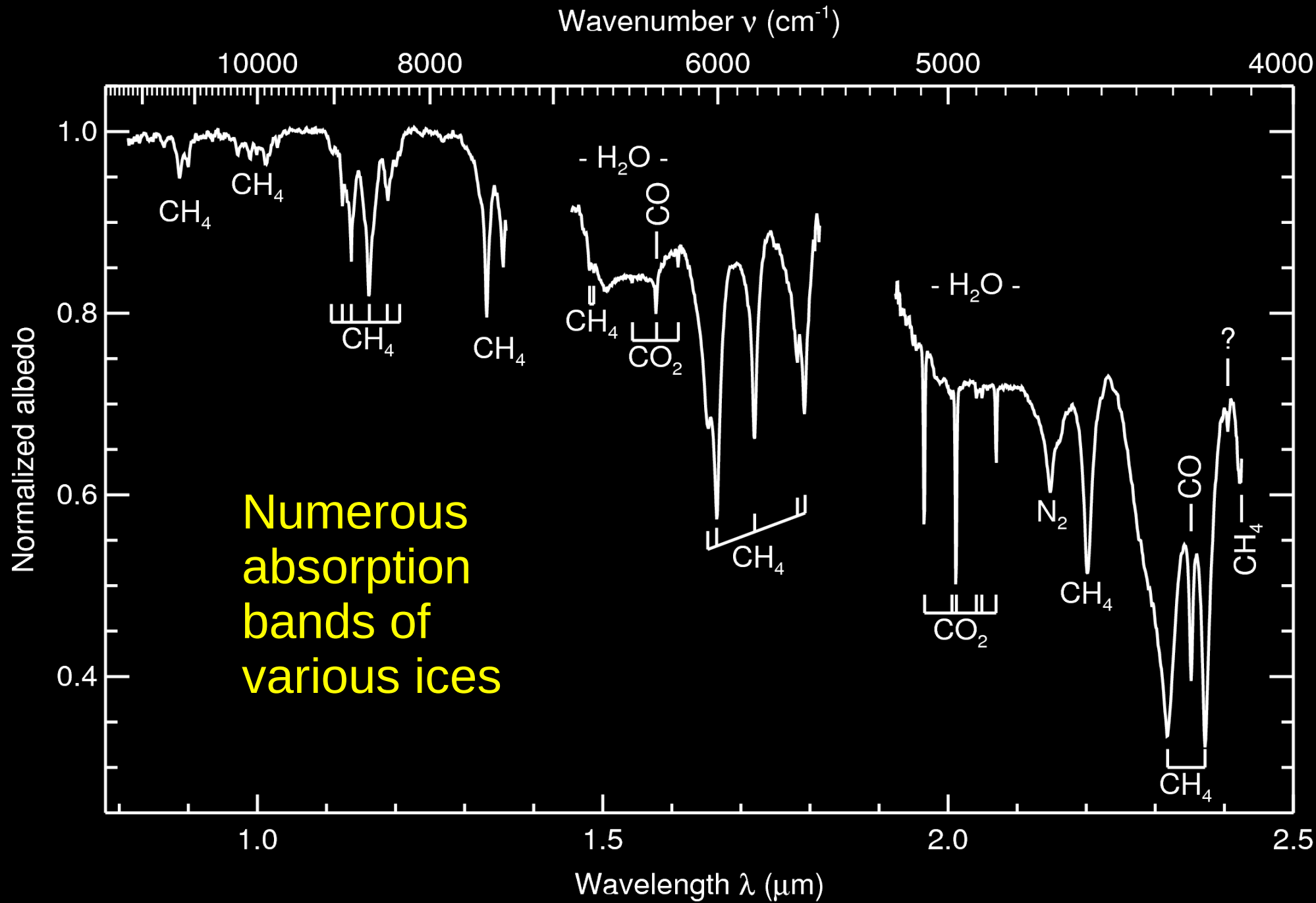


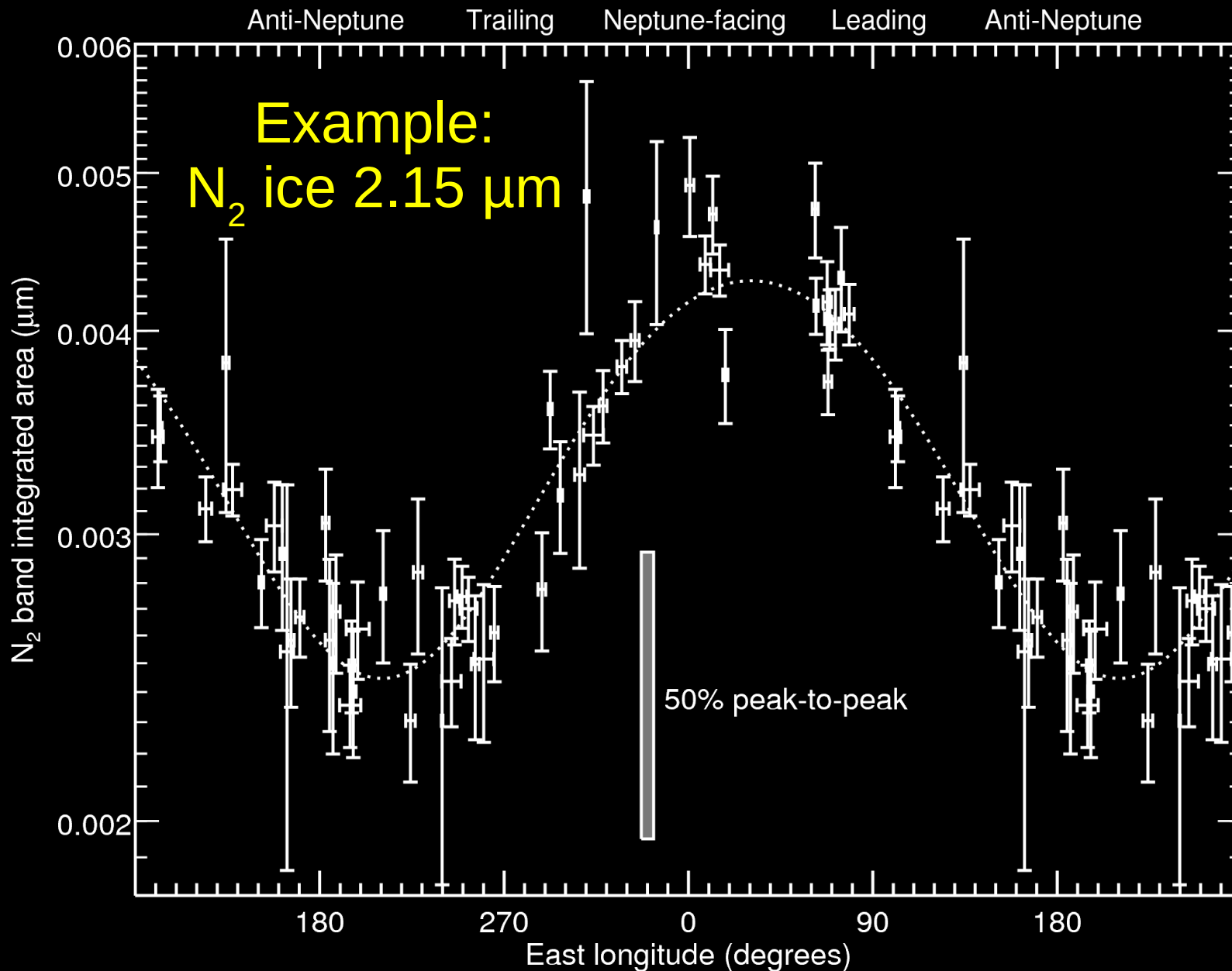
# *Ten Years of Triton Spectral Monitoring with IRTF/SpeX*

- Observed every year since 2000, now more than 50 nights, looking for transient events. Takes just a few hours – perfect for remote observing.
- No sign of transient events so far, but spectacular detail on longitudinal distribution of ices, and also hints of secular evolution.
- Reference: Grundy, Young, Stansberry, Buie, Olkin, and Young 2010. Near-infrared spectral monitoring of Triton with IRTF/SpeX II: Spatial distribution and evolution of ices. *Icarus* 205, 594-604.

