



# Status of the New Horizons Pluto/KBO Mission

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# New Horizons



*First Mission to Pluto and the Kuiper Belt*  
*First Mission in NASA's New Frontiers Program*  
*First Outer Planets Launch Since 1997*







# New Horizons Exploration Mission

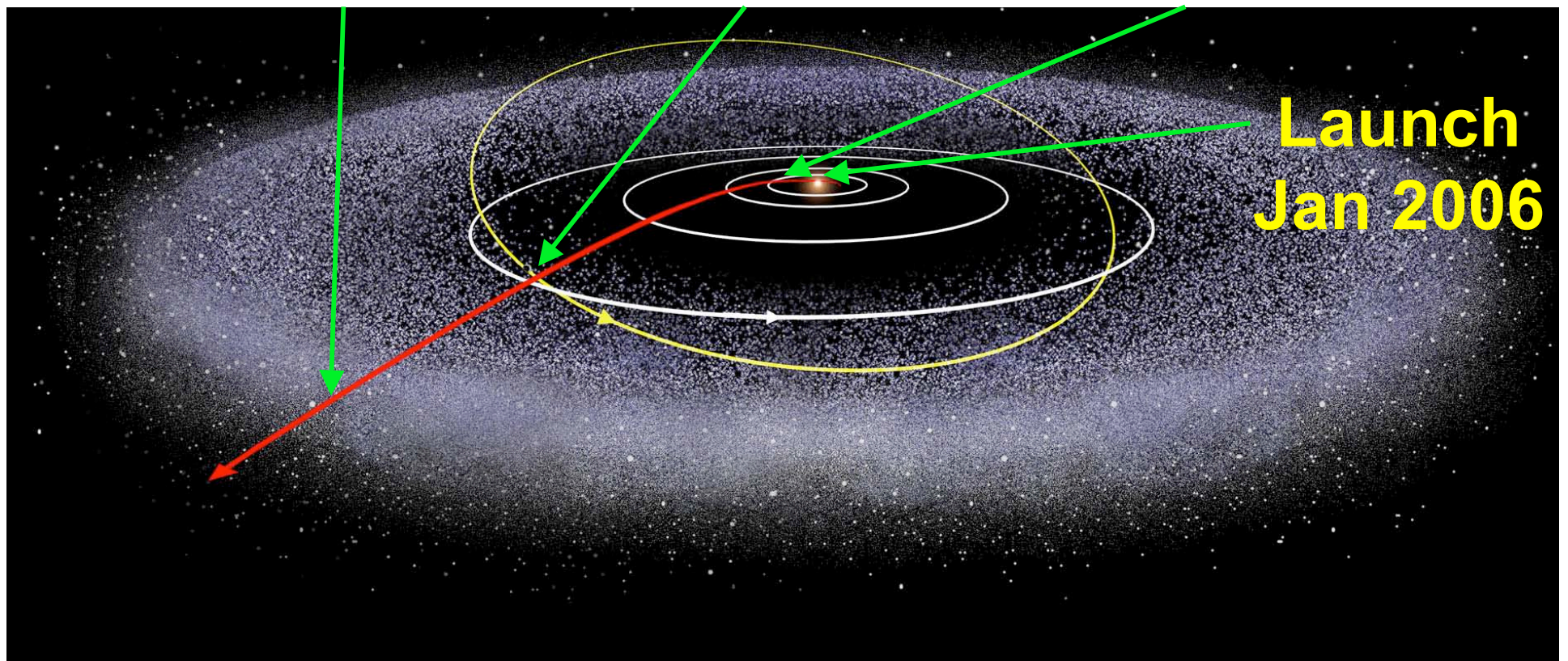


## Initial Reconnaissance of The Solar System's "Third Zone"

**KBOs**  
**2016-2020**

**Pluto-Charon**  
**July 2015**

**Jupiter System**  
**March 2007**





# New Horizons Scientific Objectives



## Group 1 Objectives: **Mandatory Science Floor**

Characterize the global geology and morphology of Pluto and Charon

Map surface composition of Pluto and Charon

Characterize the neutral atmosphere of Pluto and its escape rate

## Group 2 Objectives: **Highly Desirable**

Characterize the time variability of Pluto's surface and atmosphere

Image Pluto and Charon in stereo

Map the terminators of Pluto and Charon with high resolution

Map the composition of selected areas of Pluto & Charon at high resolution

Characterize Pluto's ionosphere and solar wind interaction

Search for neutral species including H, H<sub>2</sub>, HCN, and C<sub>x</sub>H<sub>y</sub>, and other hydrocarbons and nitriles in Pluto's upper atmosphere

