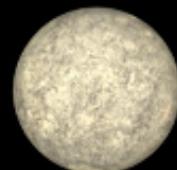


2015 – Year of Planetary Exploration



Ceres



Pluto



Eris

“Dwarf planets Ceres, Pluto, & Eris”

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<http://www.arcadiastreet.com>

2015 Missions

Mars Rover Opportunity
Mars Rover Curiosity

Dawn

New Horizons

Calendar of Upcoming Events

Jan - Dawn Direct Imaging of Ceres > HST

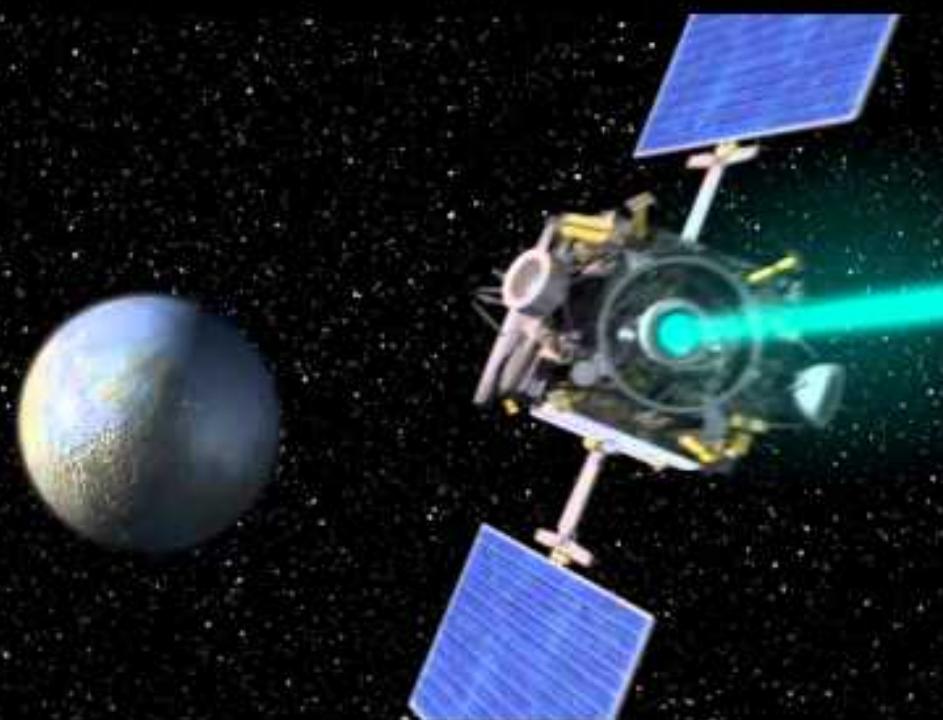
Mar – Dawn Orbit of Ceres

Mar – New Horizons Direct Imaging of
Ceres > HST

July – New Horizons Flyby of Pluto

August – New Horizons Enter Kupier Belt
Extended Mission

The Dawn Mission to the Asteroid Belt



Dawn Historic Firsts

First Ion Propulsion Spacecraft

First to orbit multiple bodies

First mission to the asteroid belt

DAWN



Mars flyby

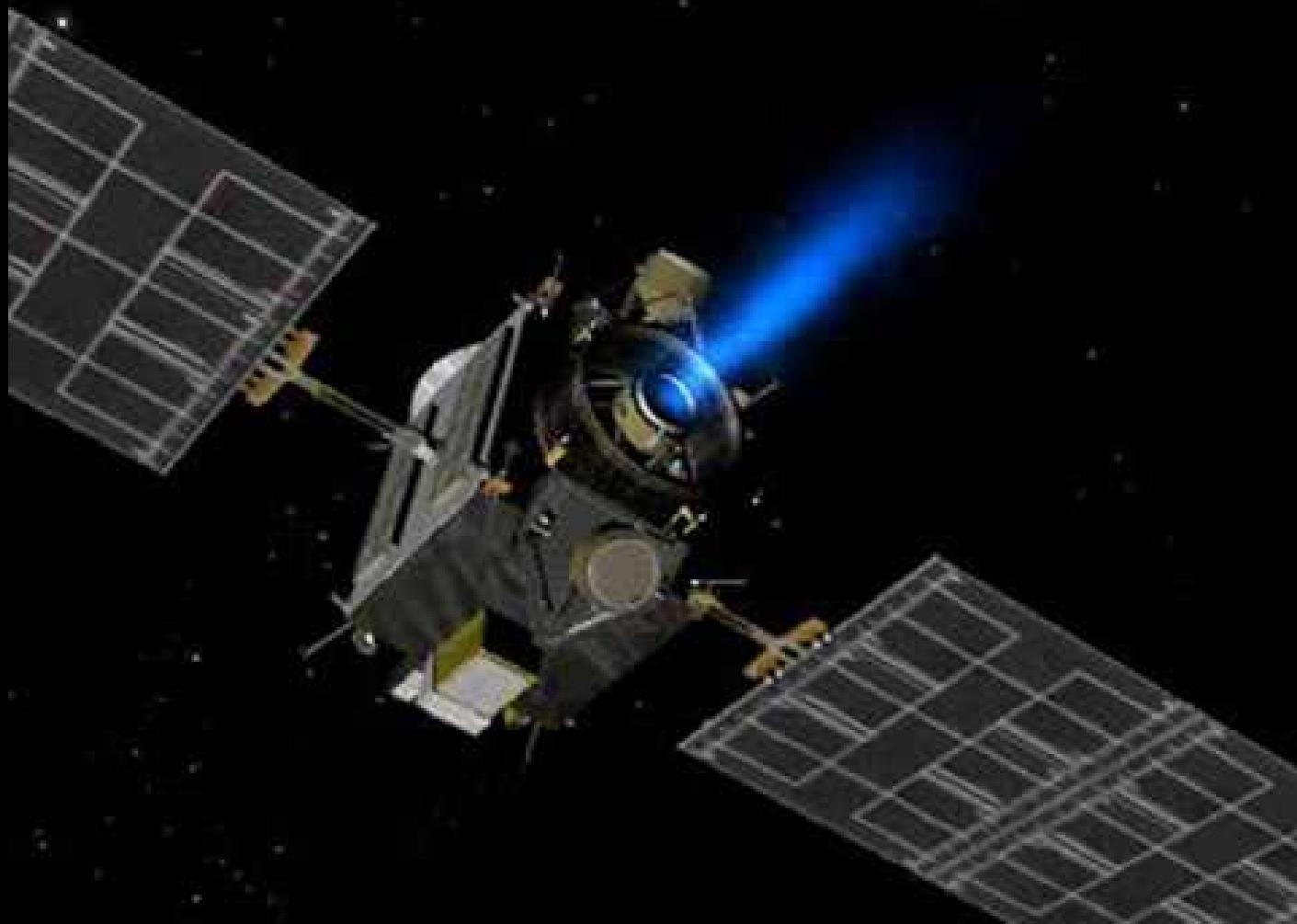
Journey to the beginning of the Solar System with the Dawn mission. Travel with the Dawn spacecraft as it explores Vesta and Ceres:

