

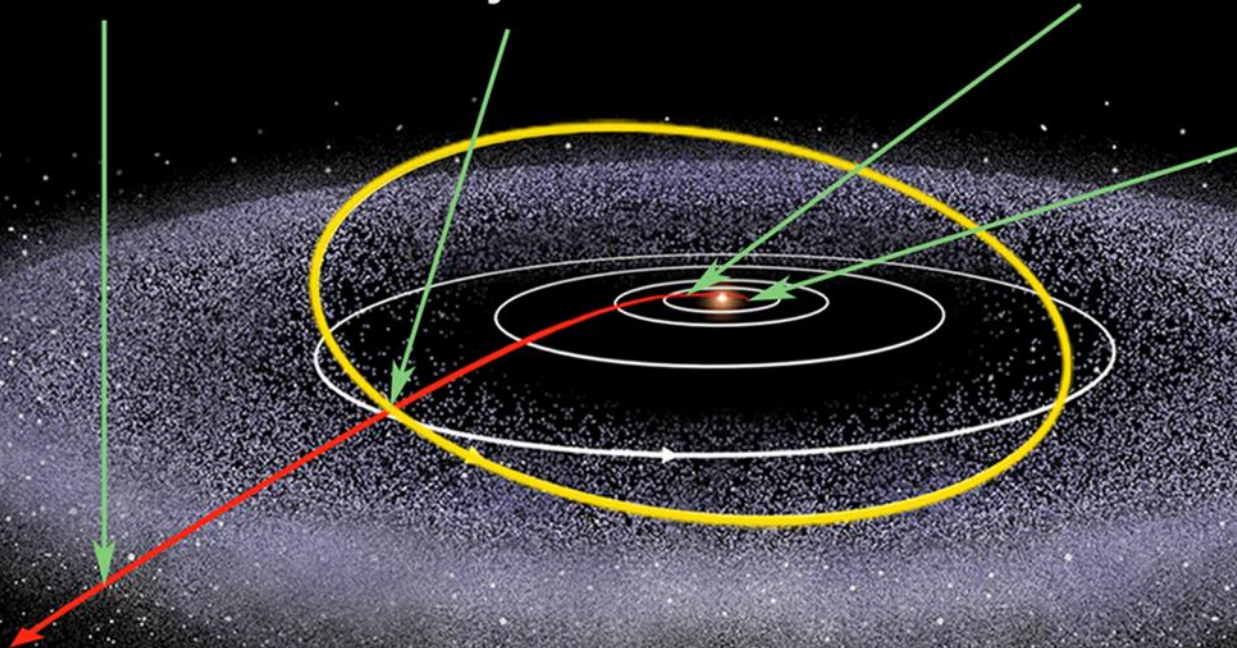
**The Everest of
Planetary Exploration:
New Horizons Explores
The Pluto System 2015**

KBOs
2016-2020

Pluto System
July 2015

Jupiter System
Feb 2007

Launch
Jan 2006

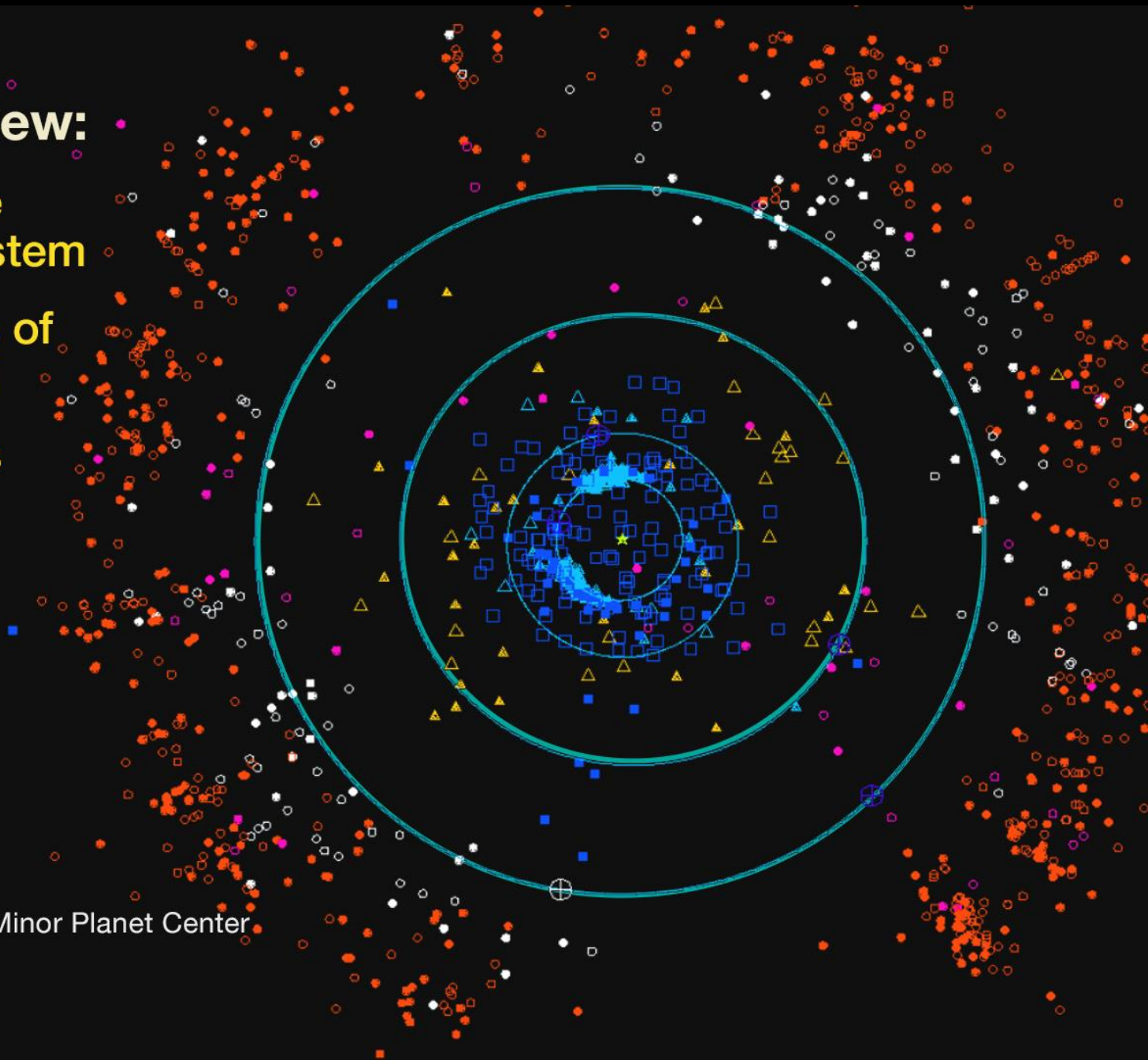


The New View:

