174			5.896			−1.170
		21.53	+10.599	3.706			2.173			5.894			−1.259
		22.02	+10.776	3.698			2.164			5.891			−1.322
		22.27	+10.868	3.692			2.165			5.890			−1.356
		means	+10.645	3.701	+0.007	3.229	2.169	+0.027	13.255	5.893	+0.001	0.429	
	7.01.66	23.64	+11.388	3.669			2.143			5.880			−1.536
	8.01.66	00.42	+11.699	3.712			2.162			5.915			−1.626
		00.85	+11.881	3.721			2.167			5.924			−1.670
		means	+11.656	3.701	+0.007	3.232	2.164	+0.027	13.425	5.906	+0.001	0.424	
	12.01.66	23.32	+79.805	5.531			3.909			7.760			7.336
		23.93	+80.063	5.546			3.934			7.770			7.228
	13.01.66	00.23	+80.183	5.546			3.929			7.775			7.250
		means	+80.017	5.541	−0.170	0.427	3.924	−0.754	1.876	7.768	−0.022	0.053	
	4.02.66	21.53	−11.869	3.912			2.323			6.078			−2.491
		21.66	−11.826	3.911			2.325			6.078			−2.508
		22.97	−11.411	3.880			2.326			6.049			−2.657
		means	−11.702	3.901	−0.021	2.697	2.325	−0.094	11.417	6.068	−0.003	0.363	
	5.02.66	01.22	−10.639	3.940			2.345			6.115			−2.798
		01.70	−10.456	3.949			2.347			6.125			−2.800
		02.48	−10.143	4.008			2.363			6.161			−2.778
		means	−10.413	3.966	−0.021	2.539	2.352	−0.091	11.132	6.133	−0.003	0.341	
	5.02.66	18.78	+5.504	3.596			2.063			5.797			0.208
		19.08	+5.565	3.543			2.048			5.765			0.191
		19.78	+5.720	3.465			2.011			5.728			0.140
		20.32	+5.828	3.479			2.018			5.741			0.099
		20.60	+5.920	3.514			2.039			5.763			0.062
		means	+5.707	3.519	0.000	3.862	2.036	+0.001	15.026	5.769	0.000	0.486	

6.02.66	01.02	+7.321	3.390			1.992			5.725			−0.391
	01.91	+7.677	3.397			2.019			5.741			−0.428
	02.18	+7.793	3.412			2.026			5.753			−0.433
	02.48	+7.923	3.462			2.046			5.773			−0.435
	means	+7.678	3.415	0.000	4.247	2.021	+0.001	15.245	5.748	0.000	0.491	
9.02.66	01.60	+48.062	4.559			2.989			6.768			5.985
	02.27	+48.302	4.544			2.992			6.772			5.891
	02.90	+48.535	4.545			2.998			6.778			5.808
	03.20	+48.648	4.556			2.999			6.773			5.771
	means	+48.387	4.551	−0.084	1.410	2.994	−0.374	5.841	6.773	−0.010	0.181	
10.02.66	23.77	+73.692	5.251			3.656			7.484			8.326
11.02.66	00.83	+74.052	5.283			3.692			7.508			8.196
	01.37	+74.273	5.295			3.700			7.517			8.095
	02.28	+74.579	5.321			3.716			7.546			7.933
	means	+74.149	5.288	−0.186	0.572	3.691	−0.805	2.490	7.514	−0.024	0.072	
2.05.66	18.93	−27.382	4.466			2.854			6.638			2.708
	19.45	−27.185	4.420			2.817			6.597			2.636
	19.87	−27.028	4.406			2.807			6.580			2.575
	20.57	−26.766	4.408			2.793			6.585			2.472
	means	−27.090	4.425	+0.042	1.789	2.818	+0.187	7.720	6.600	+0.006	0.231	
3.05.66	19.07	−13.758	4.038			2.570			6.310			4.042
	19.30	−13.666	4.163			2.564			6.300			4.012
	19.70	−13.510	4.110			2.524			6.264			3.957
	20.30	−13.283	4.111			2.528			6.265			3.869
	20.69	−13.138	4.067			2.501			6.226			3.808
	21.32	−12.908	4.017			2.447			6.172			3.710
	means	−13.377	4.084	+0.031	2.421	2.472	+0.137	11.777	6.256	+0.004	0.325	
4.05.66	18.35	−1.030	3.520	0.000	4.024	2.014	0.000	15.998	5.740	0.000	0.519	5.213
	18.73	−0.896	3.475	0.000	4.190	1.981	0.000	16.483	5.697	0.000	0.539	5.178
	21.63	−0.717	3.275	0.000	5.044	1.851	0.000	18.580	5.555	0.000	0.614	4.766
	21.92	−0.786	3.276	0.000	5.037	1.857	0.000	18.479	5.552	0.000	0.615	4.718
	23.30	+1.194	3.240	0.000	5.207	1.834	0.000	18.885	5.521	0.000	0.633	4.481
	23.58	+1.288	3.246	0.000	5.182	1.851	0.000	18.596	5.541	0.000	0.622	4.434
	23.88	+1.390	3.247	0.000	5.175	1.853	0.000	18.563	5.552	0.000	0.616	4.387

Table IVb (Continued)