2011 Dawn orbits Vesta

2015 Dawn orbits Ceres



Dawn's Ion Propulsion

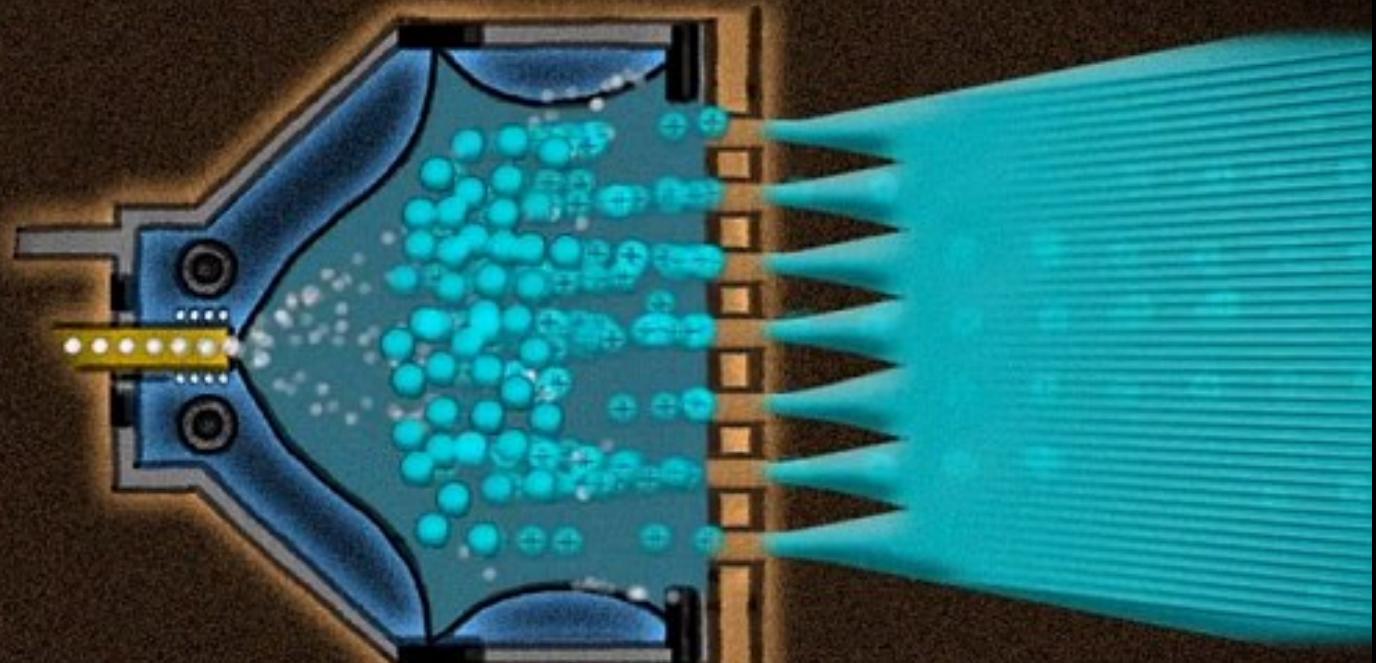


Dawn's Ion Propulsion



Dawn's Ion Thruster passes xenon gas over an electrostatic grid engine powered by the sun. Power to the engine is 1-7 KW with an exhaust velocity of 20-50 Kilometers/sec. VERY small thrust levels but over a very long period of time.