A Three-Zone
Planetary System

A Third Class of
Planet Found

Small Planets
Dominate



Plot prepared by the Minor Planet Center

Kuiper Belt

Weywot



Quaoar



Sedna

Hi'iaka, Namaka



Haumea



Makemake

Dysnomia



Eris

Charon, Hydra, Nix



Pluto



Orcus



Ixion



Varuna



AW197

Asteroid Belt



(1) Ceres



(2) Pallas

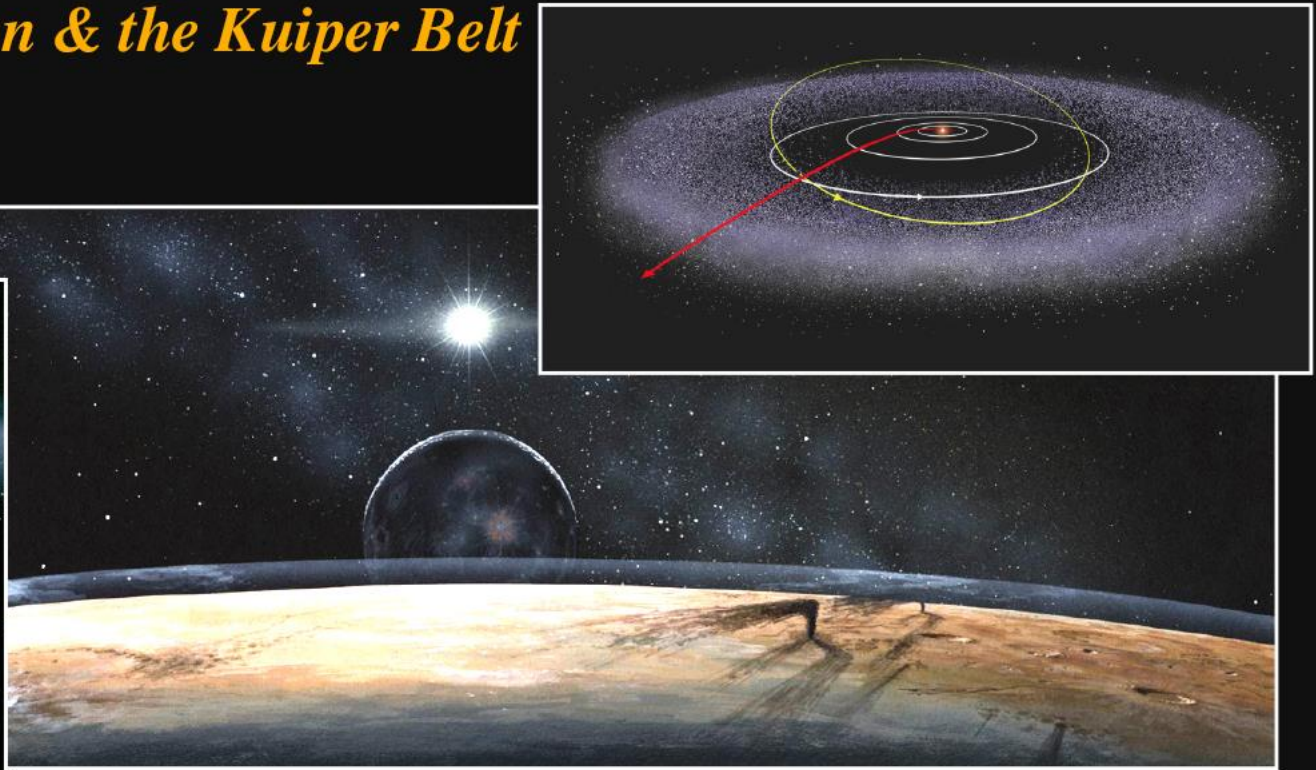
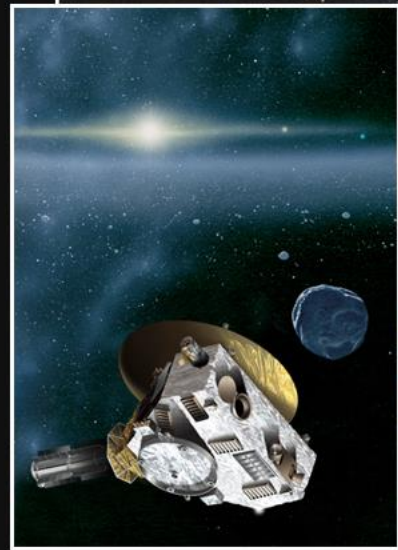


(4) Vesta

Scale
1000 km

Highest Funding Priority Medium-Scale Mission New Start of the 2003 Planetary Decadal Survey:

