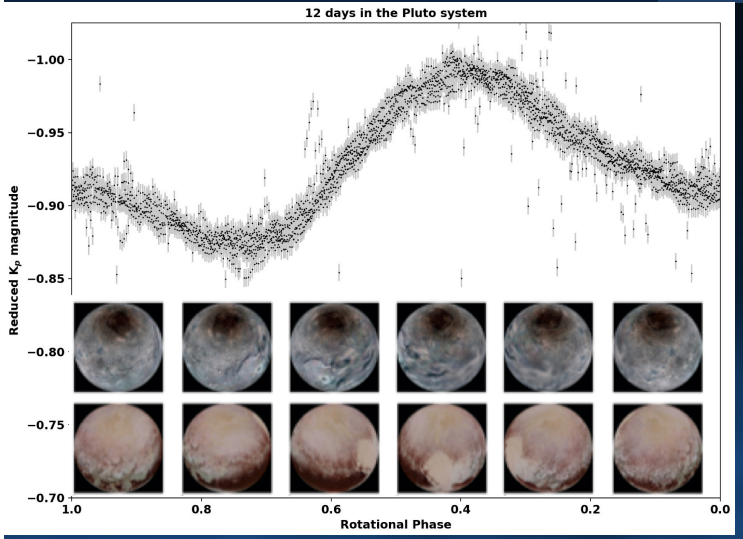
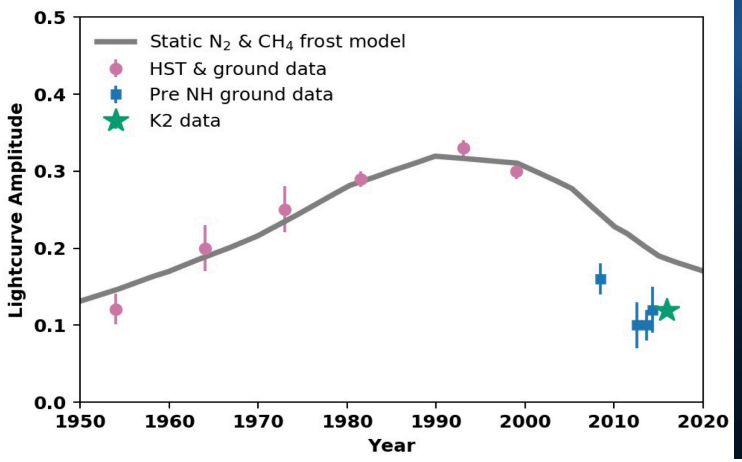
K2 Mission Observations of 12 Days in the Pluto-Charon System



Above: This composite lightcurve from K2 is a function of the light reflected by both Pluto and Charon.
Below: Multi-year amplitudes of Pluto's reflected light show that the K2 data are not consistent with the static frost model (grey line).



Observations of the Pluto system with the Kepler spacecraft demonstrate that changes in Pluto's brightness with time suggest that molecular nitrogen (N_2) and methane (CH_4) are transported over the surface with the seasons.

- During its K2 extended mission, Kepler's monitored the Pluto-Charon system for an unprecedented, nearly continuous 83 days (>12 Plutonian days) after the New Horizons flyby.
- The combined light curves for Pluto+Charon (image, top left) have an average total amplitude significantly smaller than predicted by a static frost model (image, bottom left).
- The Hubble Space Telescope observed lightcurve variations of Pluto, but these were attributed to differences in viewing geometry and a static surface frost of N_2 and CH_4 was assumed.
- Kepler's original purpose was to discover extra-solar planets, but this repurposing shows how spacecraft can have second life, in this case, to better understand planets within the solar system.

Benecchi, *et al.* (2018) *Icarus*