

Nov. 3, 2017

- Today
  - Student Presentations
  - In 2nd lecture -- finish Atmospheric Circulation
    - use previously posted material
  - Pluto (just a couple slides)
- Midterm exam Wednesday Nov. 8. Review Monday



New Horizons spacecraft flew by Pluto on July 14, 2015

Pluto has a thin atmosphere of  $N_2$  and  $CH_4$

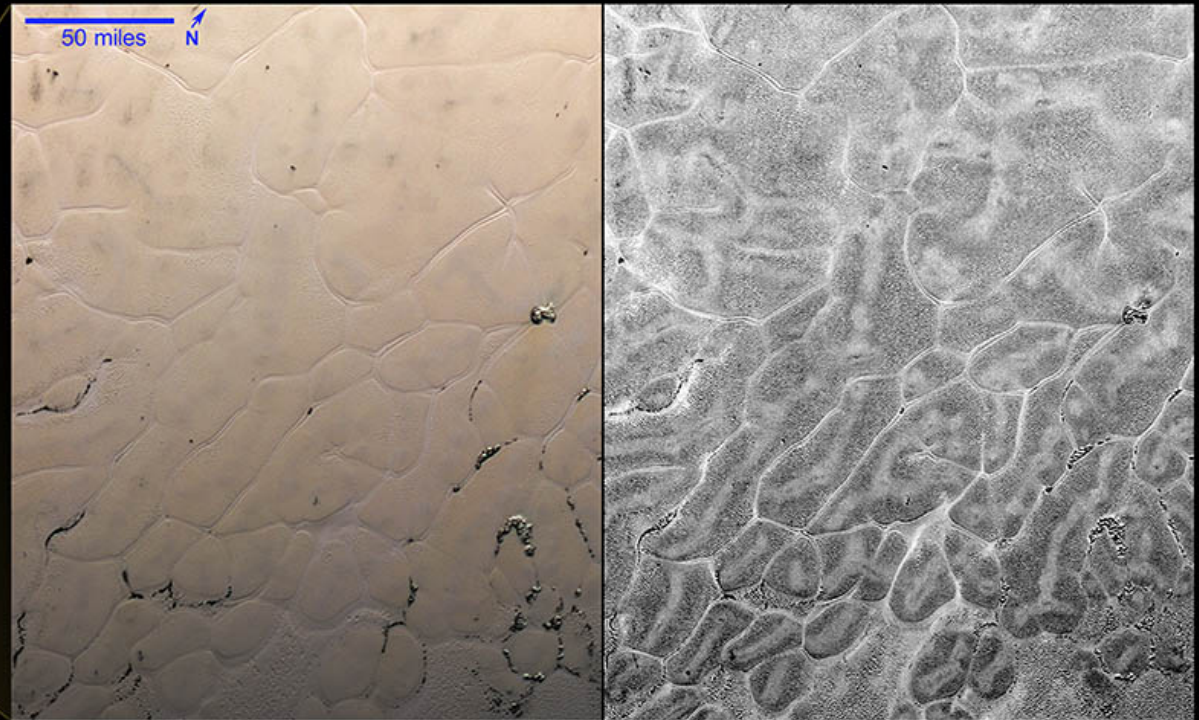
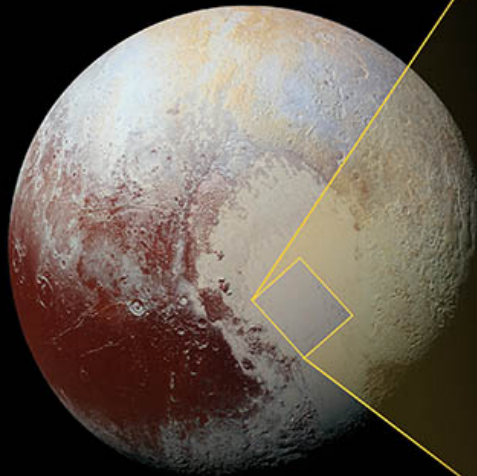
- Surface also covered by  $N_2$  and  $CH_4$  ice
- Transport of these ices during Pluto's long year (246 earth years) and during Milankovitch cycles may dominate its geology.
- Eccentric orbit: 29.7 AU to 49.3 AU
  - Atmosphere changes as it gets farther from sun and T drops