Search for an atmosphere around Charon

Determine bolometric Bond albedos for Pluto and Charon

Map the surface temperatures of Pluto and Charon

## Group 3 Objectives: **Bonus**

Characterize the energetic particle environment of Pluto and Charon

Refine bulk parameters (radii, masses, densities) and orbits of Pluto & Charon

Search for magnetic fields of Pluto and Charon

Search for additional satellites and rings



# Pluto-Charon Encounter Highlights



- Six months of encounter science
- Exceed Hubble resolution for months
- Map all of Pluto and all of Charon
- Make global composition maps of Pluto and Charon
- Map their surface temperature
- Directly measure Pluto's escape rate and assay its atmospheric structure and composition
- Improve interior models and determine if either Pluto or Charon differentiated
- Locate additional Pluto-system satellites <1 km in diameter

*The most exciting discoveries  
will likely be the ones we  
didn't anticipate.*







# KBO Encounter Science

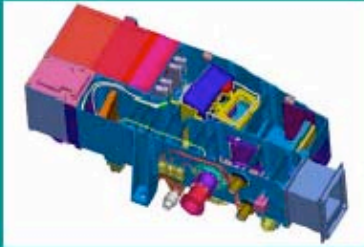


- Geologic, Photometric, Color Mapping
- Composition Maps ( $H_2O, CO, CO_2, CH_4, \dots$ )
- Stereo Surface Mapping
- Thermal Mapping
- Atmosphere Search
- Measure Sputtering Products
- Mass, Density, Figure Measurements
- Crater Counts for Impactors  $<20$  m in Size
- Satellite Searches to  $<1$  km, with Follow-up Studies

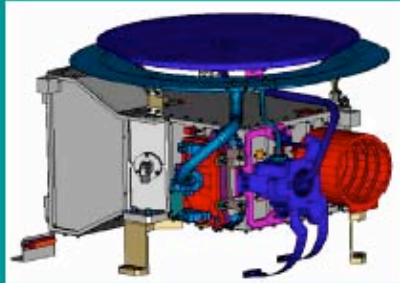




# New Horizons Instruments



Alice UV Spectrograph, 520-1870 Å, CBE mass 4.15 kg, power 4.0 W

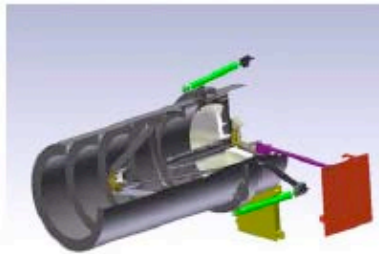


Ralph visible & IR imager, CBE mass 10.67 kg, power 5.3 W



Radio Science Experiment (REX). CBE mass 0.1 kg, power 2.1 W

## Core Payload



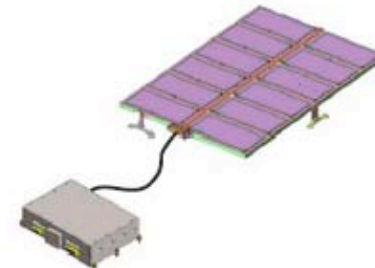
Long Range Reconnaissance Imager (LORRI), panchromatic imager. CBE mass 8.59 kg, power 5.1 W



Pluto Energetic Particle Spectrometer Science Investigation (PEPSSI). CBE mass 1.41 kg, power 2.32 W



