01.09

Pluto-Charon Surface Mapping From Mutual Event Lightcurves

R. P. Binzel (MIT)

In addition to diameters and orbital information, high time resolution and high precision photometry of the Pluto-Charon mutual events can provide information on the surface albedo distribution for one hemisphere of Pluto and one hemisphere of Charon.

Numerous precision and high time resolution lightcurves have been obtained of partial and total mutual events during 1986, 1987, and 1988 using the University of Texas McDonald Observatory 2.1- and 2.7-m telescopes. These lightcurves are being used to investigate the large scale and small scale surface albedo distribution on Pluto and preliminary results will be reported.

01.10

Further Analysis of Pluto-Charon Mutual Event Observations — 1988

D. J. Tholen, M. W. Buie (Inst. for Astronomy, Univ. of Hawaii)

Through the end of July, we successfully observed portions of another 16 Pluto-Charon mutual events during the 1988 opposition. Our latest set of orbital and physical parameters for the system is given below. This model is based on 2007 data points from 20 different events observed between 1985 February and 1988 May. The mean residual between the observed and computed brightness is 0.008 mag. A new semimajor axis of Charon's orbit has been adopted, and the radii and albedos for Pluto and Charon have been scaled accordingly. We now have sufficient data to solve for the eccentricity, and the value determined from the least-squares fit is still indistinguishable from zero. The range of albedos listed for Pluto represents the variegation of Charon-sized regions of Pluto. At smaller scales, the albedo contrast is almost certainly even higher. The uncertainties associated with each model parameter represent our best estimate of the true uncertainty in that parameter. The formal standard deviations derived from the least-squares fit are much smaller. In general, these realistic uncertainties are a factor of two smaller than they were at this time last year. This research is supported by NASA Grant No. NGL 12-001-057.

Semimajor axis	19,640	±	320	km
Eccentricity	0.00009	±	0.00038	
Inclination[a]	98.3	±	1.3	deg
Ascending node[a]	222.37	±	0.07	deg
Argument of periapsis[a]	290	±	180	deg
Mean anomaly[b]	259.90	±	0.15	deg
Epoch	JDE 2,446,600.5	=	1986 June 19	
Period	6.387230	±	0.000021	days
Pluto radius	1142	±	9	km
Charon radius	596	±	17	km
Pluto blue geometric albedo	0.43 — 0.60			
Charon blue geometric albedo	0.375	±	0.018	
Mean density	2.065	±	0.047	gm cm^{-3}

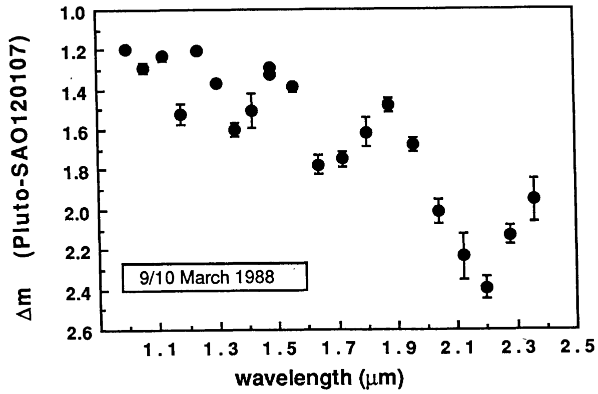
[a]Referred to the mean equator and equinox of 1950.0.
[b]Measured from the ascending node.

01.11

CVF Spectrophotometry of Pluto and Triton

R. L. Marcialis, L. A. Lebofsky (LPL/U. of Arizona)

We are in the process of obtaining near-infrared 24-color light curves of Pluto/Charon and Triton at NASA's IRTF, and will give a progress report on the status of these observations. The region of spectral interest spans 1.0 – 2.5μm. Immediate goals of the project are to monitor variations in volatile distribution (primarily CH_4) as each body rotates, to see if and how albedo correlates with composition, and to determine the phase coefficient *vs.* wavelength. No doubt the Triton spectra will be useful ground support for the Voyager flyby next August. Long-term goals of the project are to monitor the spectrum of Pluto as it passes through perihelion (1989 January), and to do the same for Triton as it approaches "major summer" in 1998. Do the observed volatile abundances vary at these seasonal extremes? Do Triton and Pluto have variable polar caps?



01.12-T

The Albedos of Pluto and Charon: Wavelength Dependence

R. L. Marcialis (LPL/U. of Arizona), E. F. Tedesco (JPL/Caltech), L. A. Lebofsky and U. Fink (LPL/U. of Arizona)

The 1987 March 04 occultation of Charon by Pluto was monitored simultaneously with three telescopes in the vicinity of Tucson, Arizona. Each site covered a distinct wavelength interval, with the total range spanning 0.44 – 2.35μm. Observing the same event ensured that the Sun–Pluto–Charon–Earth viewing geometry was identical at all three sites. Therefore the results may be directly intercompared. We have used this photometry to derive separate spectra of Pluto and Charon over a factor of five in wavelength.

The out-of-eclipse slope of 6 millimag/hr is seen to persist during totality, and demonstrates the existence of albedo feature(s) on the anti-Charon hemisphere of Pluto. This continuum slope appears to be independent of wavelength. Additionally, the contention of Mulholland and Gustafson (*Astron. Astrophys.* (1987) **171**, L5–L7) that the depth and duration of nearly central Pluto–Charon mutual events "is both wavelength and telescope dependent" has been demonstrated to be incorrect.

Session 2: Moon, Mercury and Remote Sensing (A. Potter, Moderator) 9:10–10:50, Texas II

02.01

Thermal Conductivity and Near-Surface Temperature Gradients in Thermal-Infrared Spectroscopy of Planetary Surfaces

B.M. Jakosky (LASP and Dept. of Geological Sci., U. of Colorado, Boulder, CO 80309-0392)

Radiation to space can dramatically modify the temperature gradient within the uppermost tens to hundreds of microns of a regolith when the radiative component of subsurface thermal conductivity is important, as described by Logan and Hunt (1970). On Mars, all three components of conductivity--radiation, solid, and gaseous conduction--can play a role under different circumstances. The radiative contribution is generally small compared to the solid component for temperatures less than about 250 K. Both added together are small compared