New Horizons: First Scientific Results

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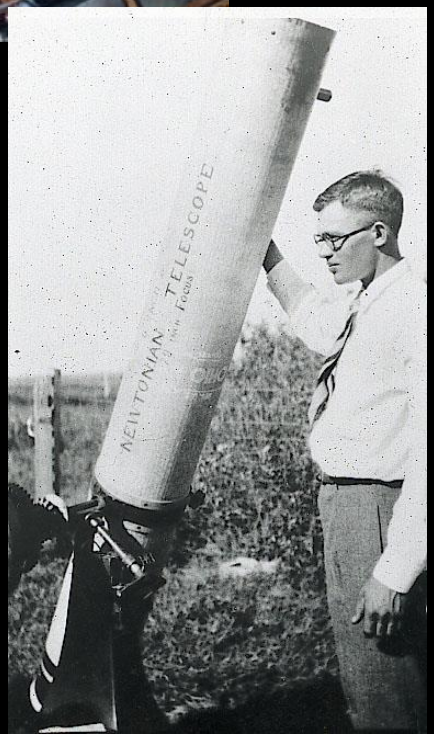
Discovery of Pluto (1930)

Percival Lowell
(1855-1916)



Clyde Tombaugh
(1906-1997)

DISCOVERY OF THE PLANET PLUTO

January 23, 1930

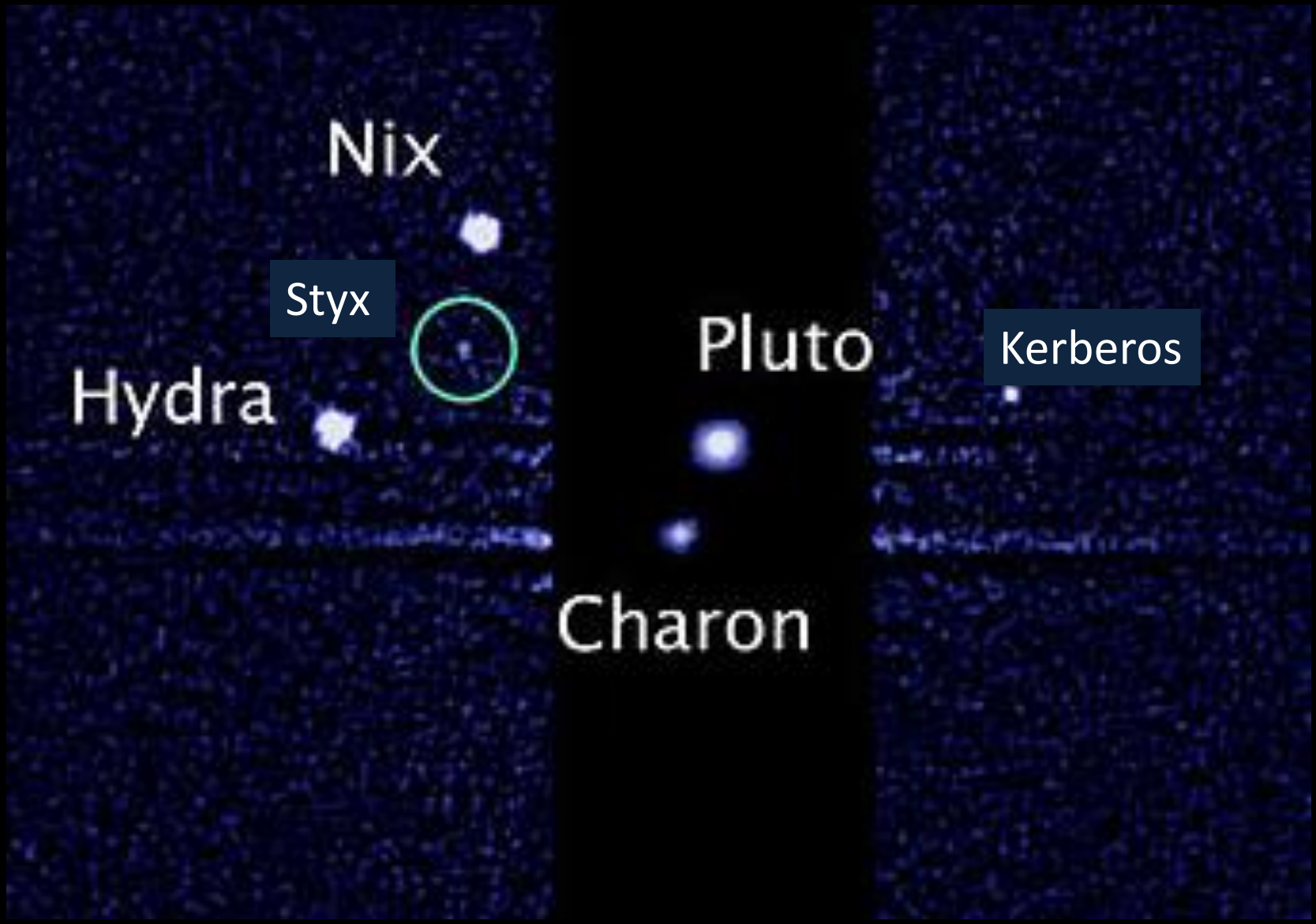
January 29, 1930

Discovery of Pluto's main moon (1978)

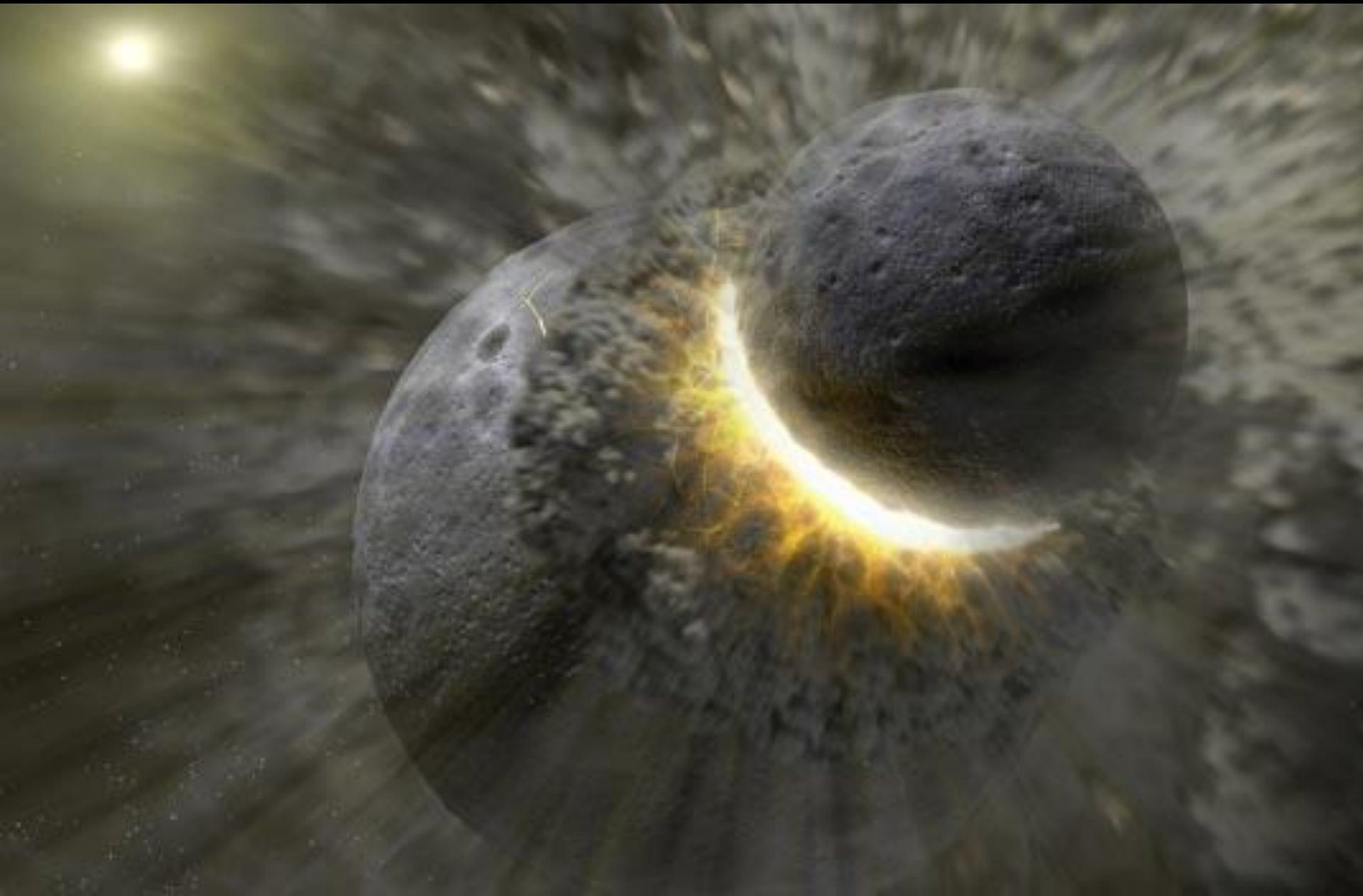
The discovery photograph (Pluto + Charon; Charon Is the blob)