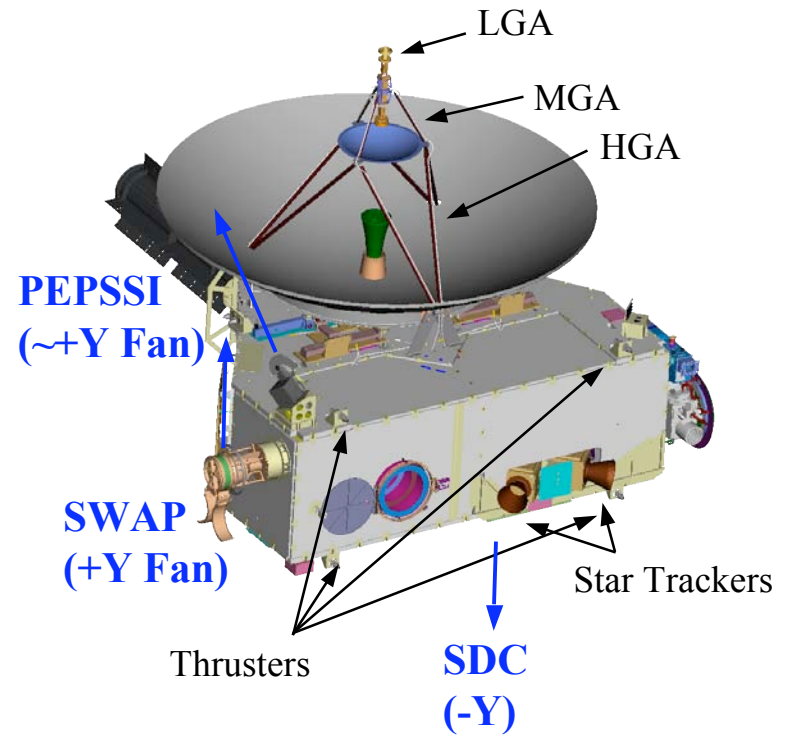
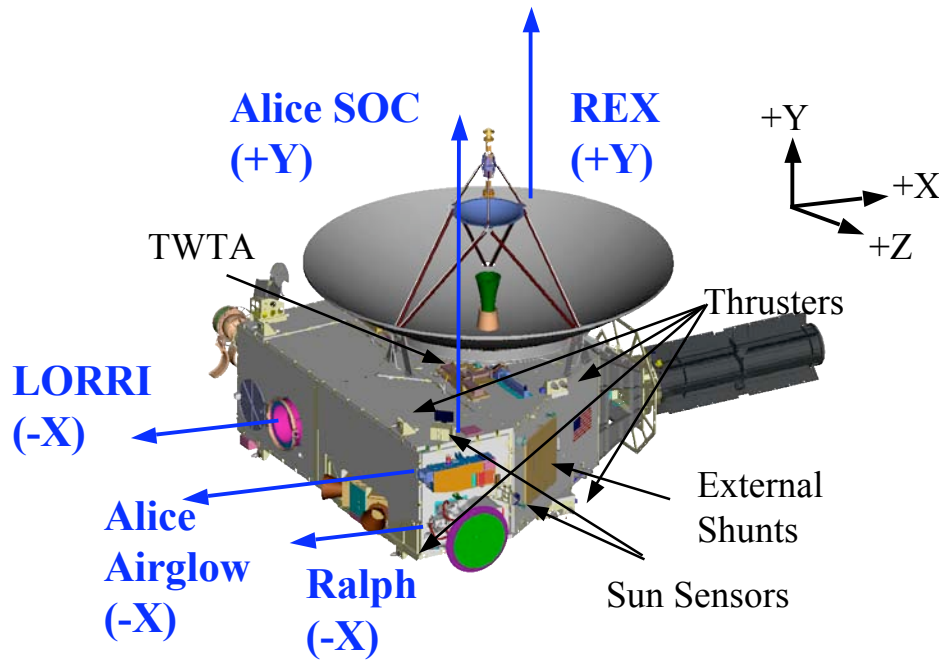
Solar Wind Around Pluto (SWAP), CBE mass 2.94 kg, power 2.25 W



Student Dust Counter (SDC), CBE mass 1.76 kg, power 6.5 W



# System Overview



Legend

<b>Instruments</b> <b>(View Directions)</b> Spacecraft Components
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1 meter