A Reconnaissance Expedition to Pluto-Charon & the Kuiper Belt



PEPSSI

REX

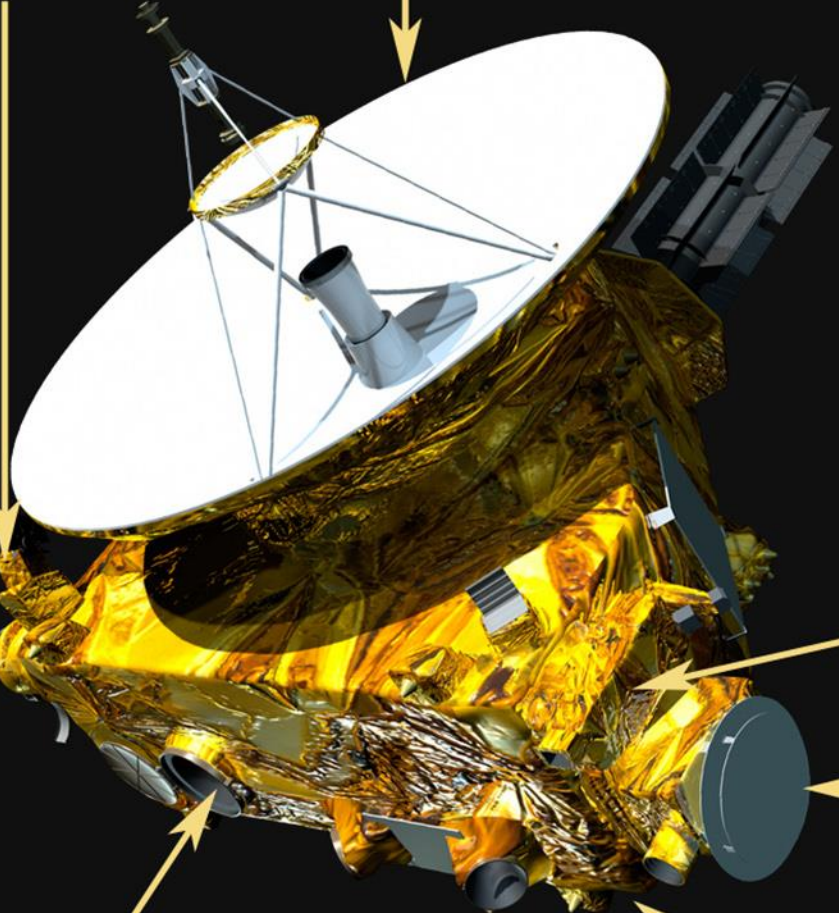
SWAP

LORRI

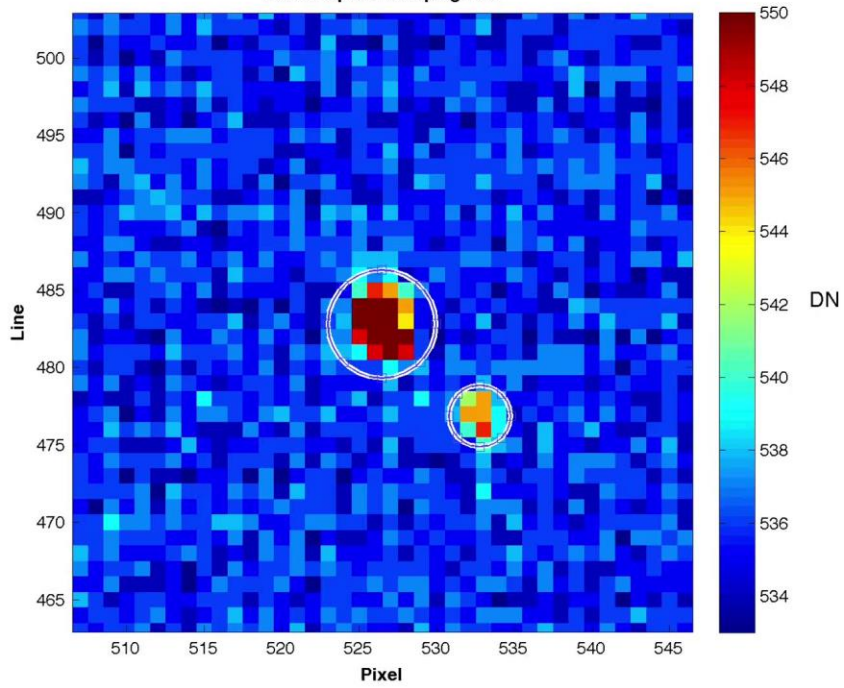
Alice

Ralph

Student
Dust Counter



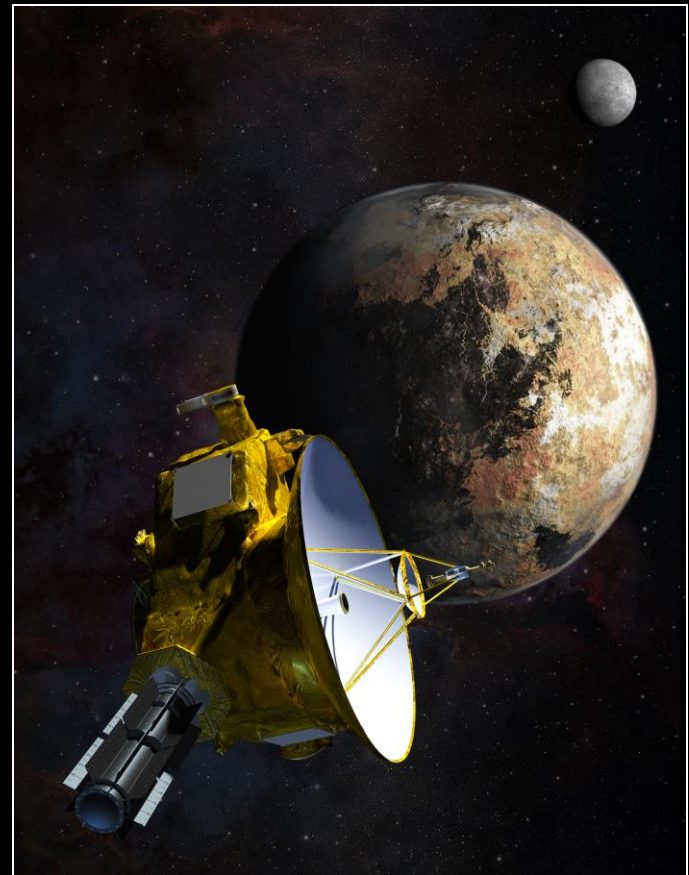
LORRI OpNav Campaign #1







NEW HORIZONS ON PLUTO'S DOORSTEP



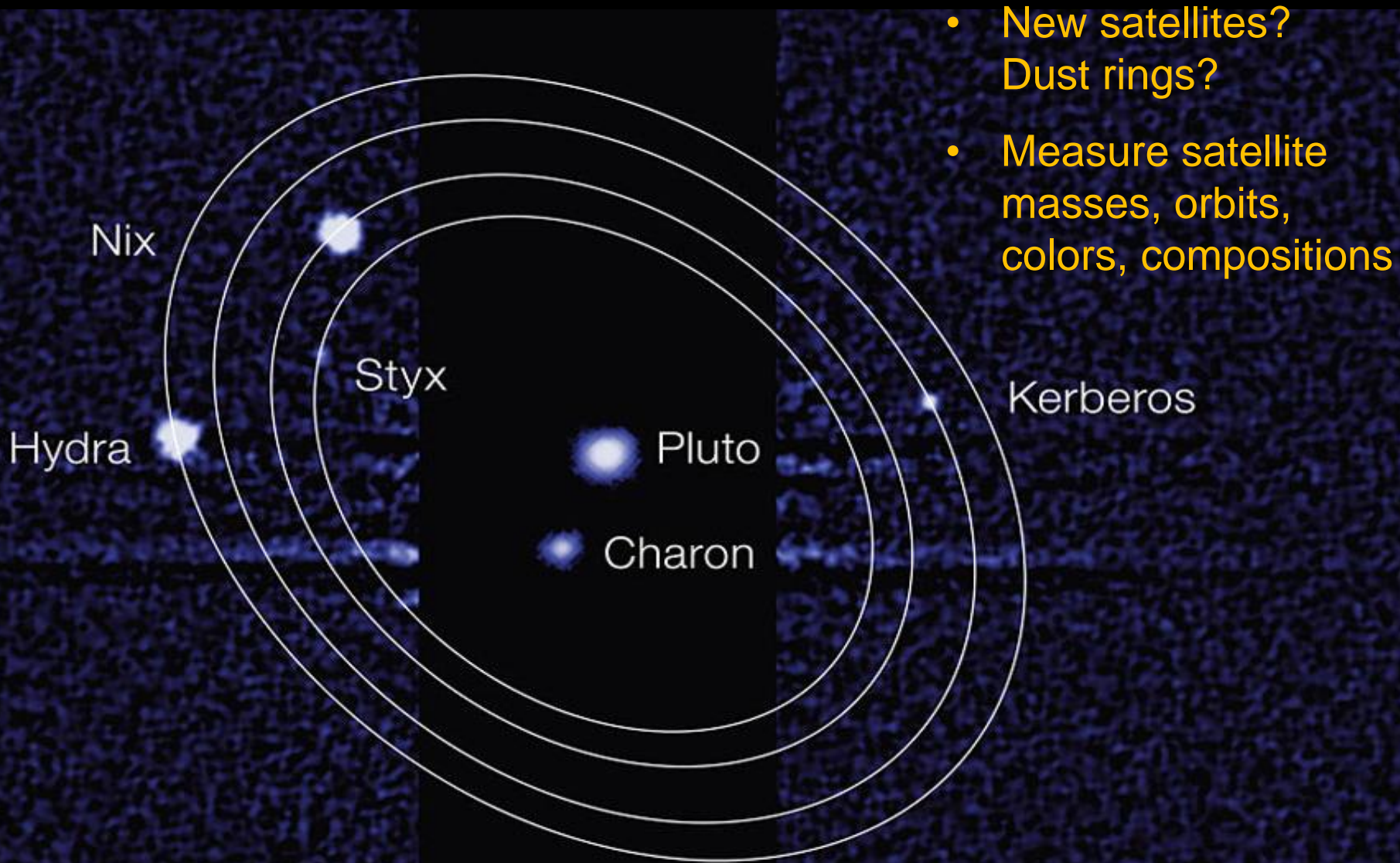
July 2015
Be There!





