the effects of the telescope PSF. We developed a technique that removes the PSF effects and stacks the resulting images into a global mosaic of Pluto's surface. The image below shows the final visible-band map obtained. The overlaid contours show the significance (in units of sigma) of the underlying albedo map.

We will present additional results and interpretations based on the UV data from this dataset. We will also present additional data taken at one rotational epoch as part of the *Live from the Hubble Space Telescope*, a K-12 educational program supported in part by NASA, NSF, and select PBS affiliates. This second epoch of observation was our first attempt at a direct search for time-variable features on the surface of Pluto.

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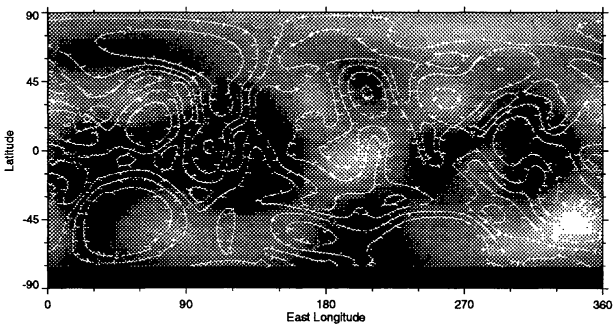

06.06

Physics of Solid N_2: a Possible Solution for Pluto's and Triton's Albedo Conundrums

N. S. Duxbury (JPL), R. H. Brown (U. of Arizona)

According to the albedo maps based on mutual event lightcurves Pluto's northern hemisphere is much darker than the southern. (We use Pluto's angular momentum vector to define North.) Currently it is the end of the southern summer on Pluto, with the subsolar point being $\approx$ 12 deg S. Thus, it was surprising to find a large bright feature near the south pole. Even more puzzling was why the visible north polar regions appeared much darker than the south polar regions. Though the precessional cycle can explain the current large south cap (Binzel 1992), it does not account for the lack of the bright fresh frost in the northern hemisphere at the end of northern winter and does not explain the brightness of the south cap. We propose a solution to these puzzles based upon the physics of solid N_2. We also estimated an initial N_2 grain diameter on the surfaces of Pluto and Triton to be $<0.3\mu$m. First, from the radiative balance at Pluto's icy surface we calculate the current highest condensation rate to be $\approx 4.57*10^{-8}$ cm/s (or $\approx 1.65 \mu m/hr$). From laboratory experiments we found that at about 3. $\mu m/hr$ or lower, N_2 condenses as a transparent layer. We conclude that what we see in the north is probably a relatively dark substrate under a clear layer of N_2 ice. Our result moreover holds for Triton. This explains the relative darkness of the northern regions up to 45 deg N seen in the Voyager 2 images. Concerning bright regions adjacent to the large, dark areas north of Triton's equator, we conclude that they may be the regions where N_2 condensed earlier than the clear N_2 did. At that time probably $T_{ice}>40$ K and hence the condensation rate was higher than the rate sufficient for the deposition of an initially transparent layer. Thus, the frost condensed as a bright layer. The same explanation is applicable to Pluto's brighter regions in mostly darker northern hemisphere. Finally, the crystalline phase transition and subsequent shattering of N_2 ice (Duxbury and Brown 1993) can explain the brightness of the south perennial polar cap.

06.07

A Re-investigation of the 1965 April 29 Stellar Appulse by the Pluto–Charon System

R. L. Marcialis (LPL/U. Arizona)

Although widely observed throughout N. America, no occultation of the star by Pluto was seen (Halliday *et al.* 1966, *PASP* **78**, 113–124). Nevertheless, this event provided an upper limit on Pluto's diameter unsurpassed until the discovery of Charon in 1978. We now know that at the time of closest approach, Charon's position with respect to Pluto was ($\rho=0.''79, \theta=137.°5$). When the event is reanalyzed under the assumption that the appulse was with respect to the Pluto–Charon photocenter, and not the photocenter of a solitary planet, several new deductions can be made.

To preclude an occultation at all observing sites, the Pluto/Charon light ratio had to exceed 6:1. Furthermore, the astrometry is consistent with the Halliday *et al.* result if one assumes Charon's absolute magnitude was identical to that recently measured by HST (Buie, 1996; personal communication), corresponding to a Pluto/Charon light ratio of ~8.2:1. (The current value at the same rotational phase is ~4.5:1.) Results are relatively insensitive to Pluto's intrinsic surface albedo distribution.

There are several implications of a "constant" Charon. First, the albedo of Charon's S. hemisphere is likely very similar to the rest of its surface; only a small intrinsic light curve should be expected. Second, it provides the *first observational evidence* that the system's secular dimming (orbital light curve) is totally attributable to Pluto, heretofore a commonly-made assumption. This reinforces previous results regarding the temporally-variable nature of Pluto's surface albedo (Drish *et al.* 1995, *Icarus* **113**, 360–386), to which mutual event- and HST-derived maps are insensitive, but consistent.

Our updated interpretation of this classic data set provides additional constraints on the amount of volatile migration which has occurred since 1930, and shows the offset between the system's photocenter and barycenter historically was smaller than at present. This last result is important to improving theories of Pluto's heliocentric orbit.

06.08

Exploring Charon's Eccentric Orbit

D. J. Tholen (Univ. Hawaii)

We previously reported on observations of the Pluto-Charon system with the Hubble Space Telescope that revealed the signature of an unexpected orbital eccentricity for Charon. Since then, we have been exploring possible origins for this eccentricity, and are attempting to confirm its existence. Possible origins that have been explored include impact, perturbation, and surface albedo distribution effects. The impact hypothesis requires a single energetic event with the potential for shattering Pluto. The perturbation hypothesis appears to have a comparable probability, but requires a significant population of trans-Neptunian bodies to interact with the system. Two models for the surface albedo distribution have been able to account for only about half of the observed eccentricity. A combination of effects may be necessary to explain the observed orbit.

To confirm the eccentricity, we have begun by combining our HST data with other HST observations of the system (Null and Owen 1996, AJ 111, 1368). These two data sets do not appear to suffer from systematic differences in their image scale determination, but the position angle calibrations may differ by about a half degree. Until any systematic differences have been eliminated, is it premature to state the eccentricity that results from a combined solution, but we hope to have such a solution by the time of the meeting. We also intend to incorporate other ground-based data sets in the orbit solution, pending elimination of systematic differences in calibration. Ultimately, we hope to acquire another set of HST observations with the corrected optics, at a significantly different epoch, and with the orbit more open.

The effects of the eccentricity on mutual event solutions for the radii will also be discussed.

06.09

Results of Analysis of HST Spectra of Pluto (1200-4800 Å) and Charon (2250-3300 Å)

L. M. Trafton (U. Texas), S. A. Stern (SWRI)

Spectra of Pluto were obtained at eight rotational phases with the FOS on HST during the 1992 and 1993 post-opposition quadratures. These were taken to study Pluto's UV light curve and atmospheric haze content, and spanned 1600-4800 Å at resolution at 1.45-3.07 Å/diode. During the 1993 observations, exploratory UV spectra of Charon were also obtained on opposite faces near elongation. These covered 2250-3300 Å at resolution 2.09 Å/diode. On Nov 9, 1993 and Feb 2, 1995, we obtained FOS spectra of Pluto