Dawn's Ion Propulsion

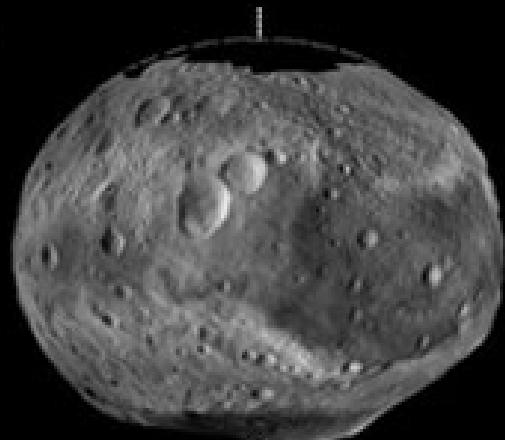


First Stop Vesta – 2013

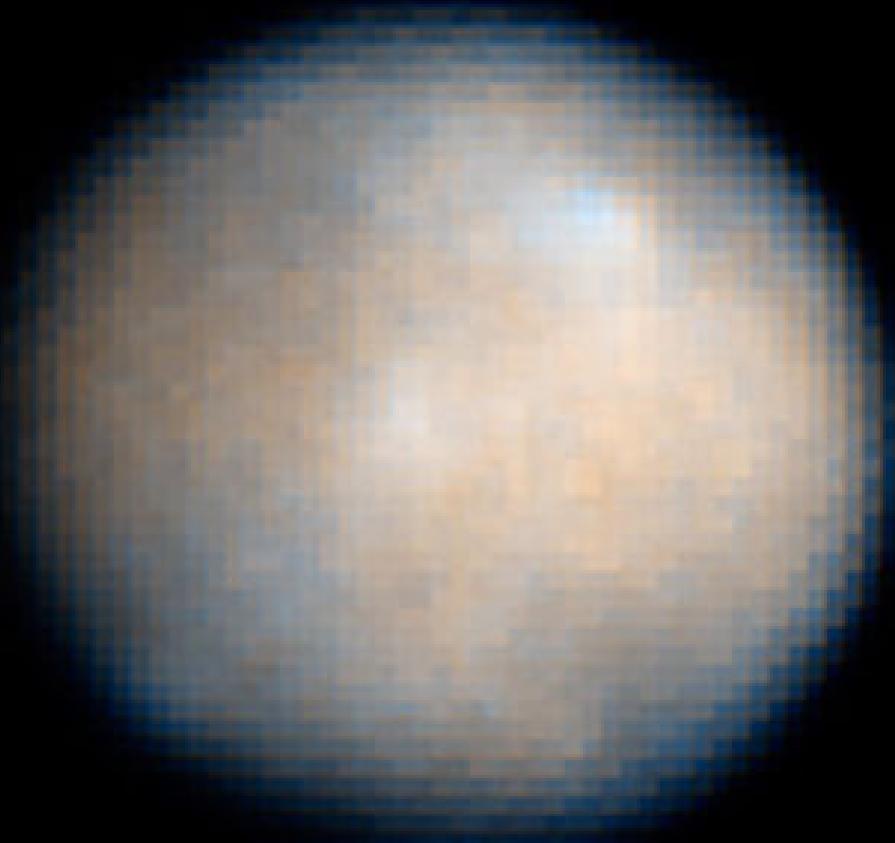


Next Stop Ceres 2015





VESTA
(Dawn spacecraft)
Rotation axis also shown



CERES (Hubble Space
Telescope)

EROS
(NEAR spacecraft)

