Pluto Through My Windshield

Bill Owen
IS PLUTO A PLANET?

• When Ceres (the largest asteroid) was discovered in 1801, people called it a planet
• Three more were discovered by 1807
• Over 100 by the turn of the LAST century
• Over 200,000 known now

• It’s the Asteroid Belt
IS PLUTO A PLANET?

• When Pluto was discovered in 1930, people called it a planet
• The next one like it wasn’t found until 1992
• Over 100 by the turn of THIS century
• Over 1,000 known now

• It’s the Kuiper Belt
Pluto’s orbit

Neptune’s orbit

The Kuiper Belt
IS PLUTO A PLANET?

• My conclusion?
• YES, Pluto is a planet.
• It has merely picked up an adjective along the way

PLUTO IS A DWARF PLANET
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 Charon, Pluto’s largest satellite (1978)

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

Jim Christy (L) with his colleague Bob Harrington
Humble beginnings

• Best picture from Hubble

The infamous stamp
Many proposals over the years

• Pluto Express (Rob Staehle)
• Pluto Fast Flyby
• Pluto Kuiper Express
• POSSE (Larry Esposito)
• New Horizons (Alan Stern)
New Horizons at Pluto

• We did something no other mission has done before
Lots or planets have appeared on the cover of National Geographic
But this is the first time it’s ever happened before the flyby
The New Horizons team
Young people (postdocs especially) and women powered the *New Horizons* project
Mission Objectives

• Map surface composition of Pluto & Charon
• Characterize geology and morphology of Pluto, Charon and 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

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
PEPSSI: Energetic particle detector
SDC: Student dust counter

http://pluto.jhuapl.edu
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)
Mission profile

- KBOs 2016–2020
- Pluto-Charon July 2015
- Jupiter System February 2007
- Launch January 2006
- Interplanetary Cruise March 2007—June 2015
Here’s what we thought we’d see
Pluto through my windshield

• It is the thrill of a lifetime to sit (vicariously) on the spacecraft and watch Pluto get bigger

• Are we there yet?
• Are we there yet?
• Are we there yet?
• Are we there yet?
• Are we there yet?
Pluto through my windshield

Campaign 1, June 2014 (P – 12 months)
Pluto through my windshield

Campaign 2, January 2015 (P − 6 months)
Pluto through my windshield

Campaign 3, April 2015 (P − 3 months)
Pluto through my windshield

“Campaign 3.5,” May 2015 (P – 2 months)
Pluto through my windshield

Campaign 4, June 2015 (P – 1 month)
Pluto through my windshield

Critical Opnav 32, July 9, 2015 (P − 5 days)
Pluto through my windshield

Critical Opnav 37, July 12, 2015 (P − 2 days)
Pluto through my windshield

Critical Opnav 37, Charon
Pluto through my windshield

Critical Opnav 37, Pluto
Pluto through my windshield

Before close approach
Pluto through my windshield
Pluto through my windshield
Pluto through my windshield
Pluto through my windshield
Pluto through my windshield
Charon too
Nix and Hydra
The magnetosphere of Pluto: It has a tail!
An extended KBO mission is planned, pending NASA approval. *New Horizons* plans on going to a small (<100 km) cold-disk KBO. Two candidates were discovered in summer 2014, and the Project decided to go to the easier but smaller one, 2014 MU69.

Our first maneuvers to get there will happen in October and November.
And the Internet goes wild

- NASA’s three NH websites were 2\textsuperscript{nd}, 3\textsuperscript{rd} and 4\textsuperscript{th} most popular in the .gov domain
- 250,000,000 hits on encounter day
- 10,000 hits per second during encounter minute
- APL moved nh.jhuapl.edu to an offsite host
Lots of fun on the Internet too
Scientists had fun too

Somebody searched for “water on Pluto”
The celebration
Pluto in my rear-view mirror