Region	Date	UT	Phase	m_{4765}	L	$I(c)_{4765}$	m_{7922}	L	$I(c)_{7922}$	m_{6692}	L	$I(c)_{6692}$	L_0
104	5.05.66	00.18	+1.495	3.259	0.000	5.116	1.851	0.000	18.525	5.559	0.000	0.611	4.341
Centre of Plato		00.52	+1.615	3.273	0.000	5.049	1.860	0.000	18.445	5.578	0.000	0.601	4.292
(Continued)		00.80	+1.720	3.291	0.000	4.963	1.876	0.000	18.153	5.585	0.000	0.597	4.254
	5.05.66	20.63	+13.289	3.966			2.443			6.210			5.710
		20.98	+13.416	3.935			2.415			6.184			5.655
		21.43	+13.575	3.932			2.418			6.184			5.581
		21.80	+13.700	3.912			2.410			6.177			5.516
		means	+13.495	3.936	+0.024	2.703	2.421	−0.086	10.883	6.189	−0.003	0.338	
	6.05.66	00.23	+14.504	3.938			2.414			6.193			5.063
		01.22	+14.842	3.914			2.405			6.175			4.892
		01.55	+14.958	3.889			2.413			6.175			4.841
		01.88	+15.076	3.909			2.423			6.189			4.793
		means	+14.845	3.912	−0.026	2.775	2.414	−0.087	11.001	6.183	−0.003	0.341	
	6.05.66	20.78	+26.013	4.167			2.657			6.406			6.094
		21.33	+26.217	4.173			2.634			6.398			6.009
		21.58	+26.305	4.172			2.626			6.387			5.967
	7.05.66	00.35	+27.194	4.216			2.656			6.432			5.427
		01.26	+27.478	4.245			2.659			6.439			5.246
		01.48	+27.549	4.264			2.681			6.463			5.203
		0.179	+27.649	4.273			2.689			6.460			5.146
		means	+26.915	4.216	−0.060	2.060	2.657	−0.260	8.600	6.426	−0.008	0.267	
	7.05.66	22.42	+38.871	4.462			2.904			6.679			5.866
		22.90	+39.027	4.471			2.906			6.687			5.773
		23.34	+39.165	4.453			2.883			6.673			5.683
		23.69	+39.271	4.454			2.885			6.679			5.609
		00.18	+39.418	4.450			2.879			6.677			5.504
		00.34	+39.464	4.463			2.888			6.688			5.469
		00.89	+39.625	4.461			2.887			6.694			5.349
		01.46	+39.792	4.485			2.890			6.701			5.226
		means	+39.329	4.462	−0.070	1.621	2.890	−0.300	6.837	6.685	−0.009	0.207	

8.05.66	22.78	+50.791	4.832			3.247			7.017			5.492
	23.15	+50.907	4.820			3.244			7.024			5.422
	23.45	+50.998	4.813			3.238			7.017			5.362
9.05.66	00.00	+51.161	4.800			3.221			7.010			5.246
	00.62	+51.338	4.795			3.219			7.007			5.109
	01.10	+51.475	4.789			3.207			6.998			4.999
9.05.66	01.35	+51.545	4.774			3.196			6.963			4.942
	means	+51.174	4.803	−0.070	1.169	3.225	−0.298	4.962	7.005	−0.009	0.152	
3.07.66	20.53	+12.804	3.972			2.369			6.171			3.925
	20.88	+12.906	3.973			2.378			6.143			3.852
	20.95	+12.927	3.973			2.377			6.149			3.836
	means	+12.879	3.973	−0.014	2.673	2.375	−0.062	11.590	6.154	−0.002	0.358	
31.07.66	20.21	−7.083	3.914			2.400			6.169			3.654
	20.53	−7.015	3.859			2.360			6.113			3.579
1.08.66	01.15	−6.188	3.869			2.358			6.104			2.604
	01.43	−6.137	3.862			2.348			6.094			2.564
	01.77	−6.074	4.055			2.341			6.065			2.520
	means	−6.499	4.912	−0.013	2.829	2.361	−0.056	11.712	6.109	−0.002	0.372	
1.08.66	20.88	+6.943	3.716			2.217			5.973			2.630
	21.02	+6.996	3.702			2.220			5.960			2.581
	21.43	+7.099	3.730			2.231			5.983			2.484
	21.97	+7.232	3.789			2.281			6.026			2.359
	22.10	+7.266	3.749			2.245			5.986			2.327
	means	+7.107	3.737	−0.010	3.335	2.239	−0.038	13.177	5.990	−0.001	0.419	
29.08.77	19.30	−13.714	4.037			2.494			6.240			2.772
	19.50	−13.662	4.105			2.539			6.283			2.726
	19.99	−13.540	4.105			2.564			6.282			2.612
	20.24	−13.479	4.079			2.532			6.292			2.553
	20.62	−13.390	4.096			2.566			6.324			2.464
	23.42	−12.715	4.127			2.623			6.382			1.832
30.08.66	00.03	−12.552	4.036			2.566			6.335			1.717
	00.58	−12.396	3.945			2.495			6.270			1.625
	00.93	−12.291	3.849			2.411			6.199			1.573
	means	−13.080	4.042	+0.015	2.523	2.532	+0.056	9.585	6.289	+0.002	0.315	