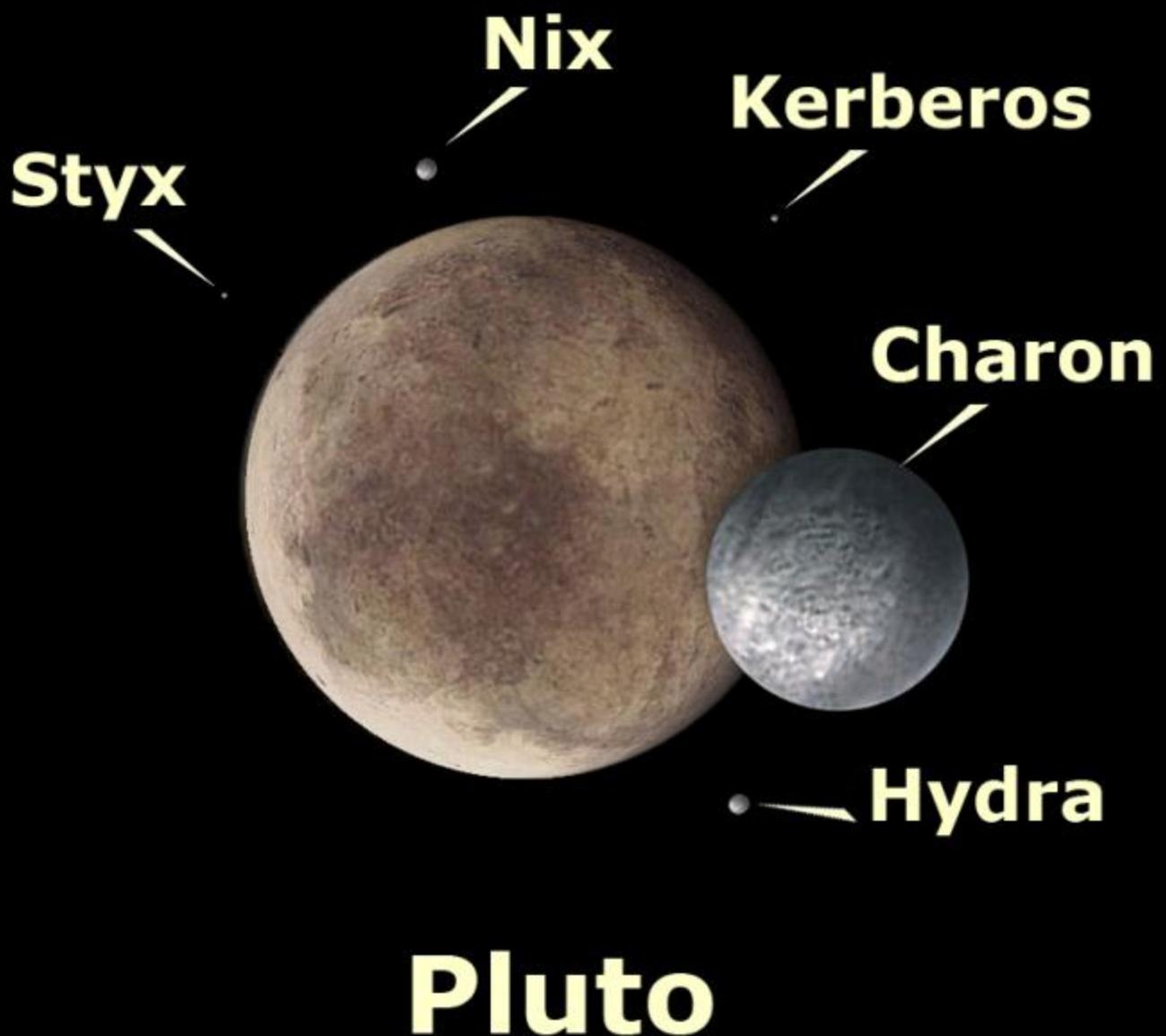
New Horizons

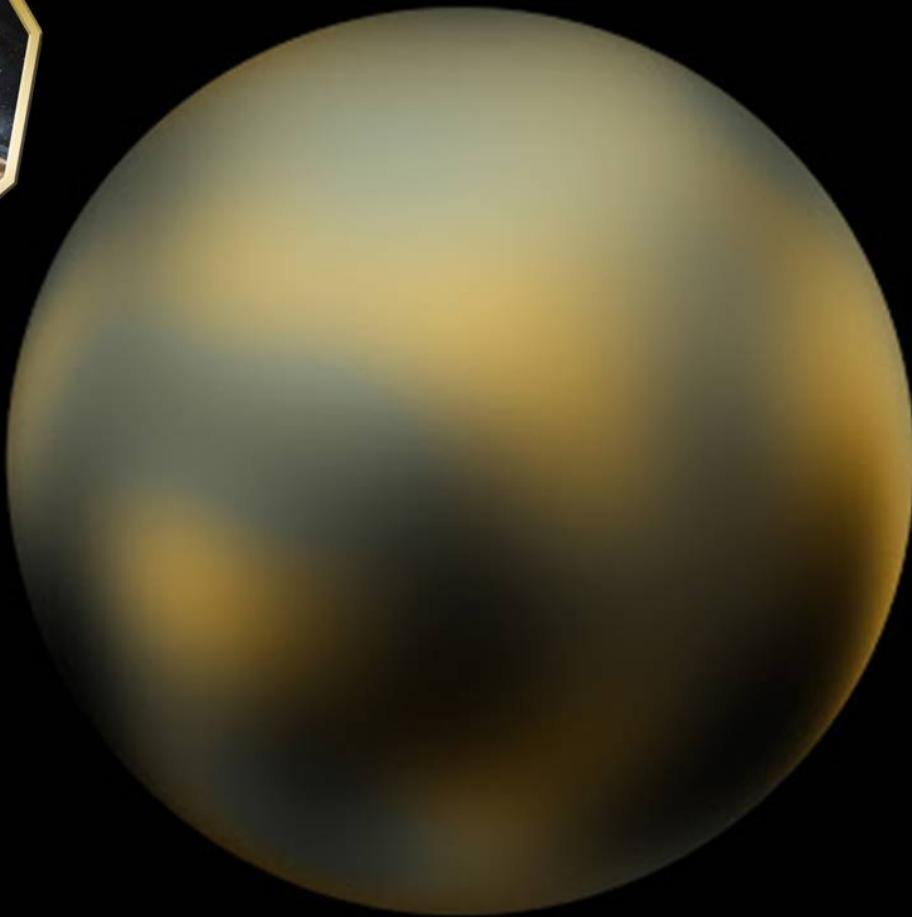


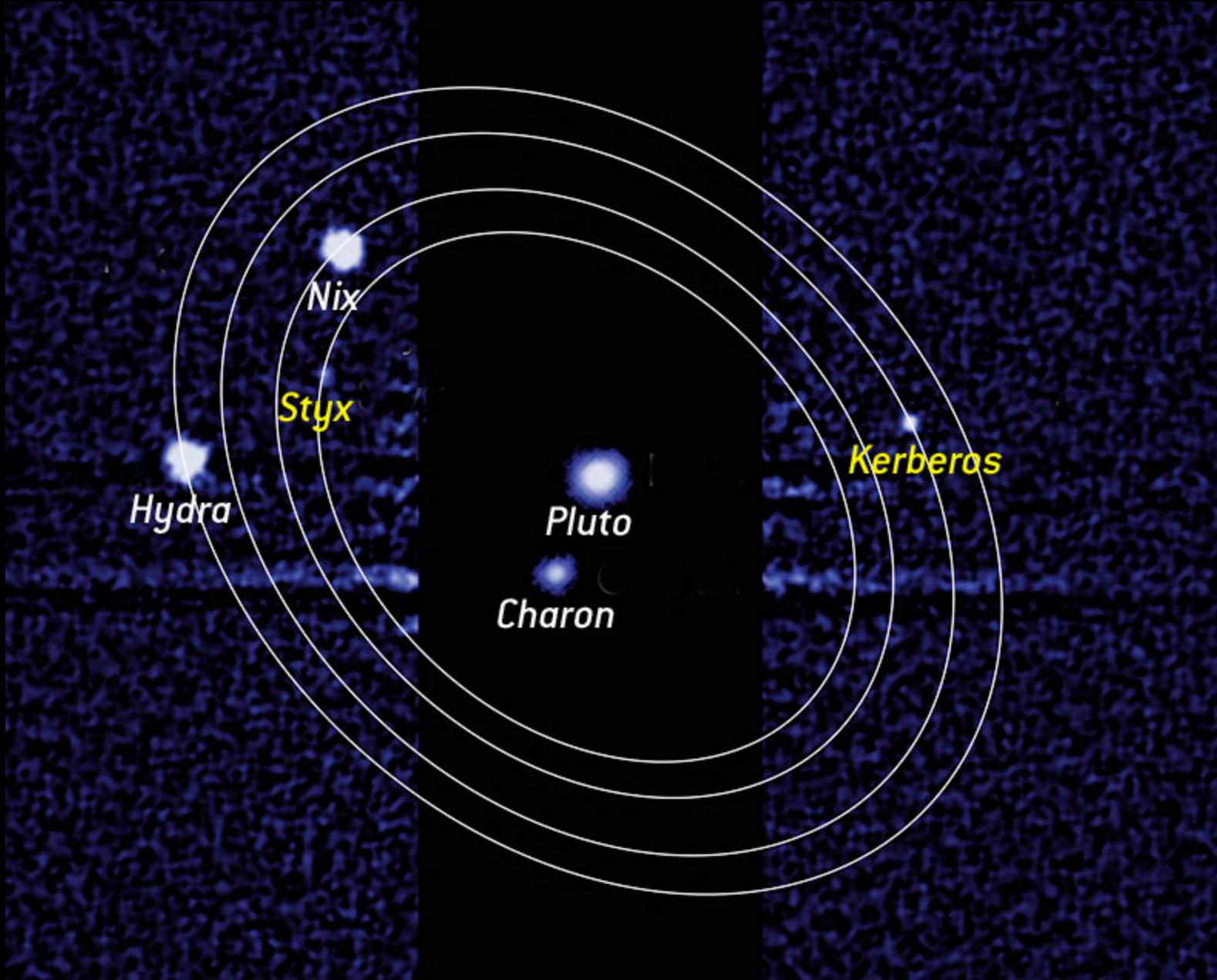
Launched Jan 6, 2004
Fastest object ever launched 36,373 MPH
Compared to Apollo – 4 days vs 8 hours
To Lunar Orbit
RTG Powered