# Pluto

Large moon Charon -- Pluto and its moon tidally locked in 6.4 day orbit

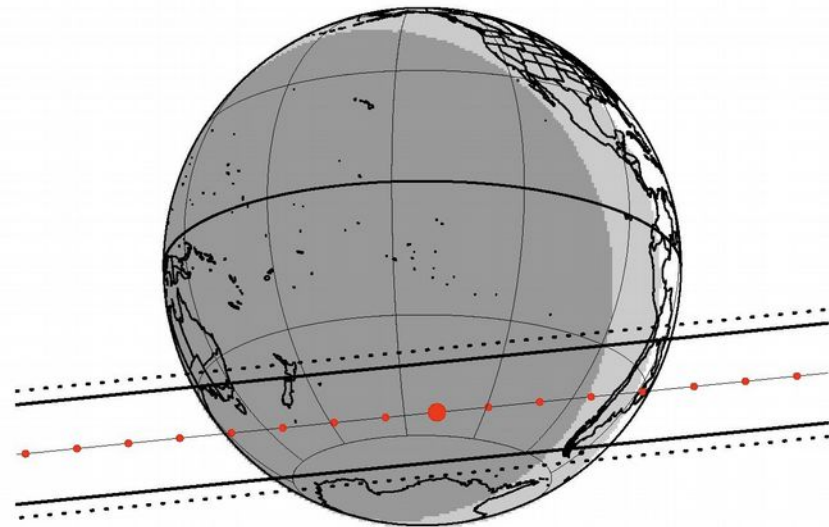
- Pluto 1189 km radius, Charon 606 km radius

TNO (Trans-Neptunian Object (Kuiper Belt) 2/3 resonance with Neptune

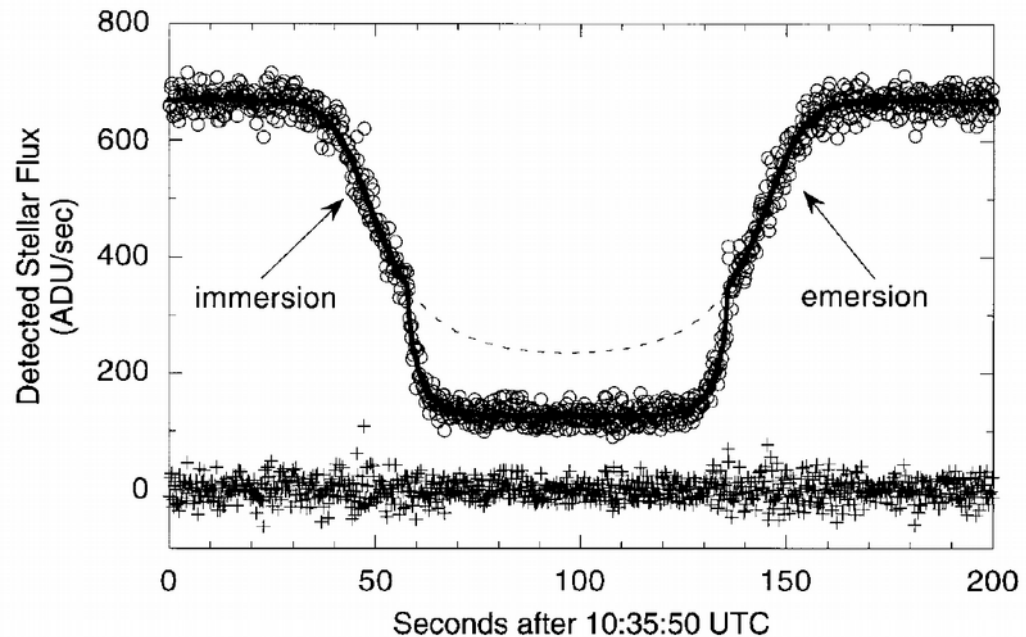


# Pluto Occultations

- Like a solar eclipse except instead of moon blocking sun, Pluto blocks some star
- Shadow (width= 2300 km, same as Pluto) sweeps across the earth
- As seen from within that path, the star moves behind Pluto
- As it enters and leaves, starlight is dimmed (defocussed) by Pluto atmosphere