Christy & Harrington

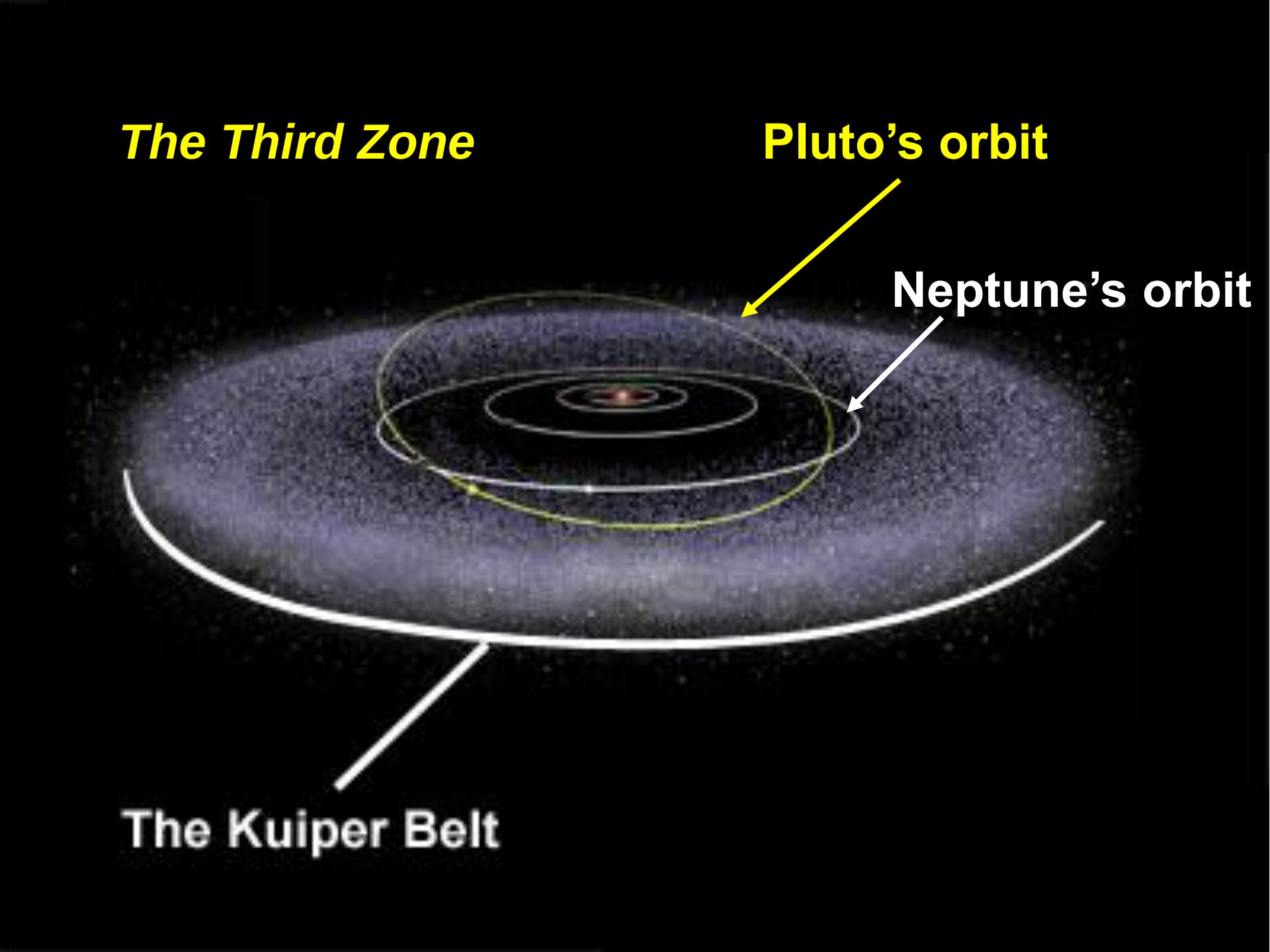
Hubble: July 2012



The origin of Charon?



The clearest map of Pluto prior to New Horizons (Buie et al., 2010)


The Third Zone
Pluto's orbit
Neptune's orbit
The Kuiper Belt


Triton (Neptune moon)
What we expected to see
(What we didn't see)

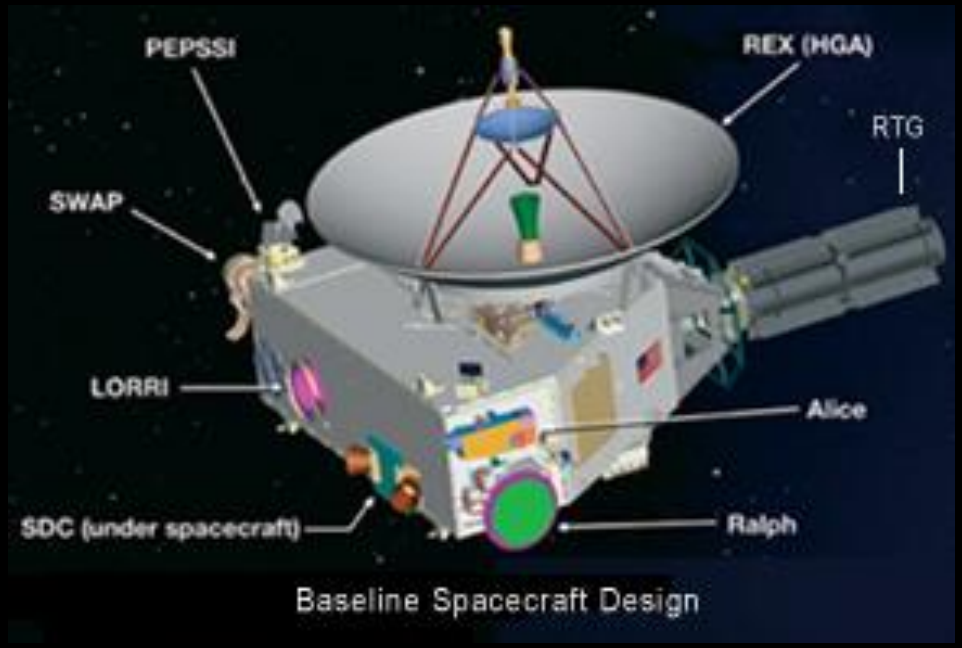
New Horizons

Finally, a mission to complete the inventory

New Horizons: Mission Objectives

- Map surface composition of Pluto & Charon
- Characterize geology and morphology of Pluto, Charon & new satellites
- Characterize the atmosphere of Pluto and its evolution
- Search for an atmosphere around Charon
- Map temperatures on Pluto & Charon
- Search for rings and additional satellites around Pluto
- PLUS... conduct similar investigations of one or more Kuiper Belt Objects