# Average Triton Spectrum

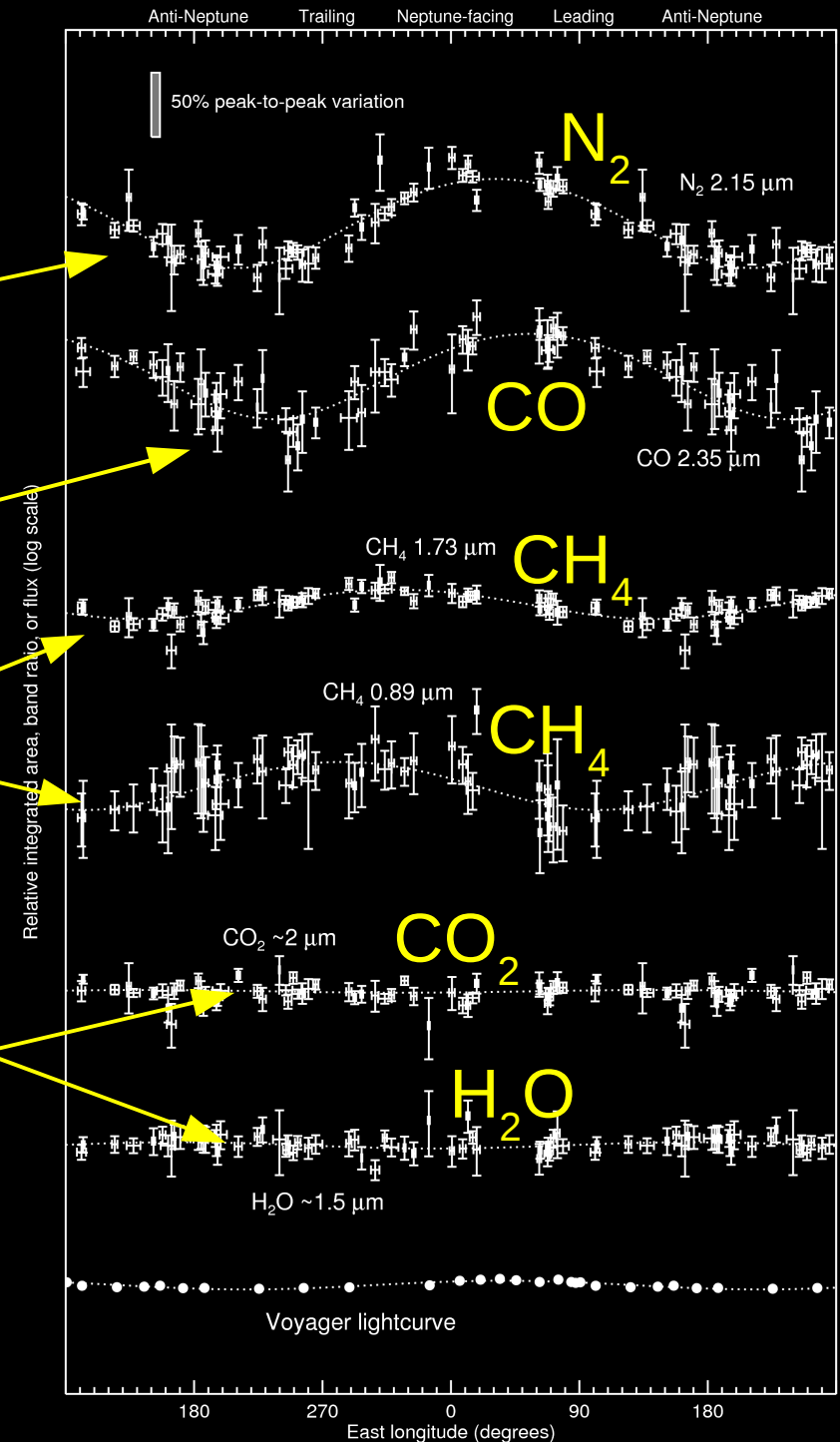


# Measure Absorption Band Variation as Triton Rotates

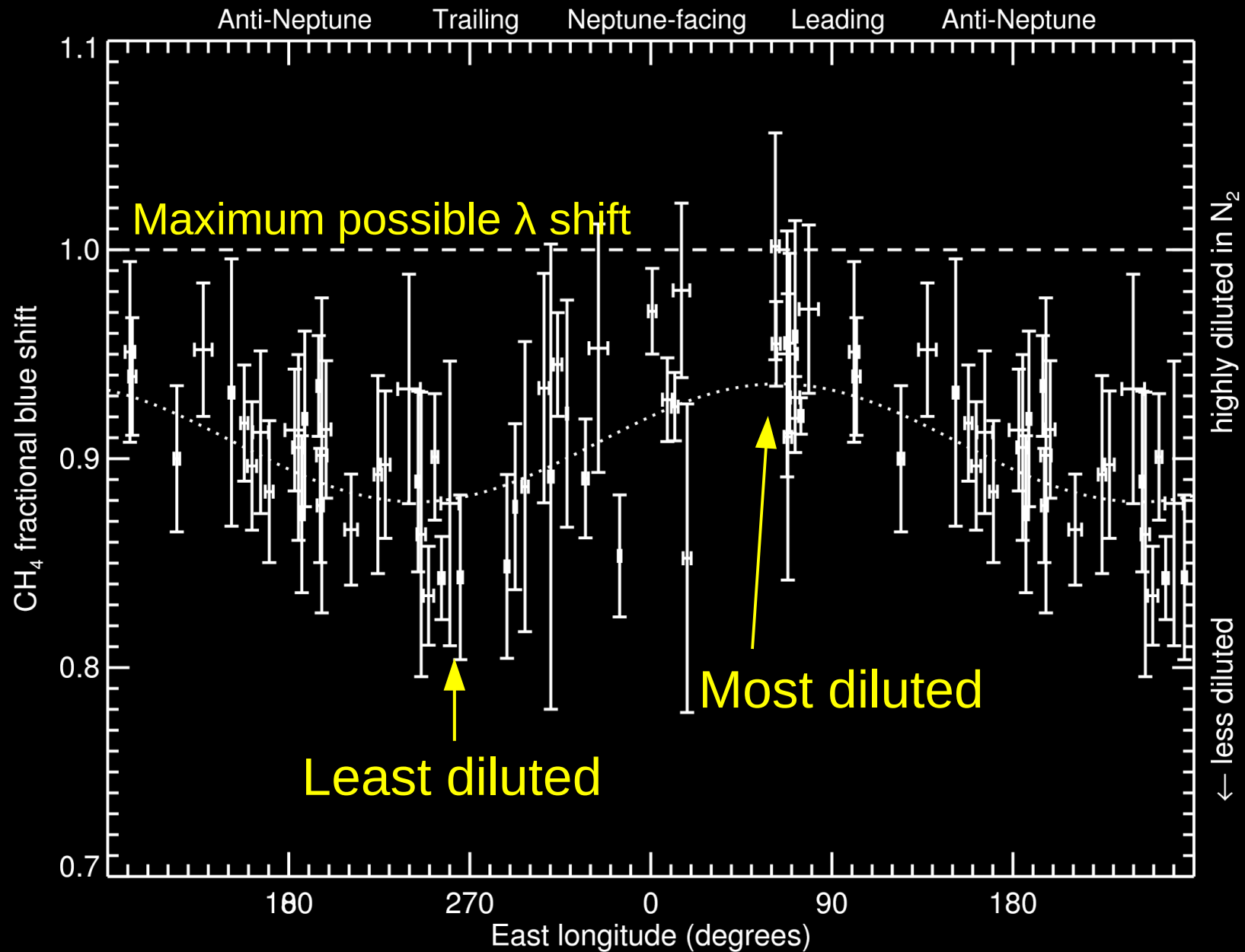