# NH Science Instruments



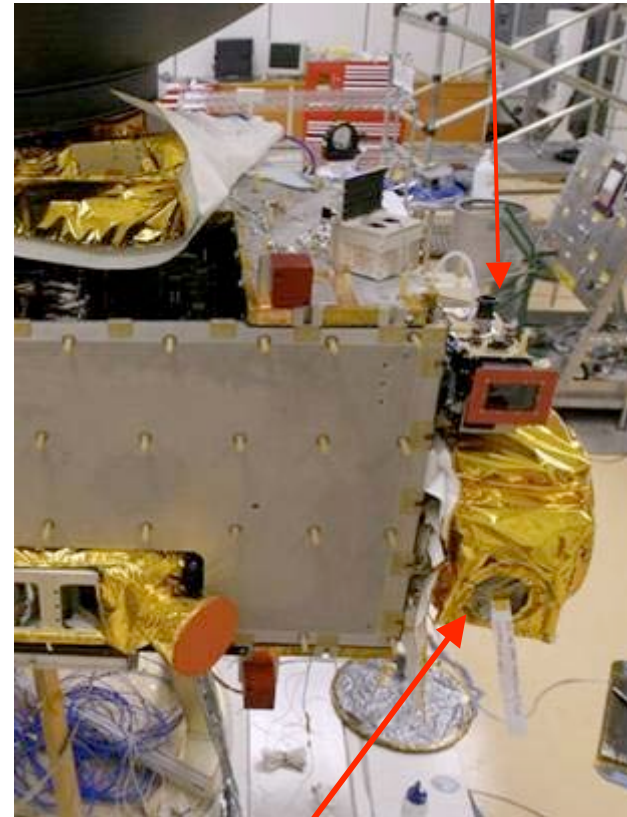
SWAP

PEPSSI

Alice



LORRI



Ralph



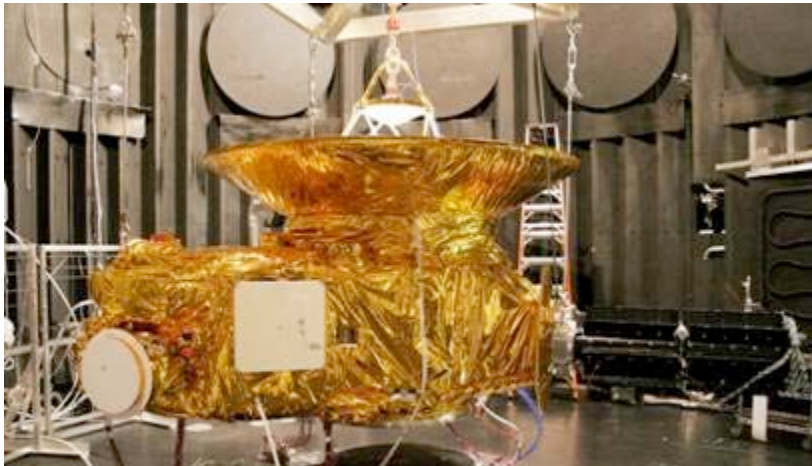
# Observatory Environmental Testing



May 2005 – APL prior to Env. tests



Jun. 2005 – GSFC Spin Balance



Jul. 2005 – GSFC Thermal Vacuum

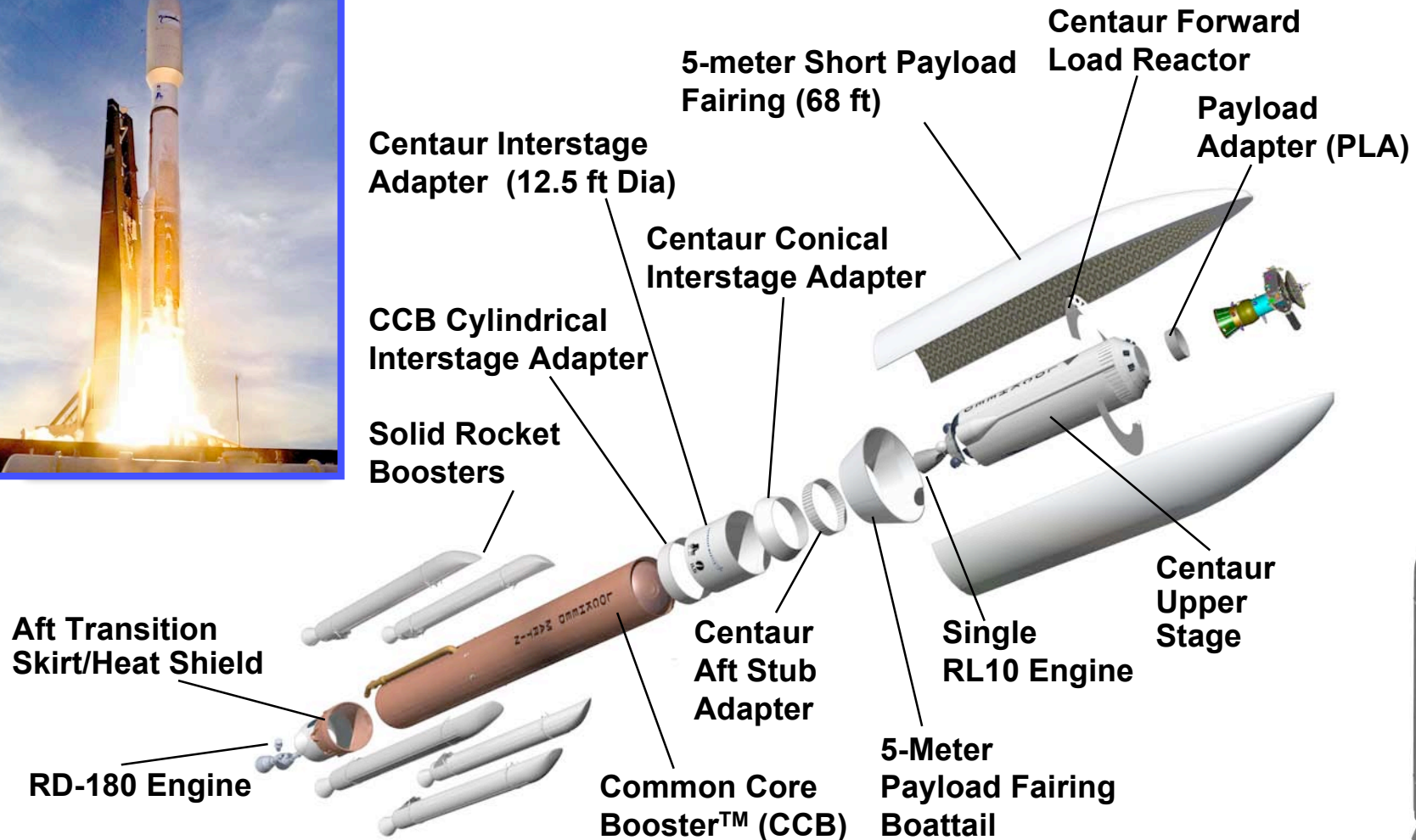


Sep. 2005 – GSFC SSDIF





# New Horizons Launch Vehicle



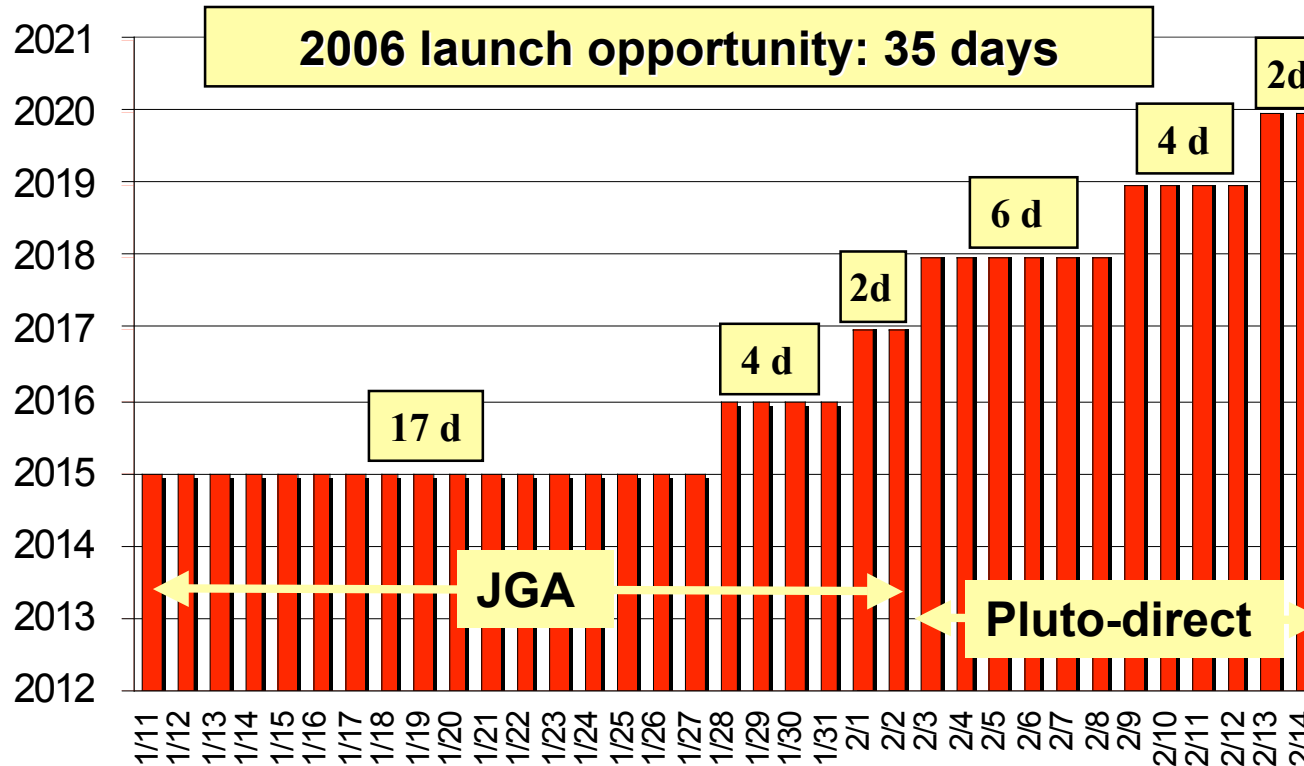




# Launch Windows



## Pluto arrival year



## Launch date (2006)

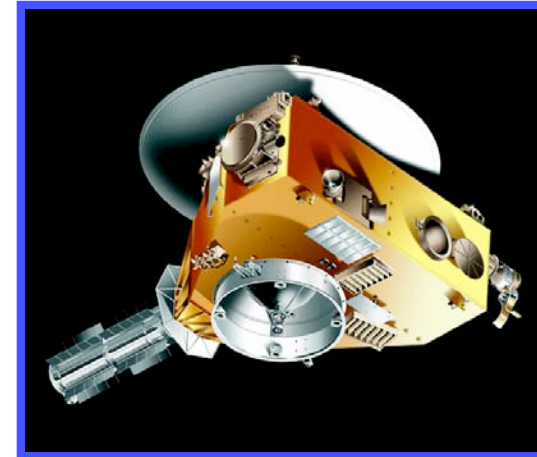