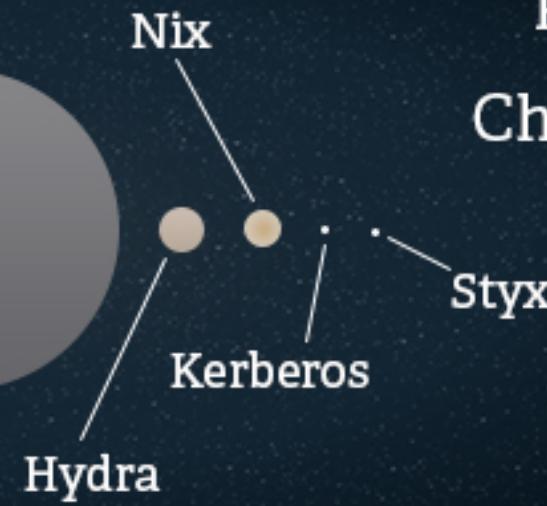
New Horizons











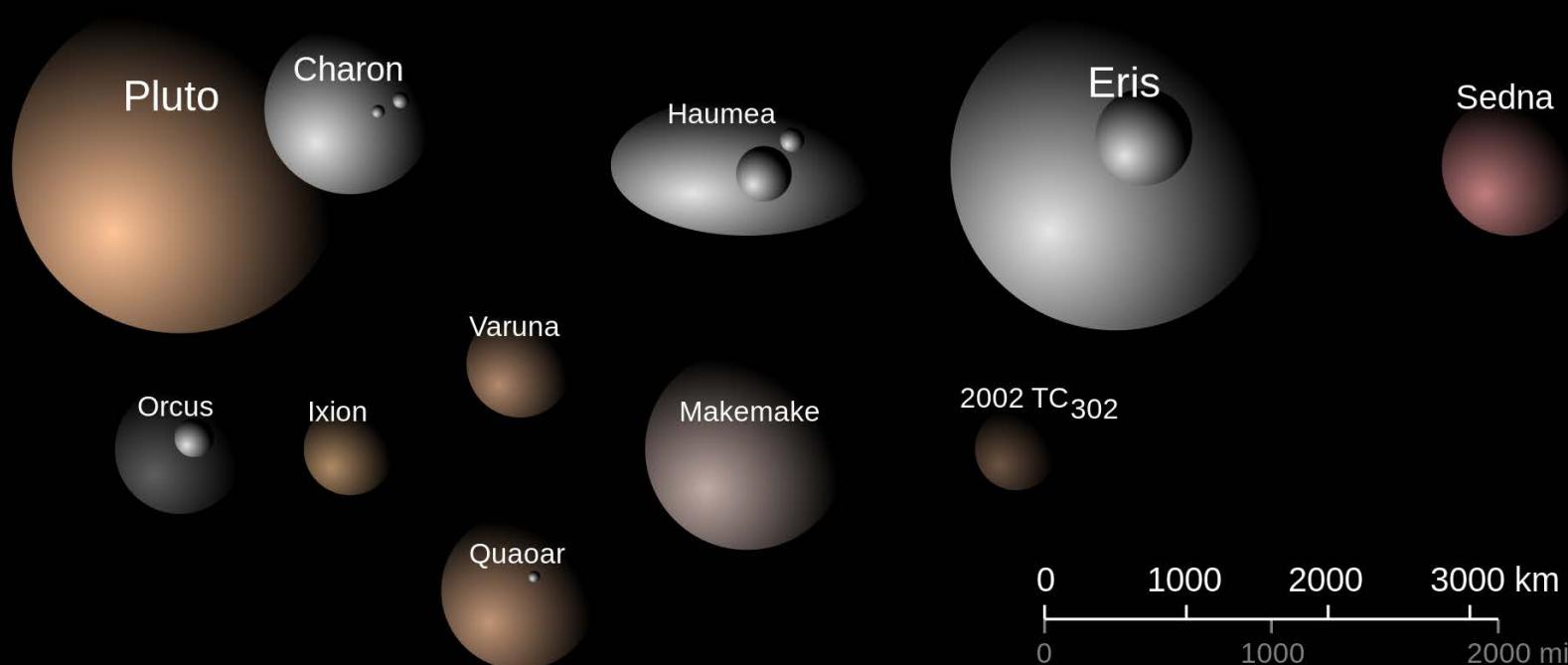
Pluto
Charon

200km

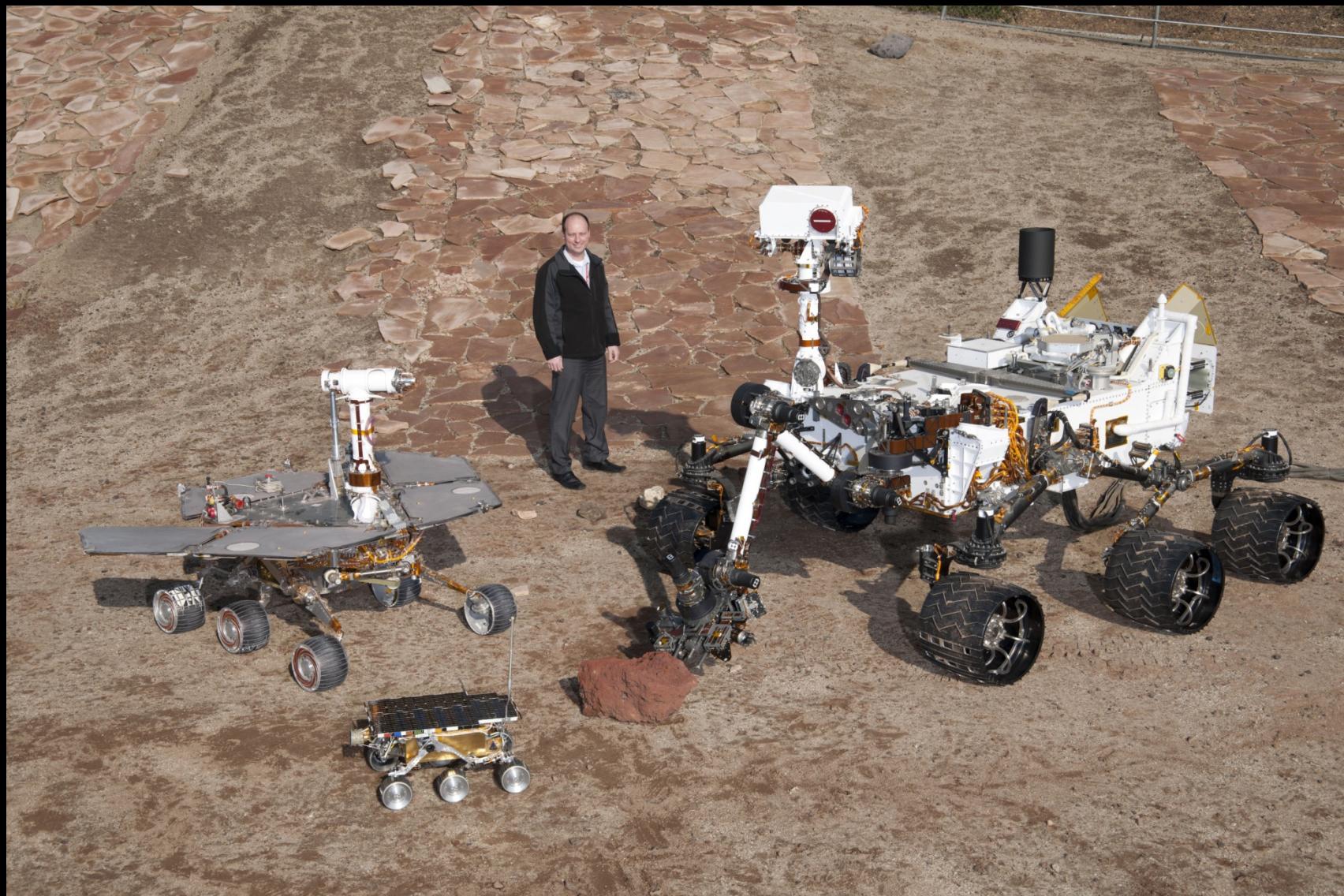


New Horizon Extended Mission

Flyby of Kupier Belt Object in 3 Years
Imaged by HST



Back on Mars



Spirit and Opportunity

Landing Dates: January 2004
90 Day Mission

Spirit Stuck in A Sandtrap
Last Transmission – March 22, 2010

Opportunity Still Roving and Transmitting
Distance – 40 Kilometers
4,006 days – 11 years