New Horizons: Basics



Baseline Spacecraft Design

Ralph: *Visible and IR spectrometer: composition and temperature of surface of Pluto, Charon, and new moons*

Alice: *Ultraviolet spectrometer: atmospheric detection and structure*

LORRI: *Camera to study geology; look for moons and rings*

REX: *Radio science experiment: atmospheric temperature and composition*

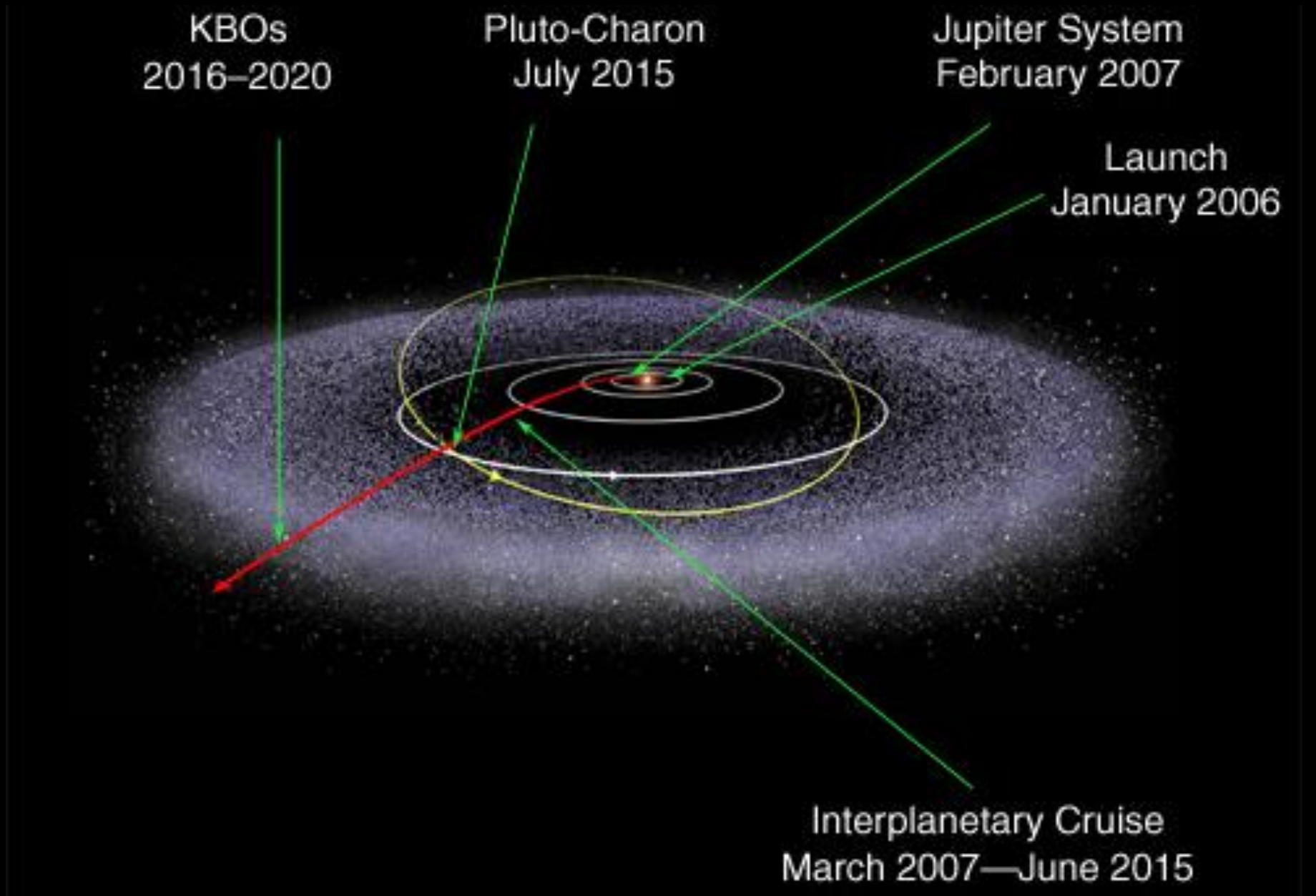
SWAP: *Solar wind studies*