**New Horizons:
Science At The
Pluto System**

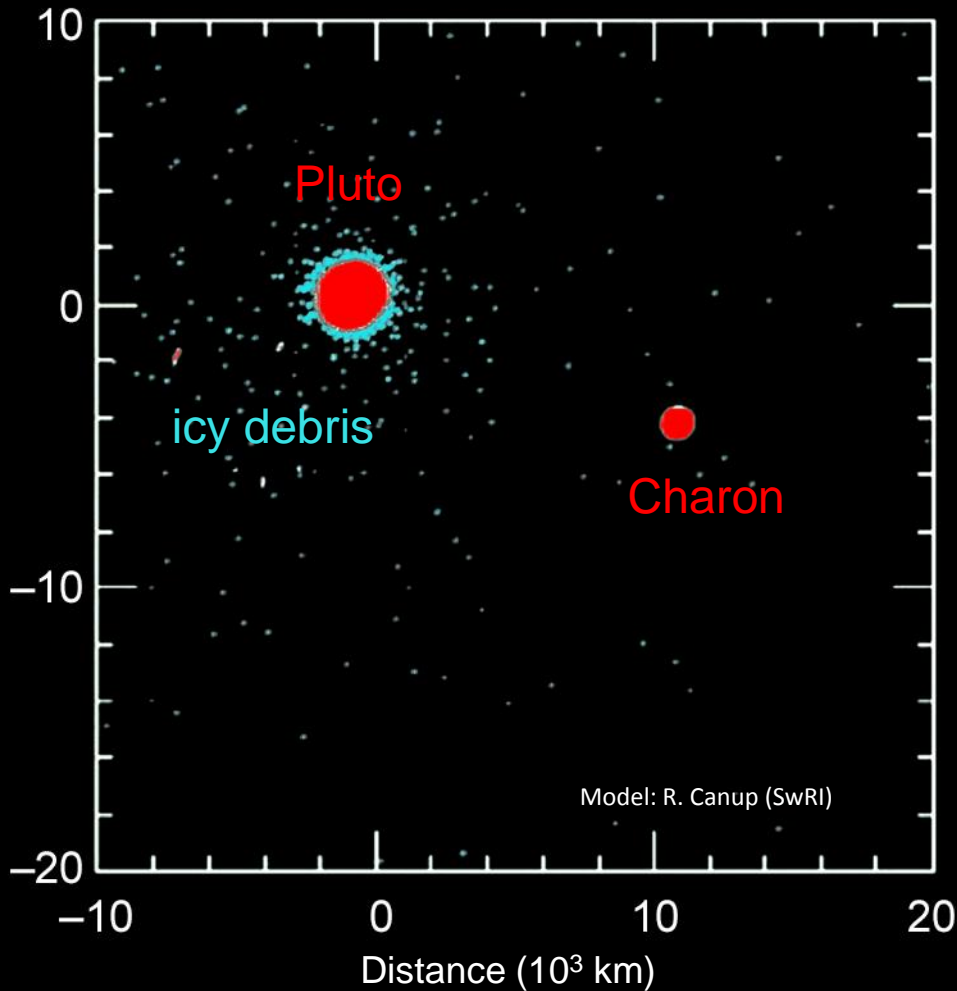
Total System Characterization



- New satellites?
Dust rings?
- Measure satellite masses, orbits, colors, compositions

Total System Characterization

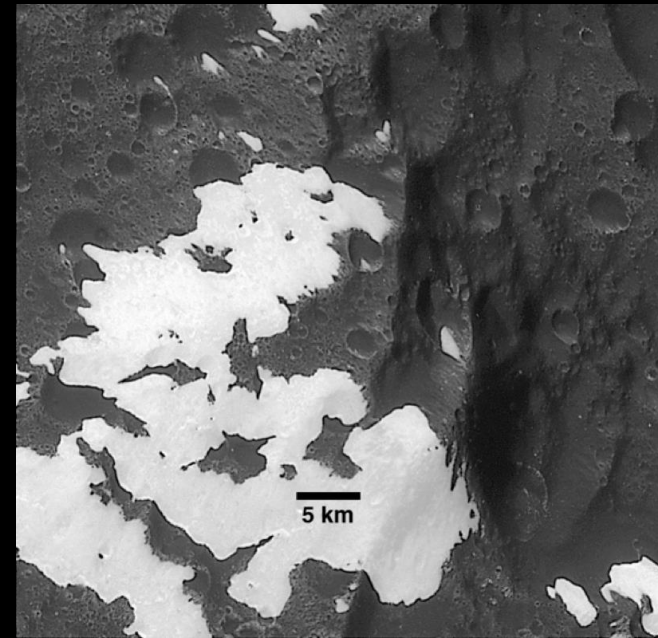
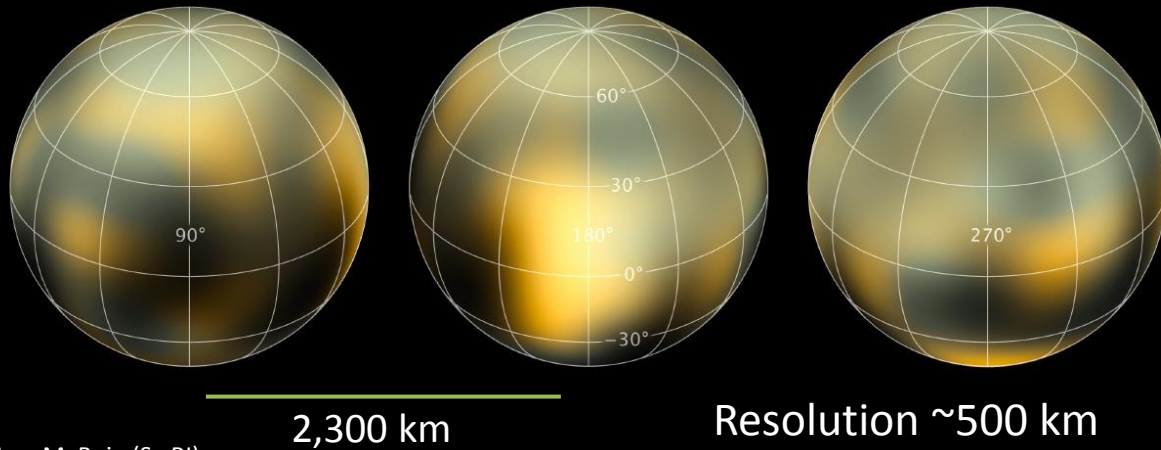
Outcome of Giant Impact