**2007 launch : 14 days;  
All arrivals 2019-2021**



# New Horizons Milestones



- ✓ Proposal– Jan-Sep 2001
- ✓ Phase A Study Complete– Oct 2001
- ✓ Selection Announcement – Nov 2001
- ✓ Phase B Start – Jan 2002
  
- ✓ Requirements Review (SRR) – May 2002
- ✓ Preliminary Design Review (PDR) – Oct 2002
- ✓ Non-Advocate Review (NAR) – Dec 2002
- ✓ Phase C/D Start – Apr 2003
- ✓ Critical Design Review (CDR) – Oct 2003
- ✓ Instrument Deliveries – July 2004-Mar 2005
- ✓ Integration & Test – Aug 2004-May 2005
- ✓ Environmental Test – May-Aug 2005
- ✓ Ship to Cape – 23 Sep 2005
  
- Launch Readiness Review – 11 Dec 2005
- **Launch Window Opens– 11 Jan 2006**





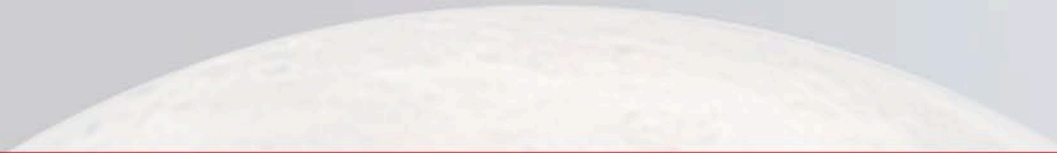
# New Horizons Status Summary



- **All systems are GO for January 2006 Launch**
  - Spacecraft is at KSC
  - Power situation is better than expected
  - Enough propellant available to enable KBO program
  - Instruments meet their specs; No descopes
  - Launch Vehicle is on schedule
  - NASA has decided to proceed to launch
    - Final decision now rests with Executive Branch (OSTP)