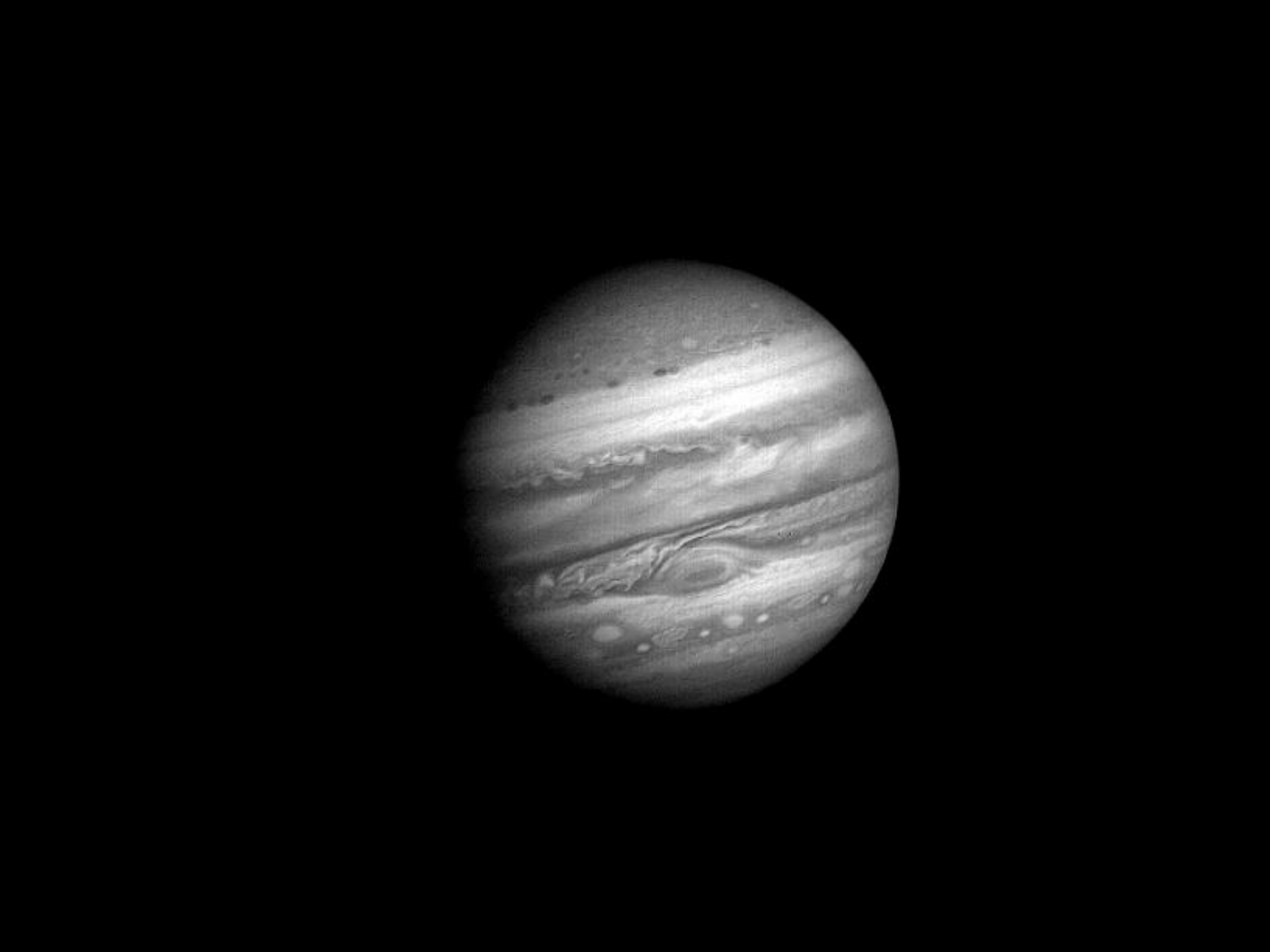
PEPPSI: *Energetic particle detector*

SDC: *Student dust counter*

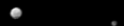
http://pluto.jhuapl.edu

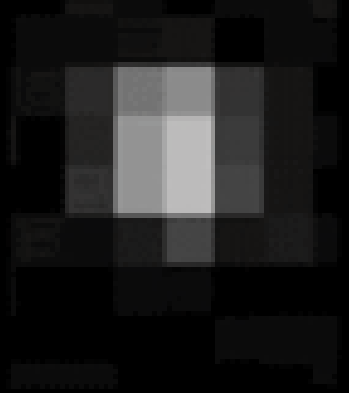
Mission profile

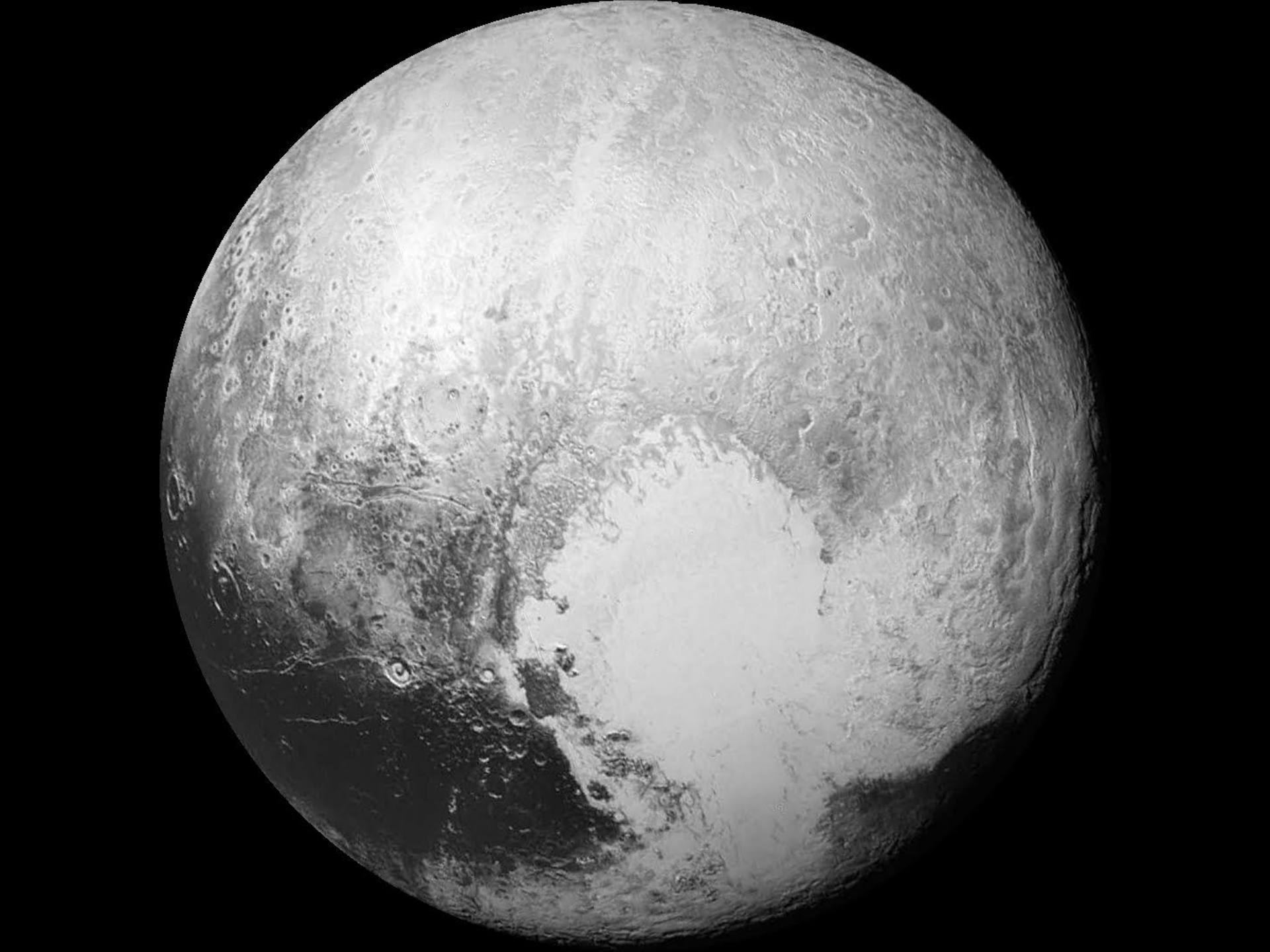


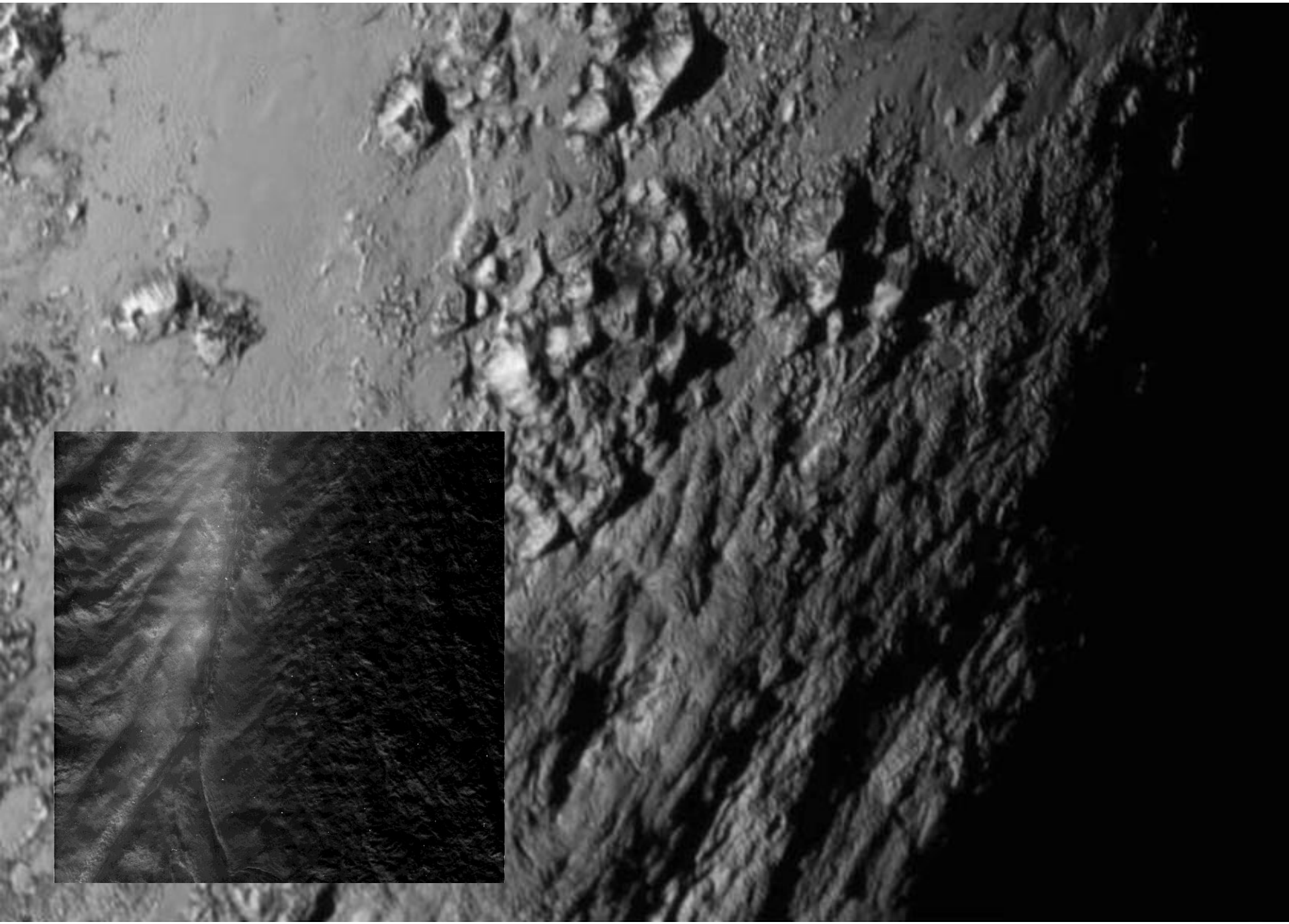


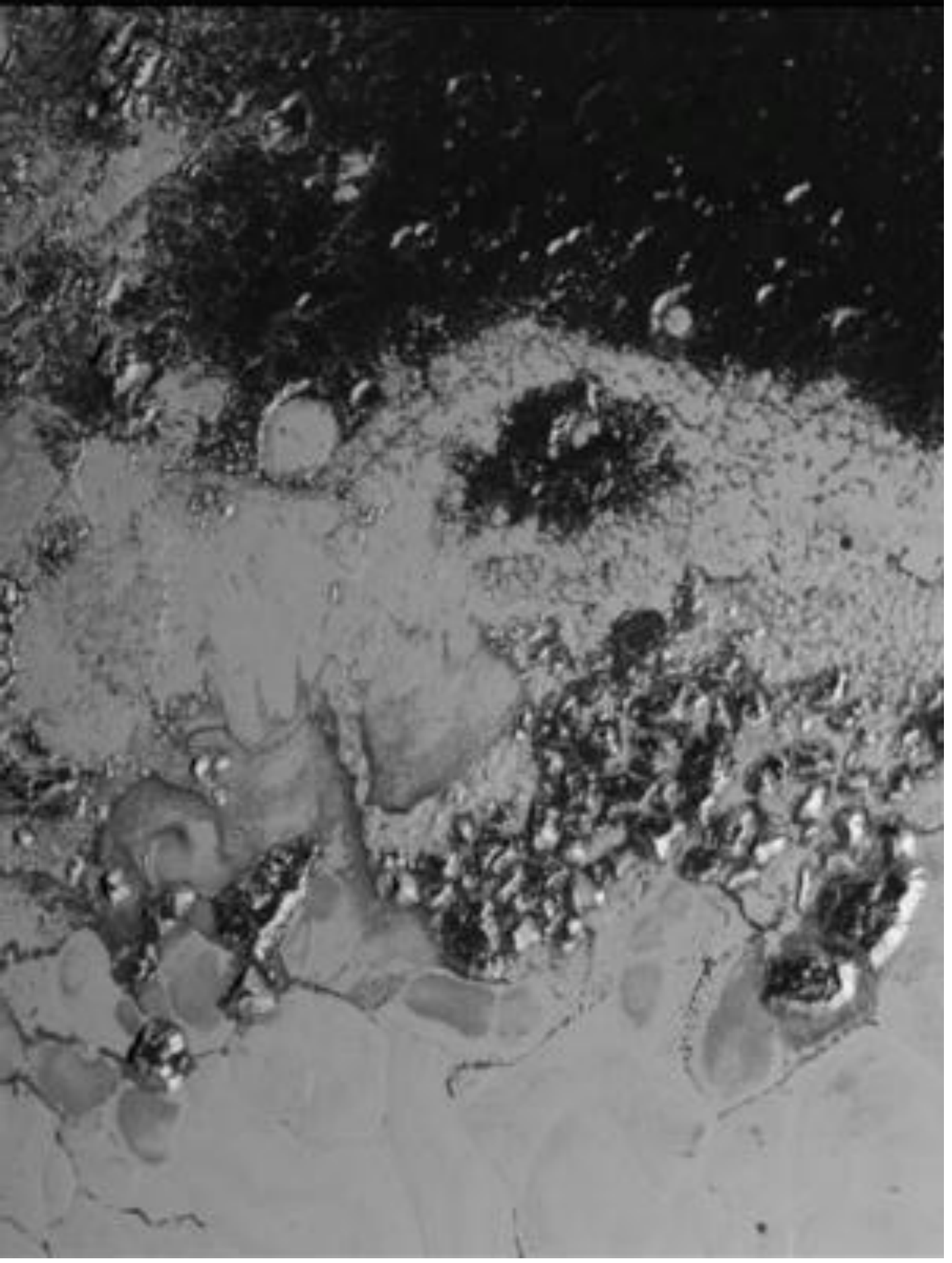

NH LORRI OPNAV CAMPAIGN 1
2014-07-19 02:30:00 UTC
Distance to Pluto: 429375336 Km
(Proper Motion)