- Goal: Understand formation of Pluto system and the Kuiper Belt – and transformation of early solar system

Global Geology

Best “synthetic Pluto” from Hubble

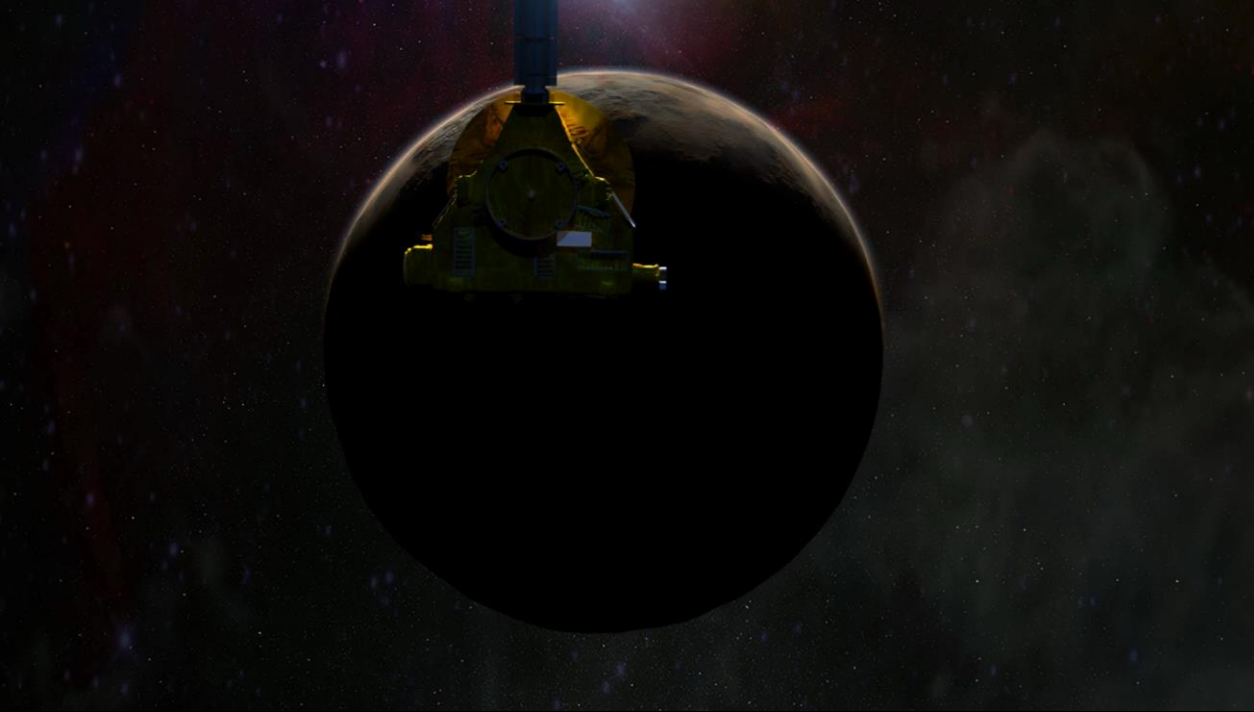


New Horizons:
90 meters/pixel

- High-Res mapping of Pluto and satellites Charon, Nix and Hydra
- Search for changes on approach to Pluto, surface-atmosphere interactions, mobile frosts, clouds and hazes
- Goal: Understand how dwarf planets evolve; compare and contrast with icy satellites

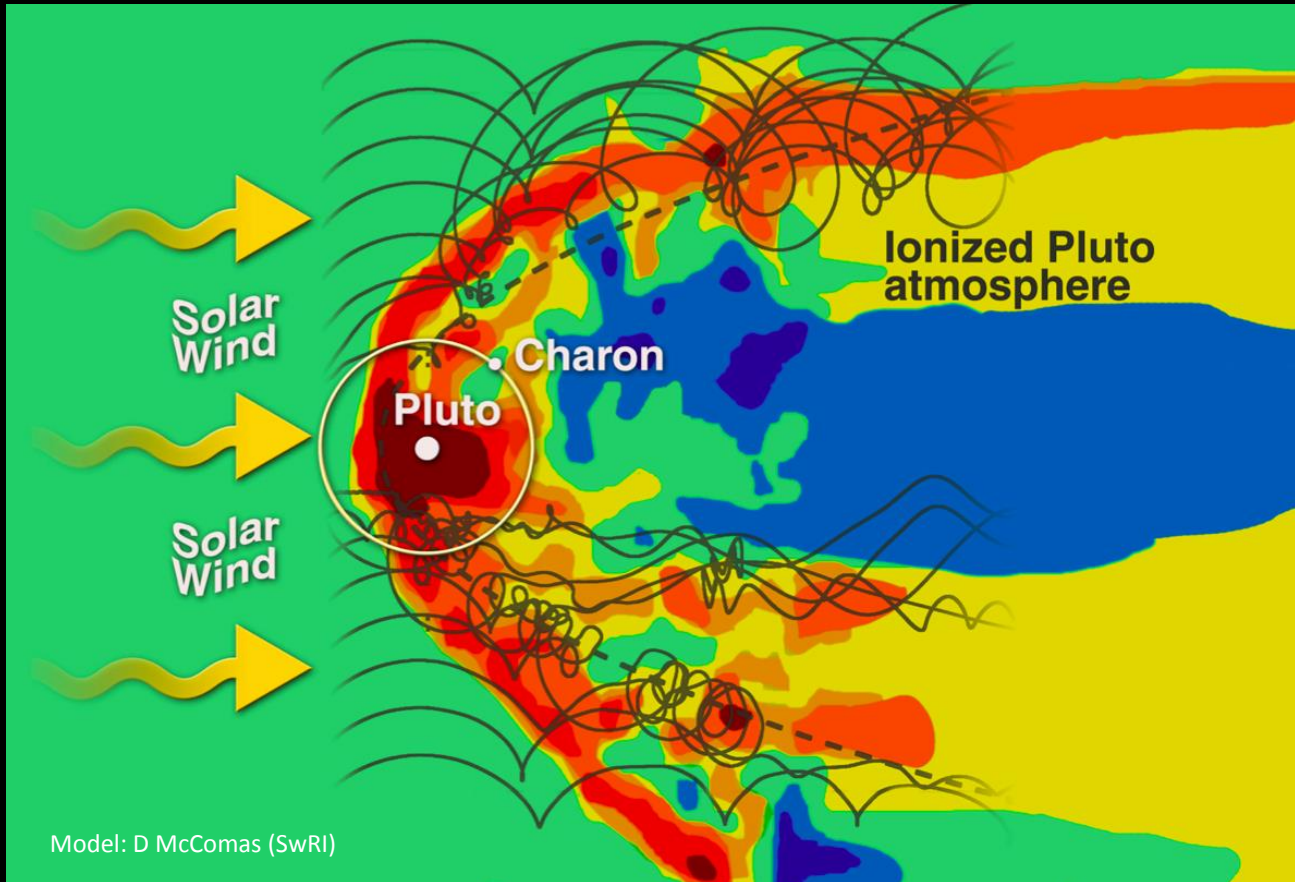
Map: M. Buie (SwRI)