Mars Rover Curiosity



Mars Rover Curiosity

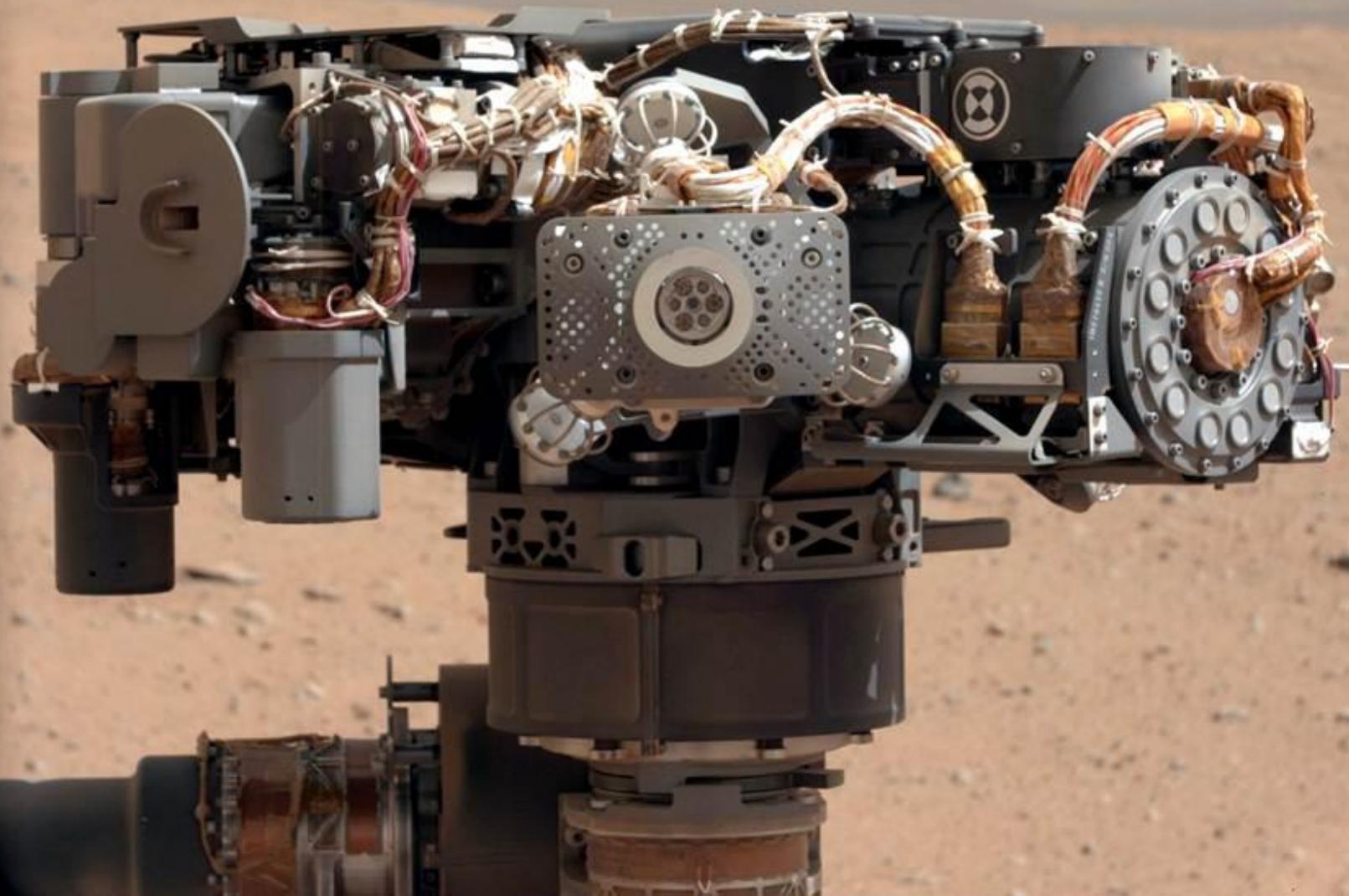
Landing Date on Mars - 6 August 2012

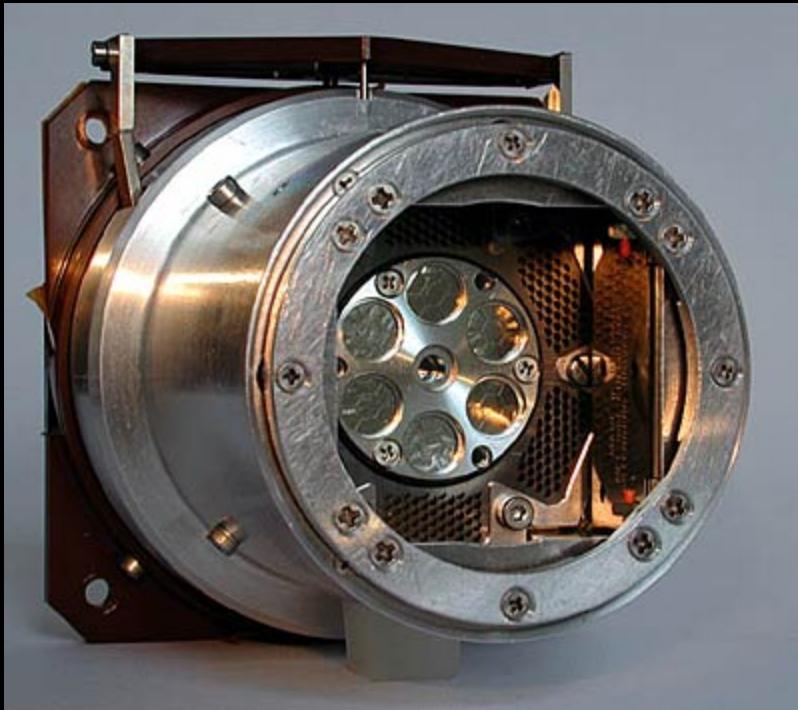
Initial Plan – One Year Mission

Based on Previous Landers – 2 years

Dec 2012 – Mission Extended Indefinitely

Travel distance – 8.6 KM





APXS

Alpha Particle X-Ray Spectrometer

**Curium 244 – Alpha Source /
Plutonium 240 Decay Gamma Source**

**PIXE Principle – Particle Induced X-Ray Emissions
and Lower Energy Emissions**

The APXS PIXE Principle

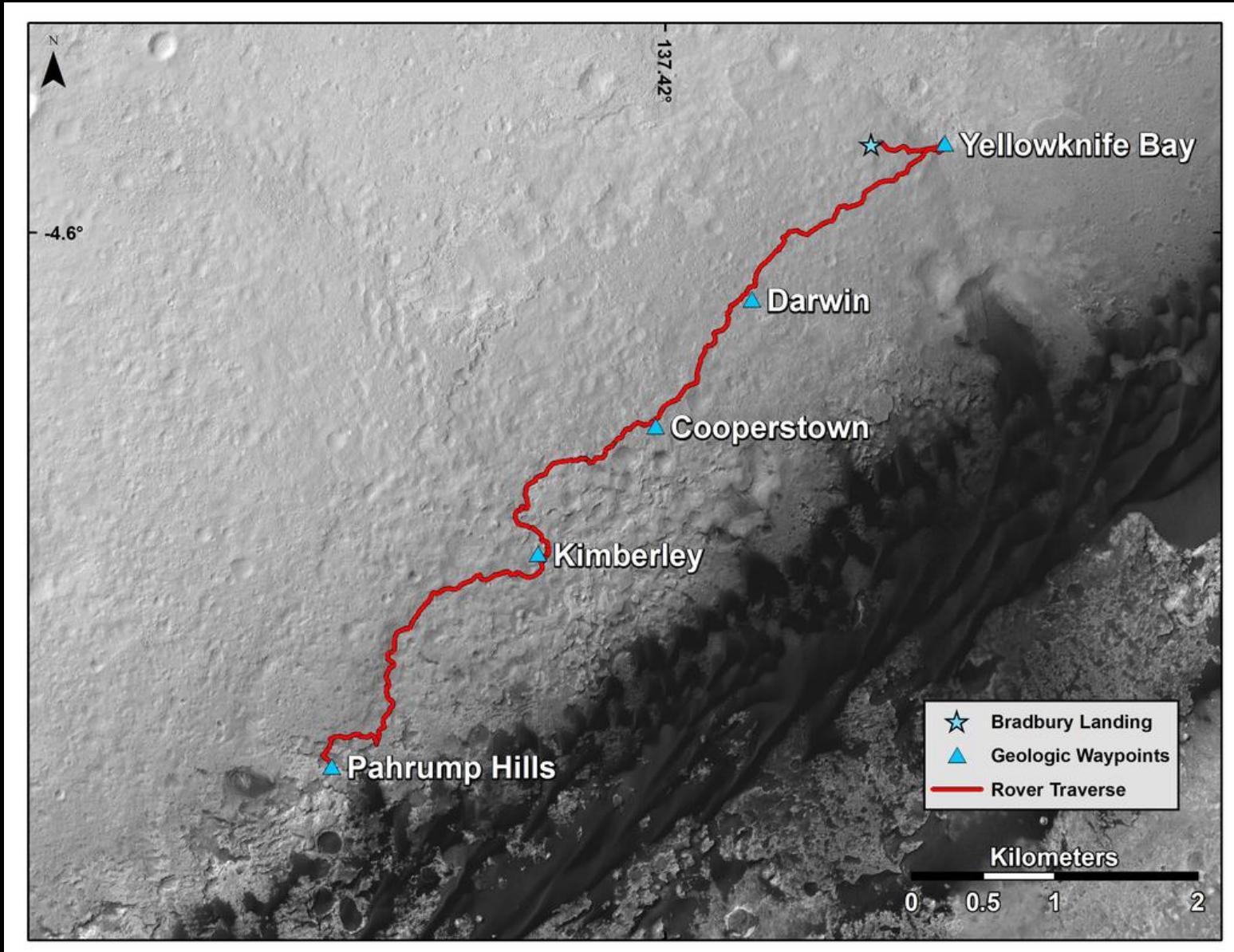
PIXE relies upon the fact that fast moving alpha particles can knock electrons from the lowest energy levels of atoms right out of the atom itself.