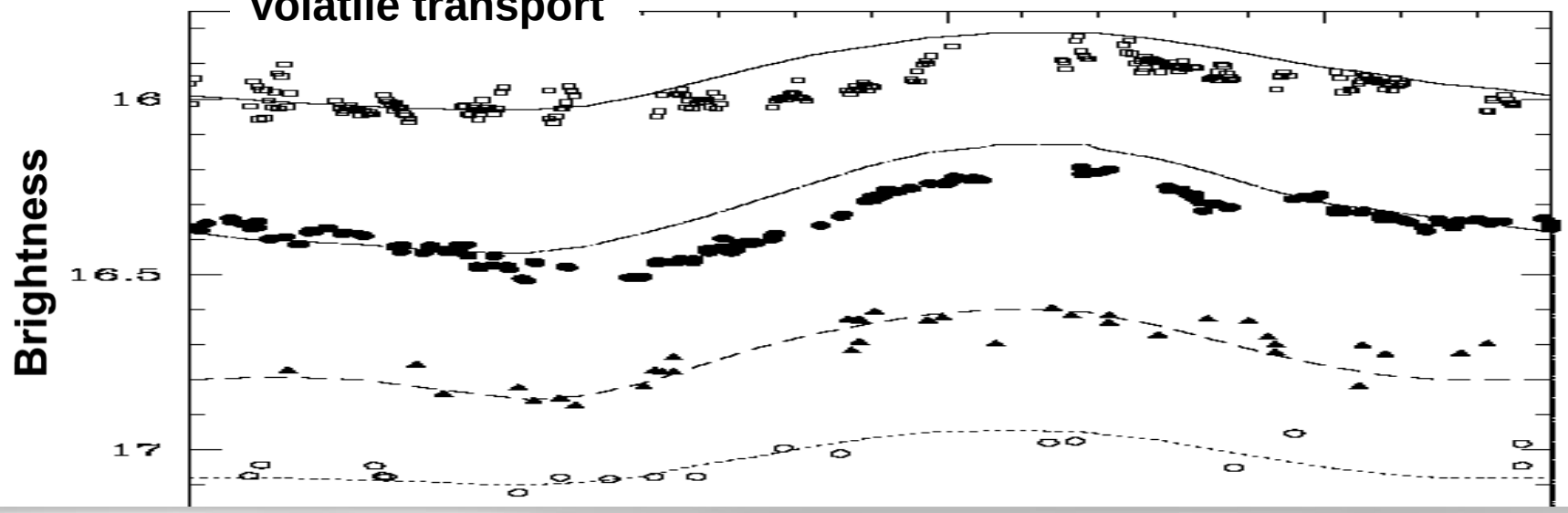


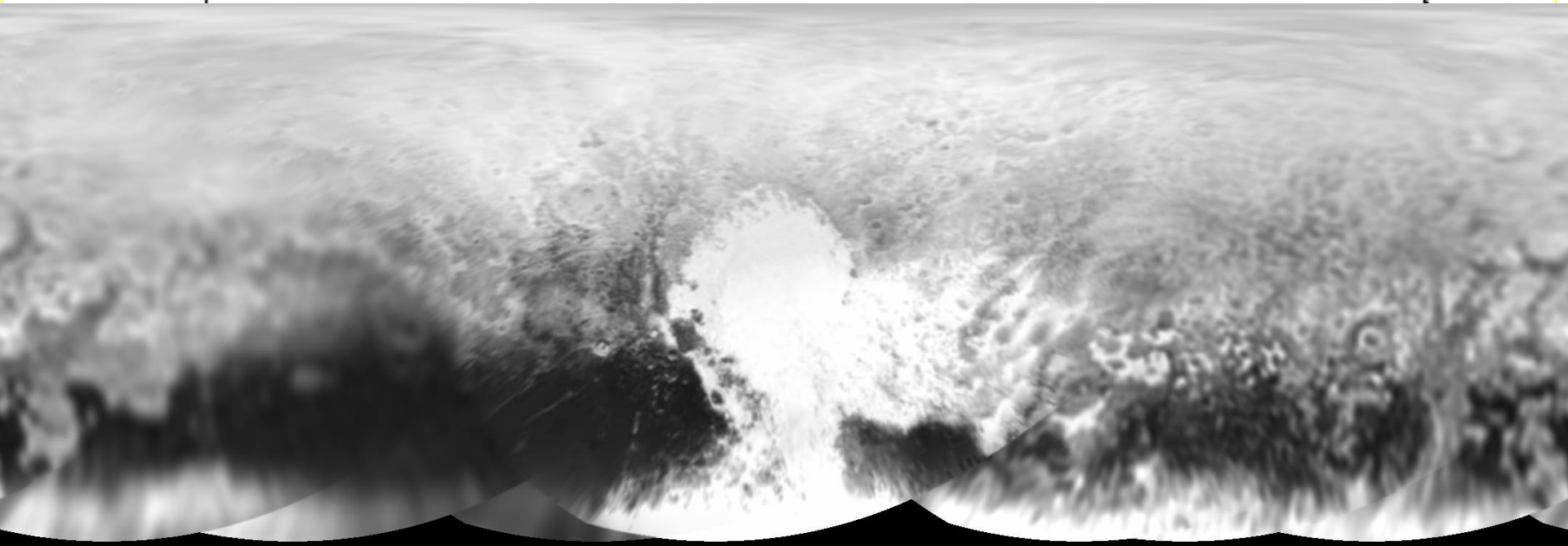




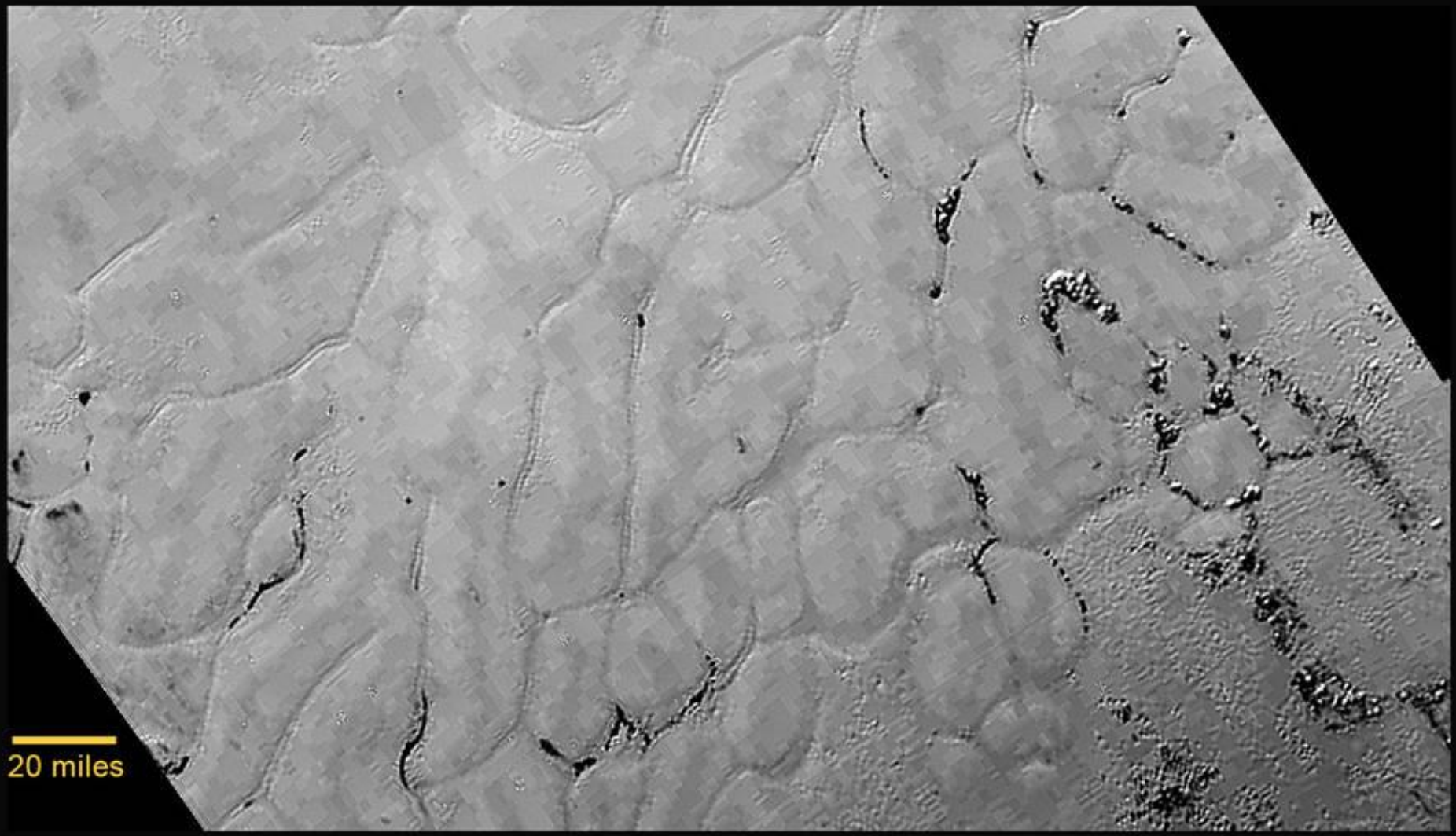


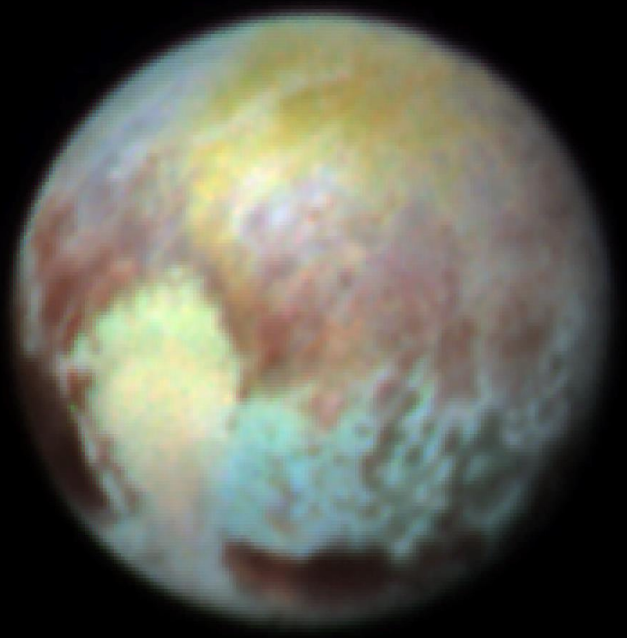
Volatile transport





The solid lines are no frost transport; the data show sublimation in the bright regions in the past few decades.