# Triton Summary

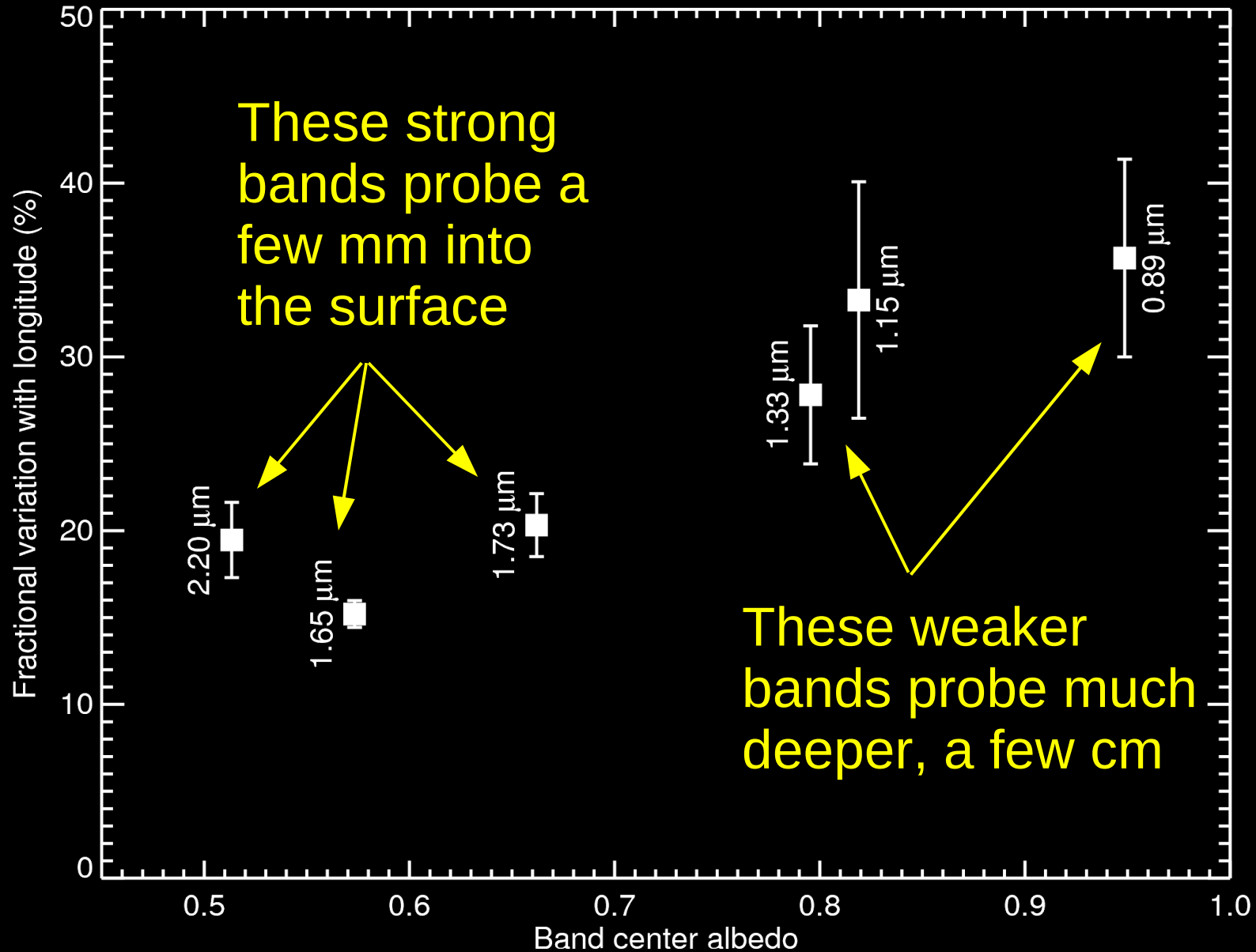
- Big  $N_2$  ice enhancement on Neptune-facing hemisphere.
- CO ice is similar. Co-occurs with  $N_2$  ice.
- $CH_4$  ice is different. More concentrated on trailing hemisphere.
- $H_2O$  and  $CO_2$  ices do not vary. Globally distributed, or only at high latitudes.