Atmospheric Structure & Escape



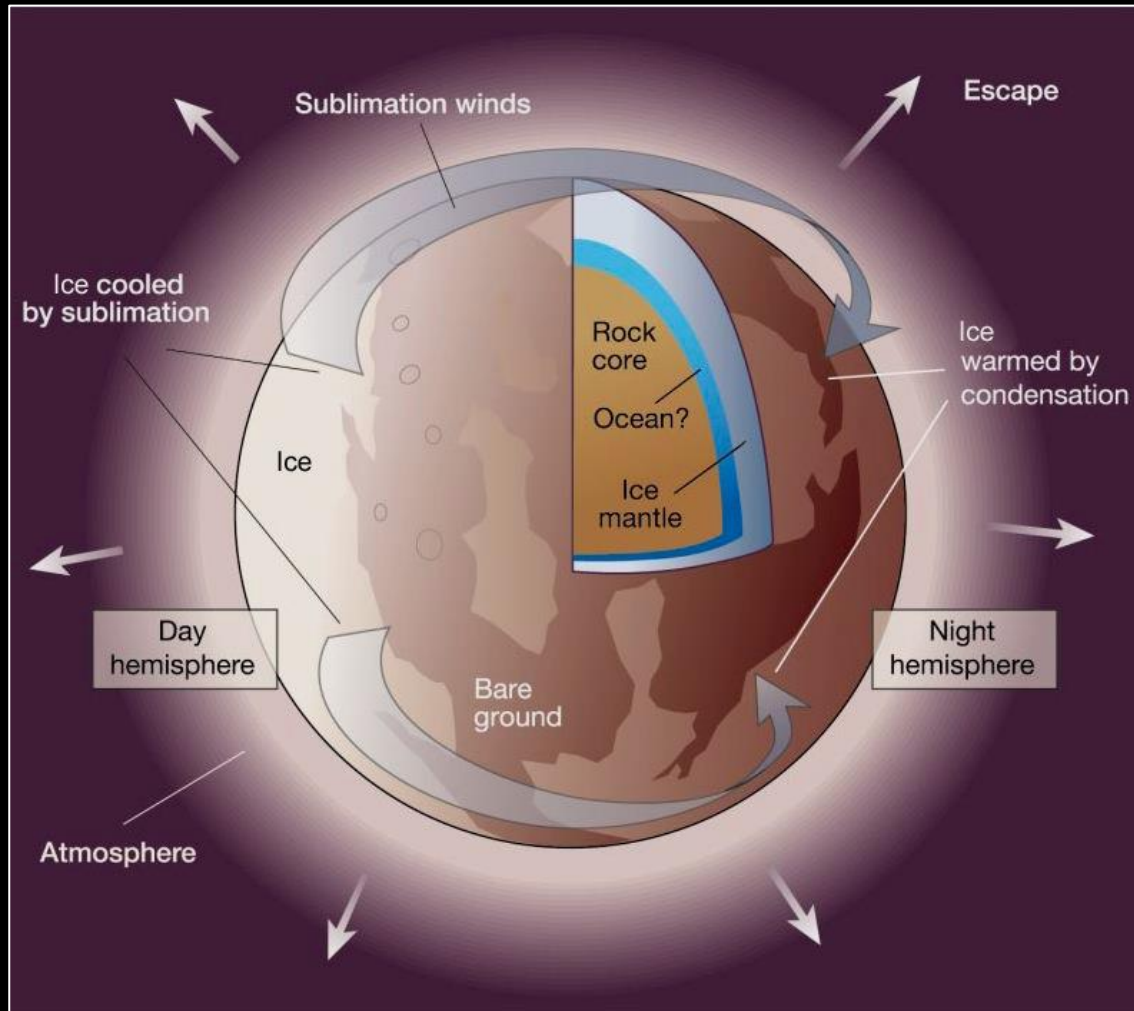
- Goal: Understand dwarf-planet atmospheres and climates

Atmospheric Structure & Escape



- Goal: Understand how planets lose their atmospheres

Composition & Temperature Maps



- Surface-ice distribution; search for complex organic molecules
- Relation of ices to sunlight, topography, atmosphere; evidence for cryovolcanism or geysers
- Goal: understand Pluto and Charon as planet and major moon

Archetype Kuiper Belt Planet

- New Horizons will revolutionize our understanding of icy planets of the Kuiper belt and broader trans-Neptunian population
- Pluto “saw” early cataclysmic events, including wholesale reorganization of the solar system
- Pluto is an active world with (perhaps) a rock core and internal ocean
- *We will be surprised and thrilled!*

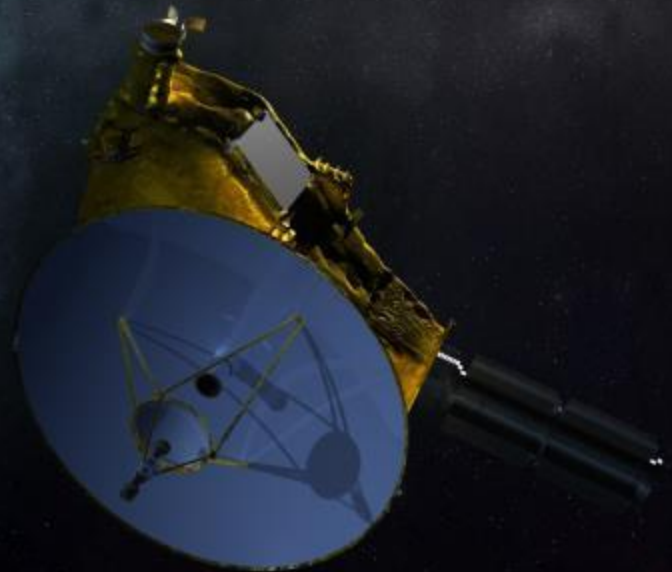




**New Horizons
Mission Operations
and Navigation**

Pluto Approach Operations 1

- Optical imaging to determine the projected path
- Trajectory adjustments
- Deep imaging of Pluto system to assess potential hazards and need to choose a 'safer' path