***See you at the launch on January 11<sup>th</sup>!***

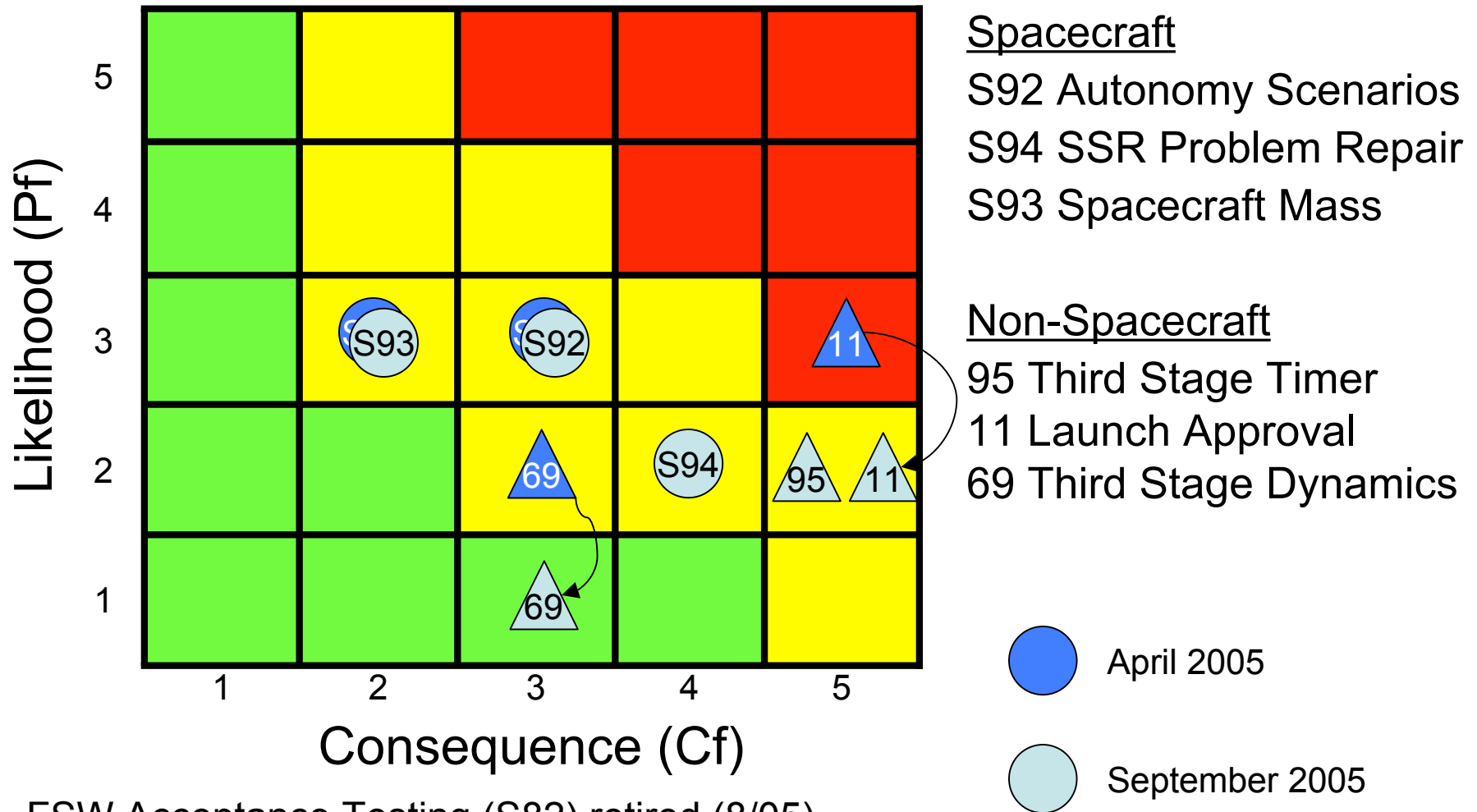




# Backup Slides



# New Horizons Top Risks



FSW Acceptance Testing (S82) retired (8/05)  
 NEPA Delays (32) retired (9/05)