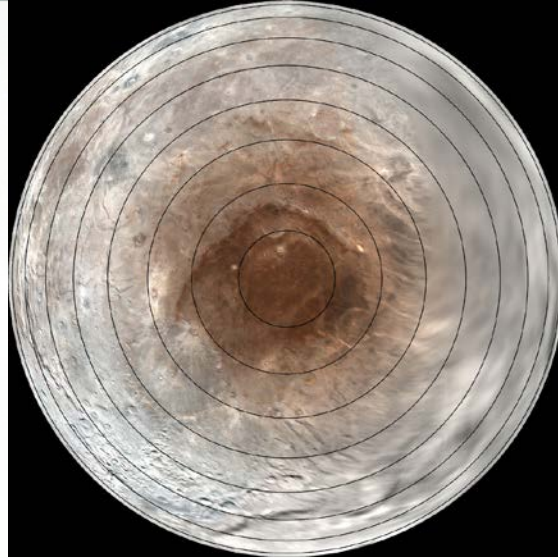


Charon's Dark Red Poles

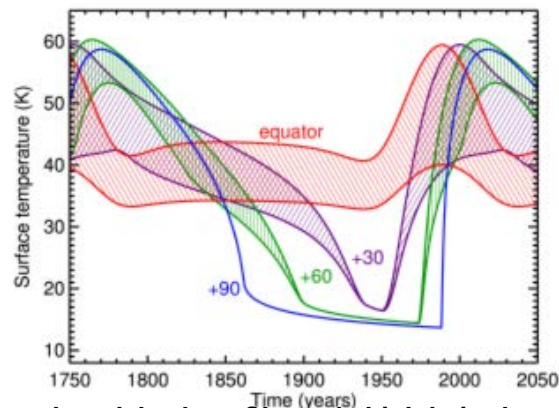
A dark, red deposit on Charon's north pole is likely formed by seasonal cold-trapping of volatiles coming from Pluto.

- During the 2015 New Horizons flyby a dark, red deposit (top left) was detected on Charon's north pole, a feature unique in the solar system. The color of the deposit is similar to regions on Pluto that have been attributed to tholin-like organic macromolecules.
- Although the southern pole, currently in winter, is lit only by Pluto-shine, it shows similar darkening (top right).
- The polar location of these deposits and their presence on both hemispheres indicates that the most likely explanation is cold-trapping at Charon's poles of methane (CH_4) gas escaping from Pluto's atmosphere (bottom right).
- Modeling of the surface thermal environment (bottom left) and photolytic processes indicate that the gas is subsequently transformed by sunlight into more complex and larger molecules, allowing for their buildup over time.

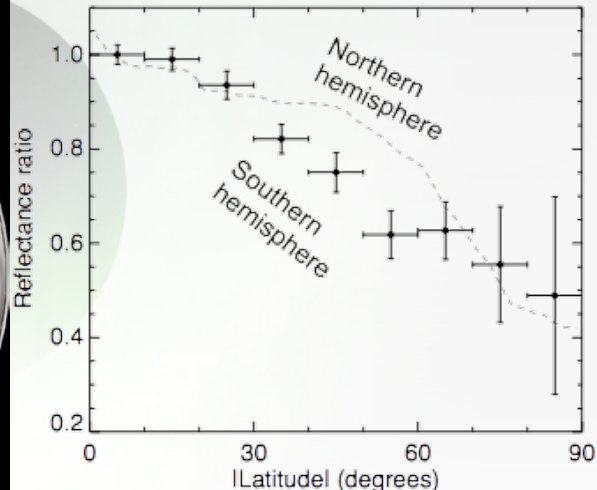
W. M. Grundy et al. (2016), *Nature*



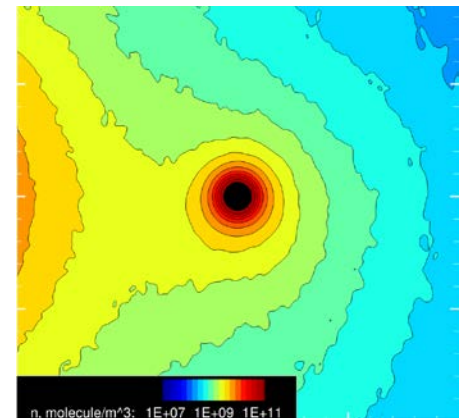
Polar orthographic color mosaic shows dark, reddish deposits centered on the north pole (10° latitude bands).



Thermal models show Charon's high latitudes get extremely cold during the long winters. Colored zones show diurnal T ranges at 4 latitudes.



Charon's southern hemisphere, dimly lit by Pluto-shine, shows similar darkening toward the south pole (points) as toward the sunlit north pole (dashed curve).



Gas escaping from Pluto (off left edge of plot) is transiently trapped by Charon's gravity (center) (Hoey et al., *Icarus*, 2017, pending).