# More $CH_4$ Details: Dilution in $N_2$ Ice



# More CH<sub>4</sub> Details: Stratigraphy

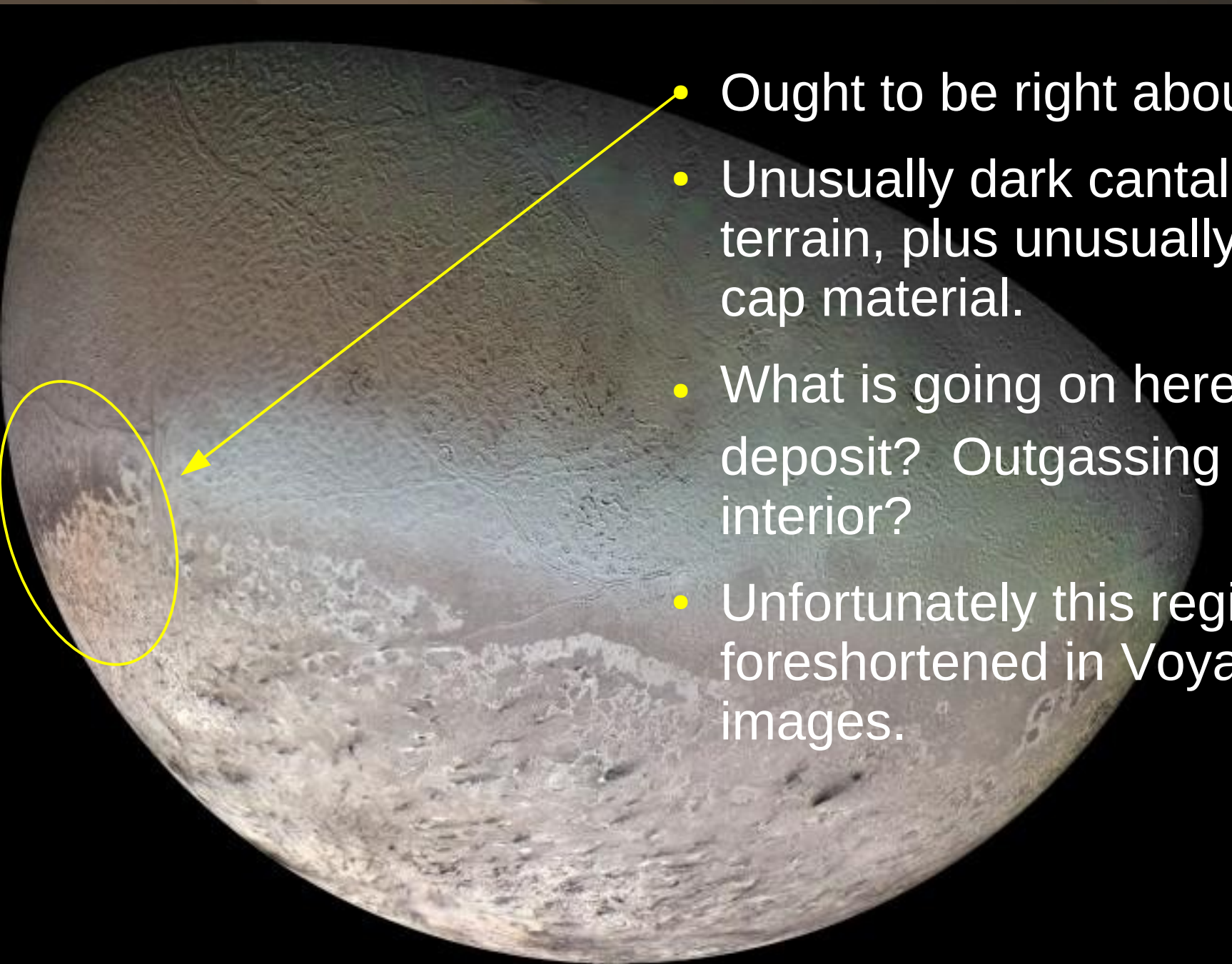


# *Complex CH<sub>4</sub> Ice Behavior*

- Longitudinal pattern is very different from N<sub>2</sub> ice, but wavelength shift says CH<sub>4</sub> is mostly diluted in N<sub>2</sub> ice.
- Wavelength shift varies with longitude, with least shift (least dilution) on the trailing hemisphere, where CH<sub>4</sub> absorption is strongest.
- Stronger CH<sub>4</sub> bands (which probe shallower) show lower amplitude variation than weaker bands (which probe deeper).
- Suggests a concentration of CH<sub>4</sub>-rich ice below the surface, localized around 300° E longitude.



# Where Is This $\text{CH}_4$ -Rich Region?



- Ought to be right about here.
- Unusually dark cantaloupe terrain, plus unusually red polar cap material.
- What is going on here?  $\text{CH}_4$  lag deposit? Outgassing from the interior?
- Unfortunately this region is very foreshortened in Voyager images.



# Secular Evolution of $N_2$ Ice?

Dashed curve is sine fit to all data. Solid curves are sines fit to 2000-2004 and 2005-2009 subsets.

Amplitude drop is not quite  $3\text{-}\sigma$ . Needs to be confirmed.