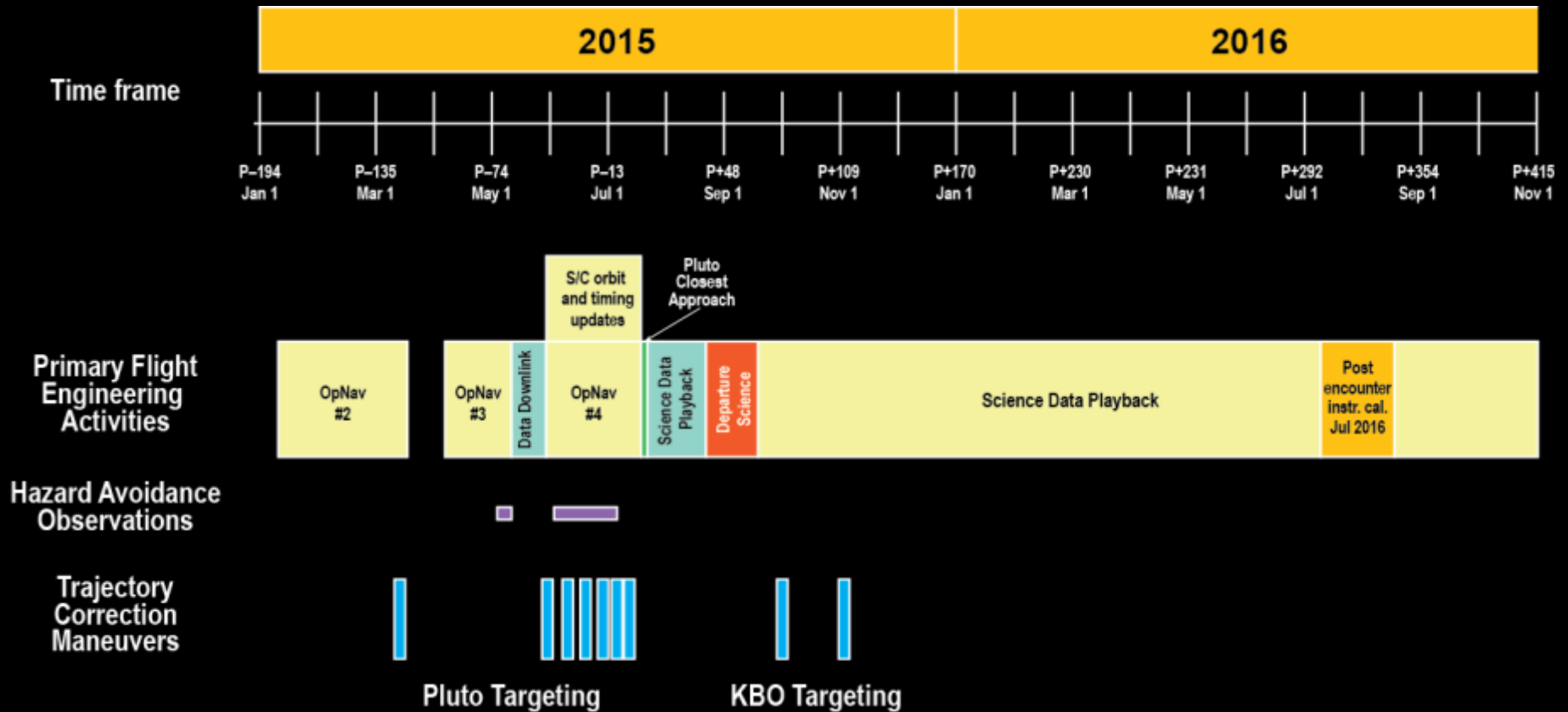


Pluto Approach Operations 2

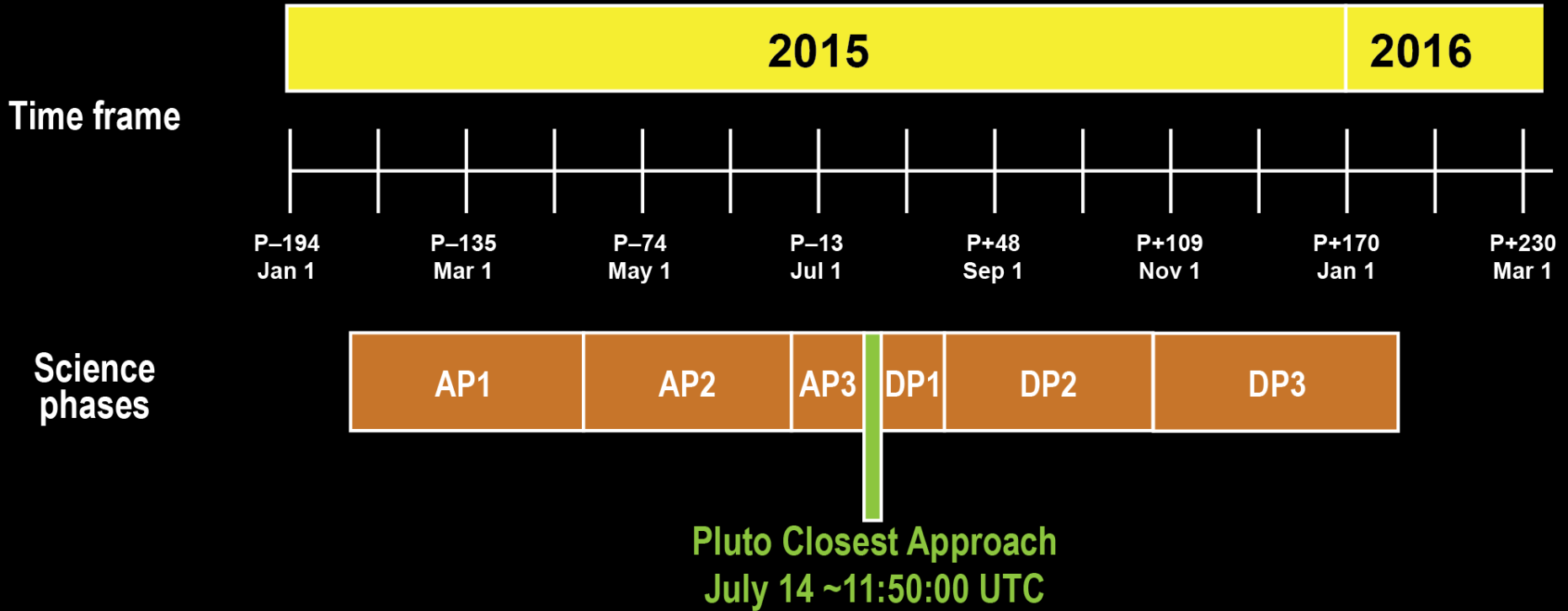
- Approach and encounter science observations
- Final days: Late updates to flyby timing and navigation information to observatory systems