20 miles



PLUTO'S BROKEN HEART IN FALSE COLOR

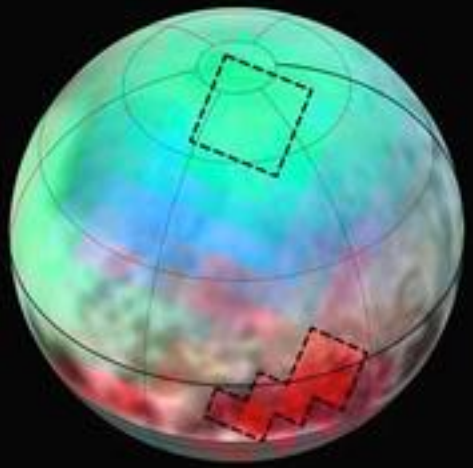
NASA NEW HORIZONS – RALPH INSTRUMENT

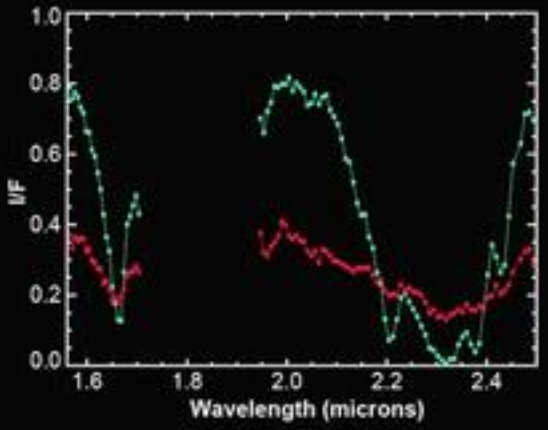
BLUE, RED, AND CH4 FILTERS – IMAGED JULY 13 2015