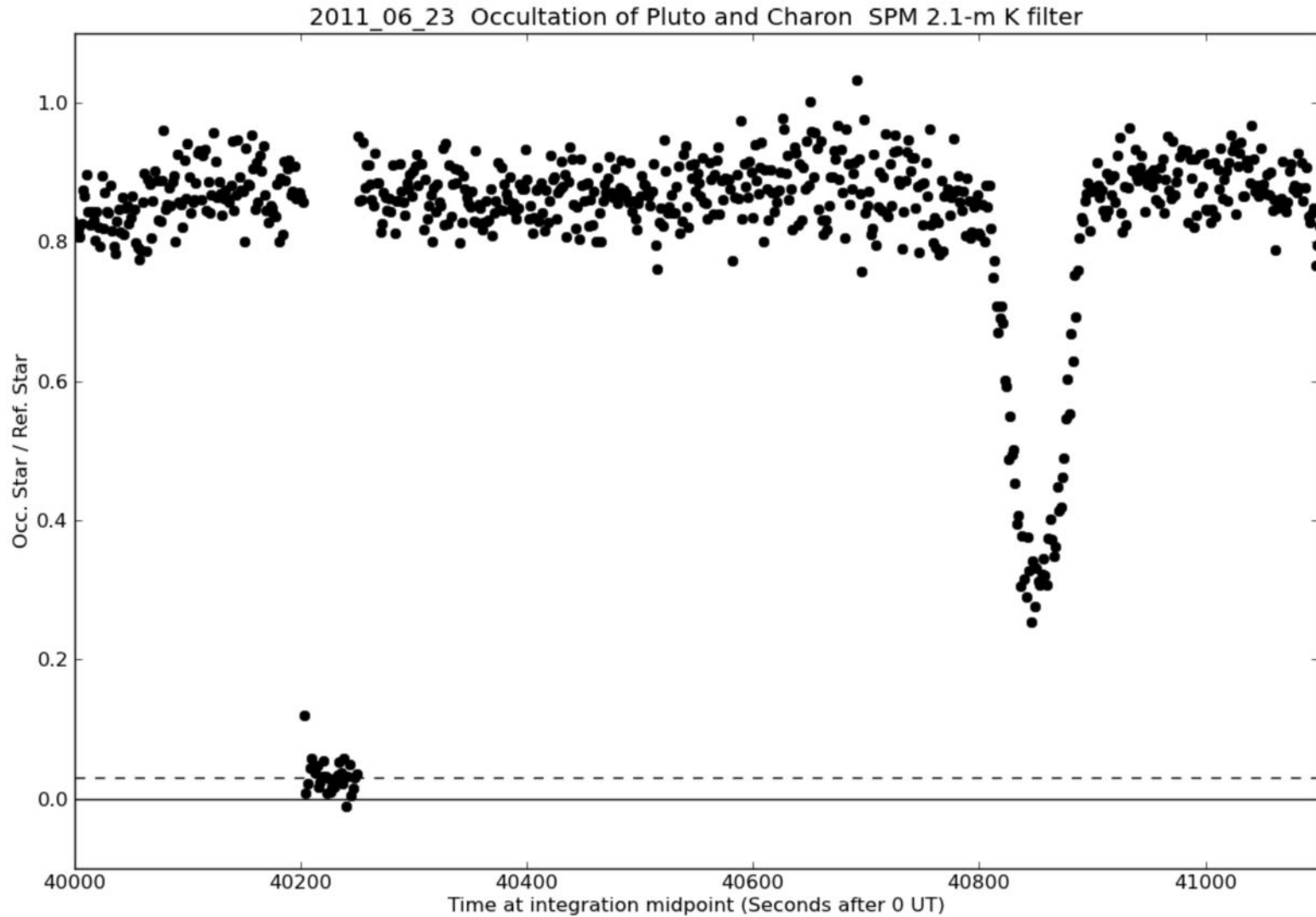


From Sicardy's web site



From Elliott & Olkin 1996: KAO 1988 occultation

# Previous Results: 2011



- San Pedro Martir (Mexican National Astronomical Observatory)
  - 2.2- $\mu\text{m}$  using their facility infrared camera (Luis Salas & Robert Howell)