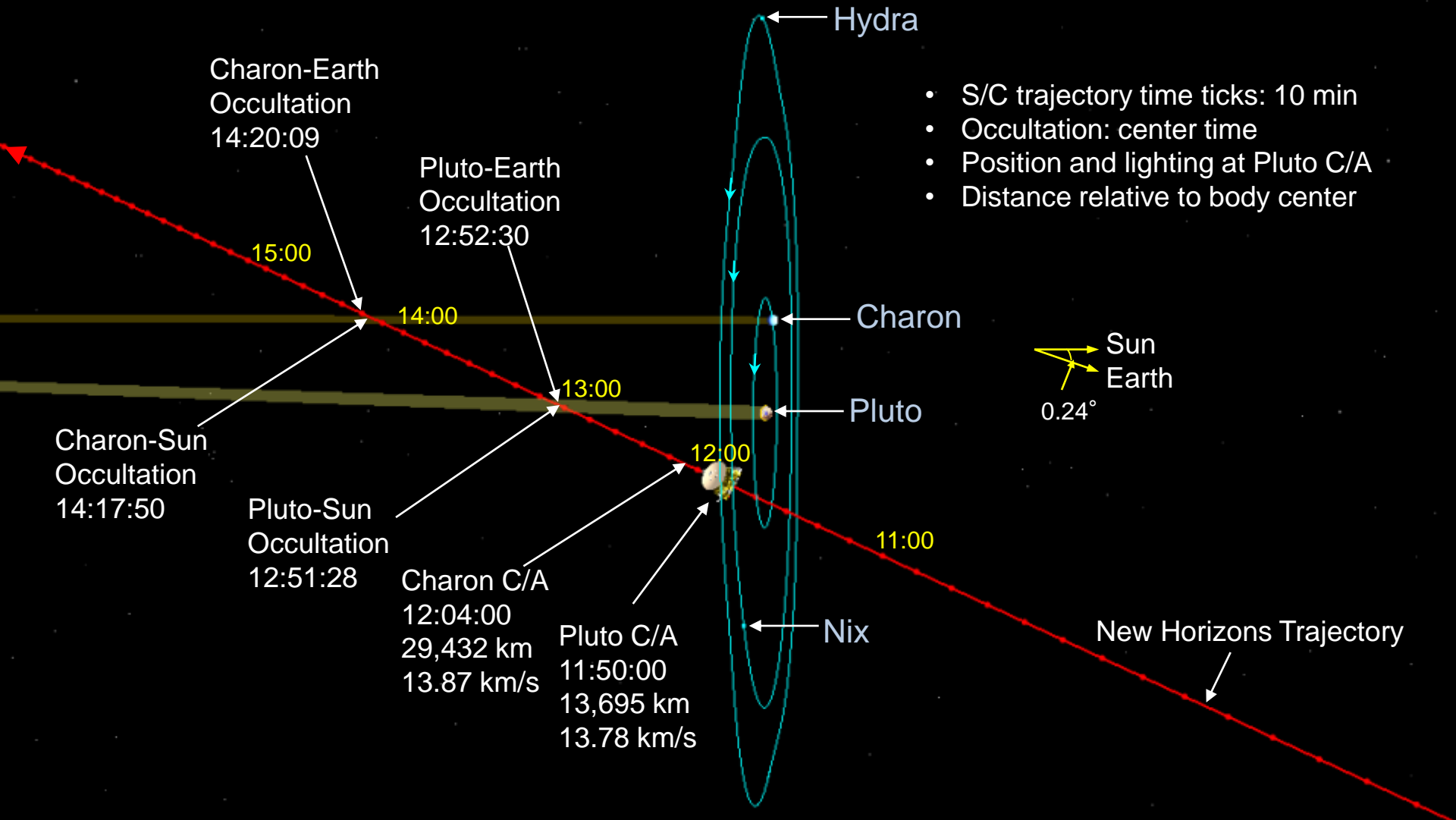
Timeline 1



Timeline 2



Closest Approach



- S/C trajectory time ticks: 10 min
- Occultation: center time
- Position and lighting at Pluto C/A
- Distance relative to body center

Charon-Earth
Occultation
14:20:09

Pluto-Earth
Occultation
12:52:30

Charon-Sun
Occultation
14:17:50

Pluto-Sun
Occultation
12:51:28

Charon C/A
12:04:00
29,432 km
13.87 km/s

Pluto C/A
11:50:00
13,695 km
13.78 km/s

Hydra

Charon

Pluto

Nix

Sun
Earth
0.24°

New Horizons Trajectory

15:00

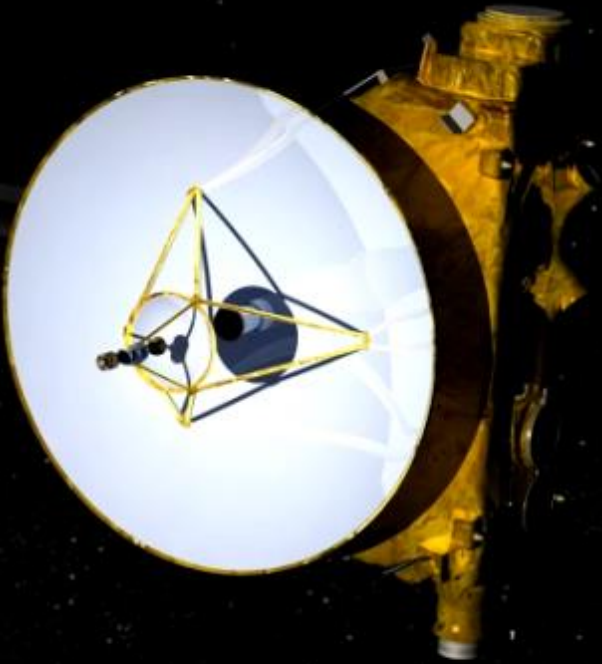
14:00

13:00

12:00

11:00

Pluto Departure Operations



- Spacecraft health and trajectory assessments
- Departure science
- Playback and evaluation of initial science results
- KBO trajectory change maneuvers
- Complete science data playback = 16 months!



**New Horizons
Science and Outreach**





Get Involved



- 'Plutopalooza' parties will be held across the U.S. and abroad
- Join the Pluto Corps of Discovery
- Register, track and find New Horizons events on the Web

**Have a 3-D printer?
Make your own
New Horizons!**



**My other vehicle is
on its way to Pluto**

<http://nasa3d.arc.nasa.gov/detail/new-horizons>

What's Ahead

NEW HORIZONS



- Long-distance views
- ~ 15 weeks of 'Better than Hubble'
- 1,000+ approach images!
- Best look: hours after flyby
- Surprises!

ON PLUTO'S DOORSTEP

After Nine Years and Three Billion Miles

Pluto Awaits 2015

- First planetary student instrument
- Pluto Pals
- ‘The Real Plutophiles’
- The ‘Year of Pluto’