Leisa spectrometer first results

CO

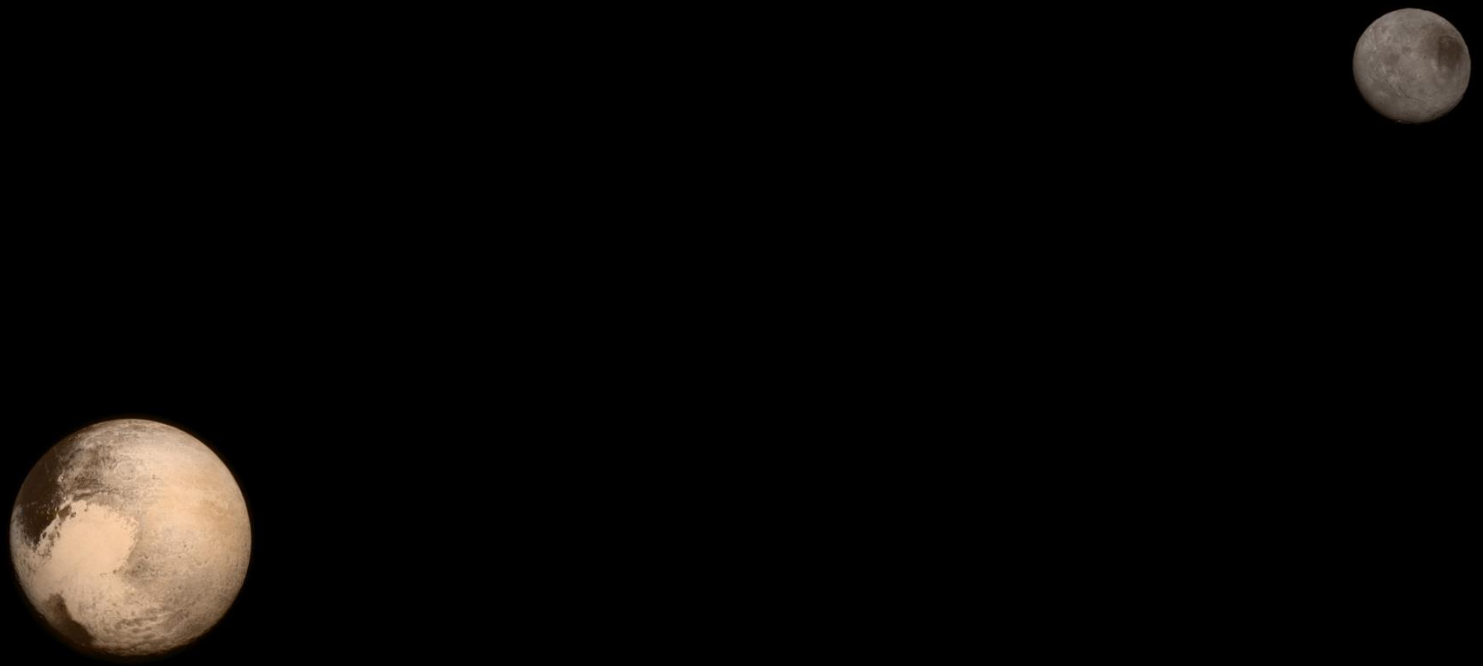
Methane on Pluto





Infrared Spectral Image

Colors of Pluto and Charon

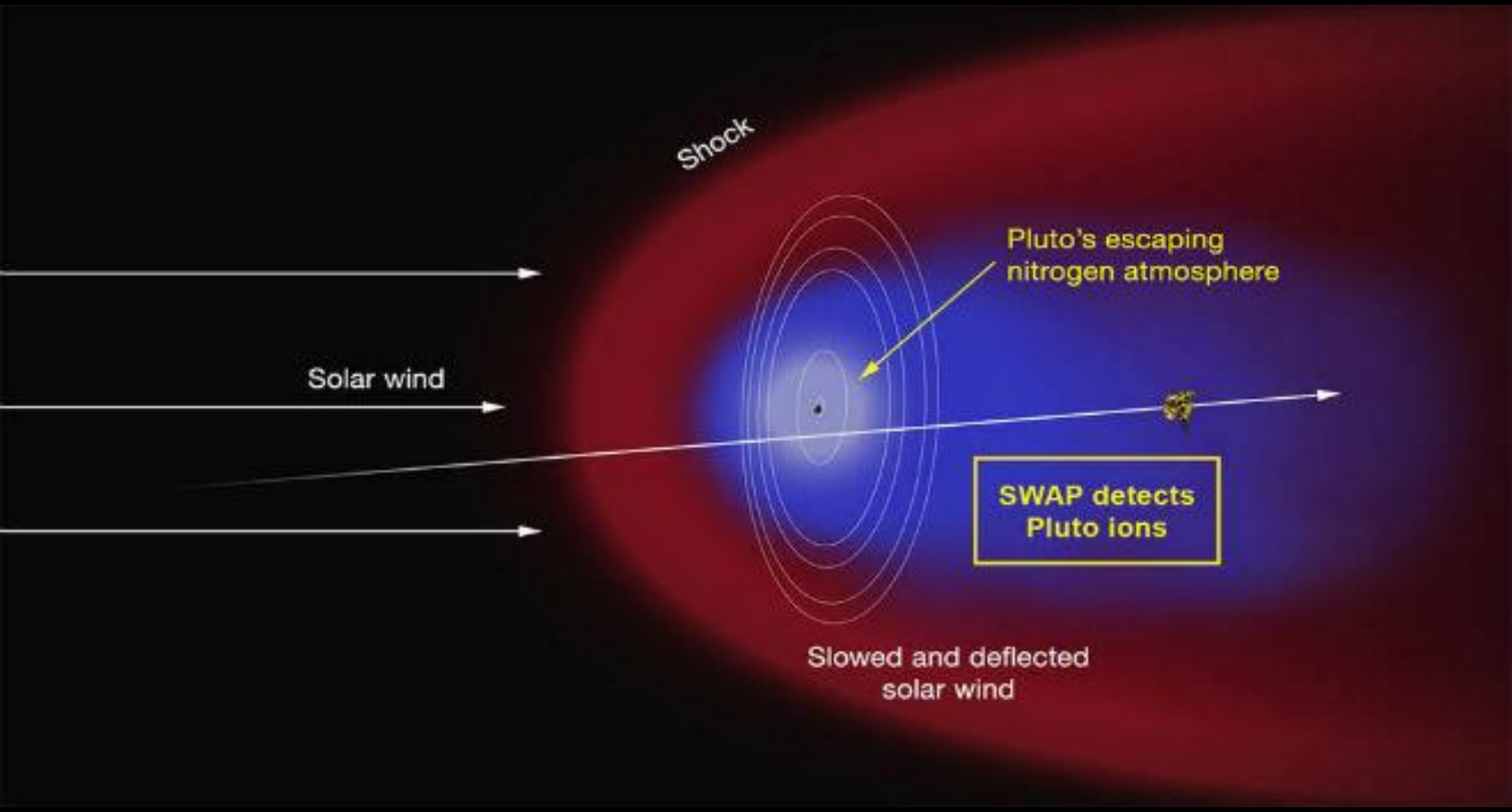


Nix and Hydra

42X36 km

55X40 km

The magnetosphere of Pluto: It has a tail!



Young people (postdocs especially) and women powered the *New Horizons* project

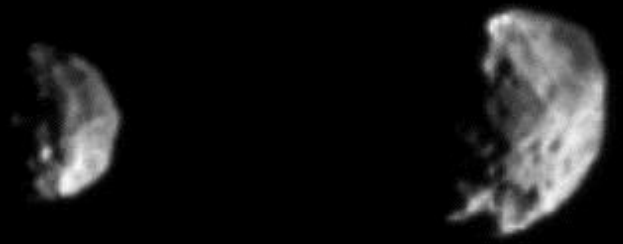
Venetia Burney Student Dust Counter

Conclusions and future work

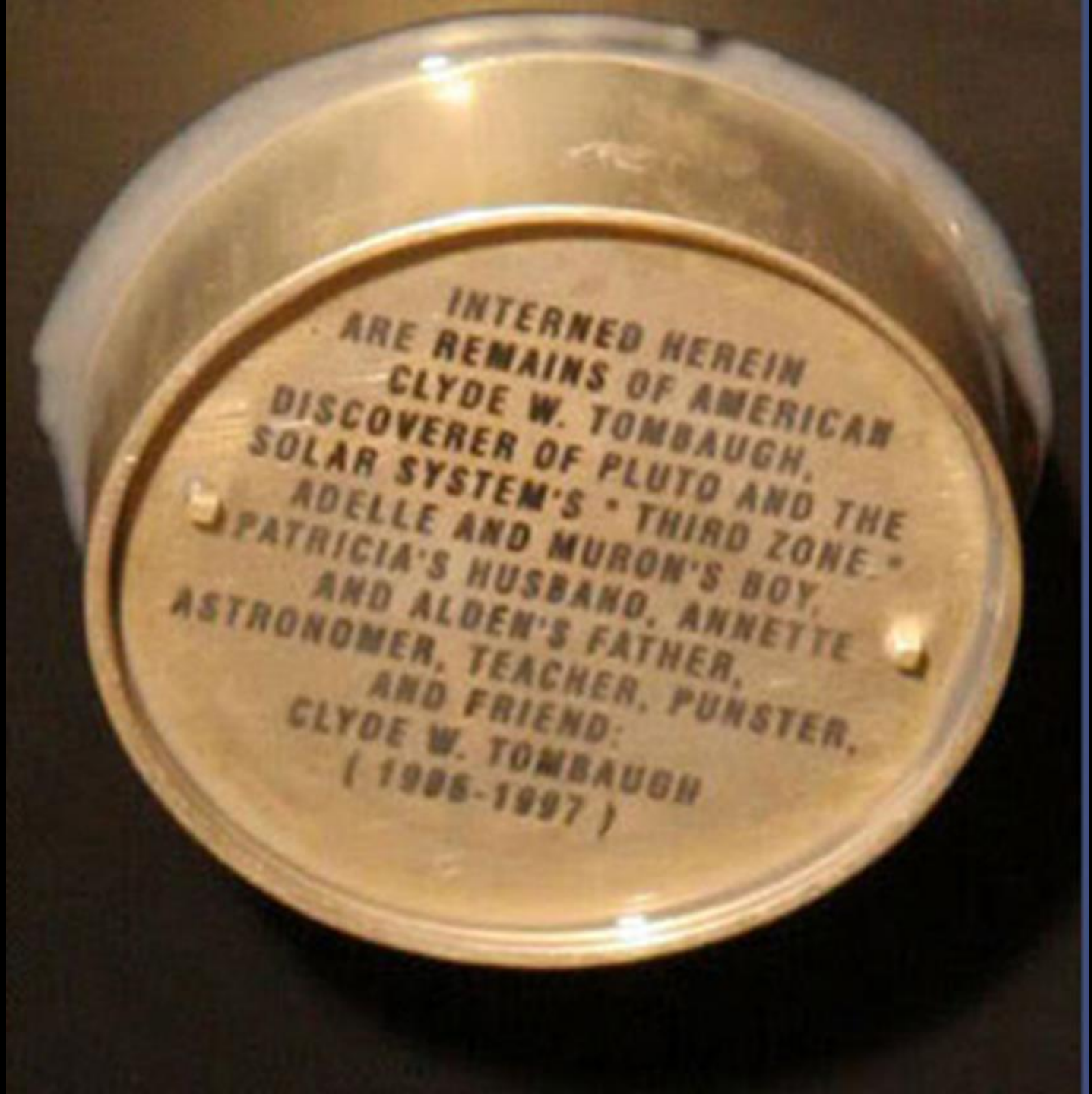
- **Pluto has a complex geologic history, with evidence for seasonal volatile transport and active processes since its formation. Multiple events seem to have occurred. Many areas are crater-free**
- **There are multiple compositional units**
- **Most of data has yet to be returned.**

Extended mission

An extended KBO mission is planned, pending NASA approval. *New Horizons* plans on going to a small (<100 km) cold-disk KBO. At least two candidates were identified, with decision on the target due this summer.



Phoebe: a possible captured KBO similar to the own to be observed by *New Horizons*.


INTERNED HEREIN
ARE REMAINS OF AMERICAN
CLYDE W. TOMBAUGH,
DISCOVERER OF PLUTO AND THE
SOLAR SYSTEM'S " THIRD ZONE "
ADELLE AND MURON'S BOY,
PATRICIA'S HUSBAND, ANNETTE
AND ALDEN'S FATHER,
ASTRONOMER, TEACHER, PUNSTER,
AND FRIEND:
CLYDE W. TOMBAUGH
(1906-1997)