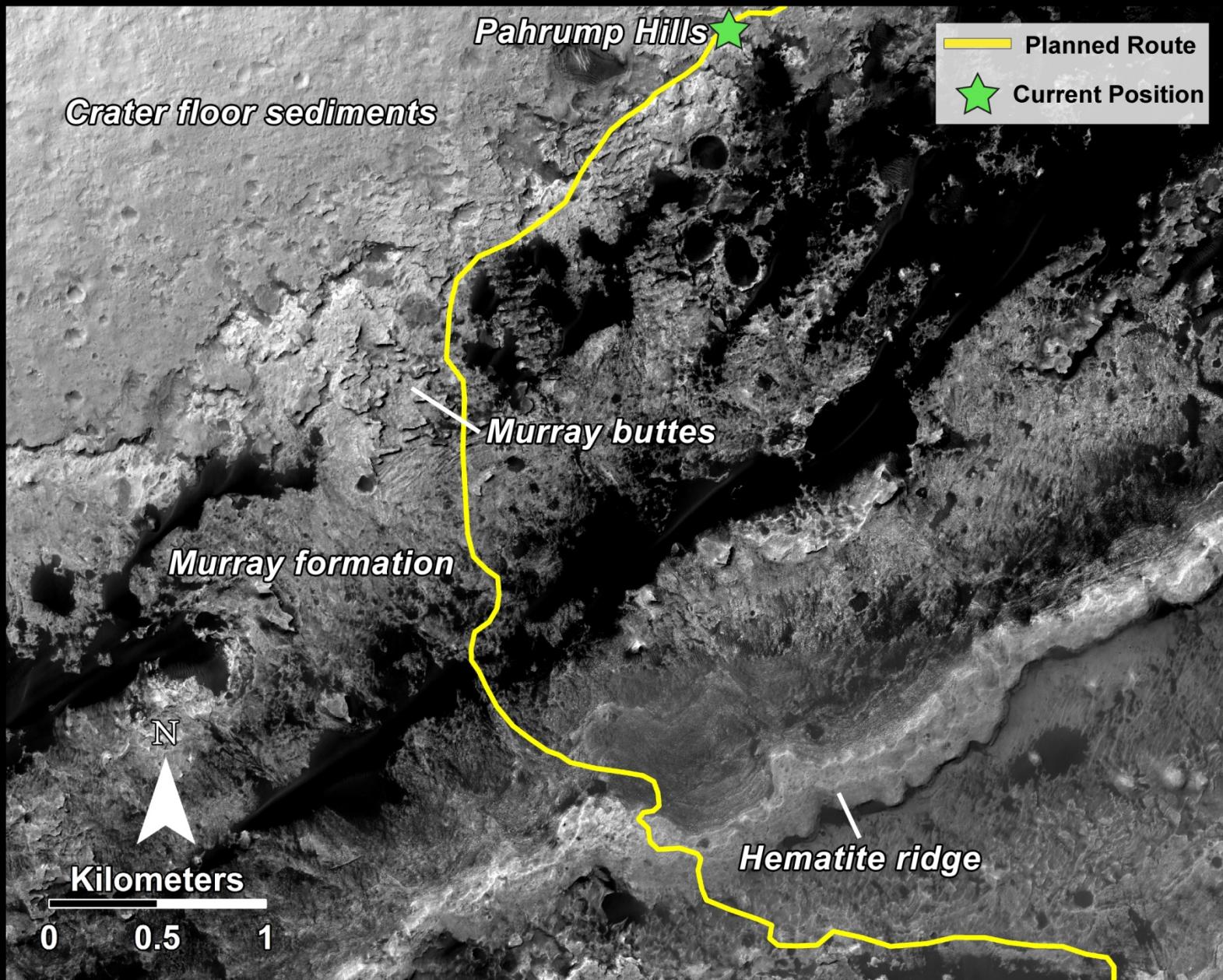
This leaves an atom with an unstable configuration of electrons, and one of the electrons in the high energy levels of the atom will now drop down to the low level one, emitting an X-ray as it does so.

APXS has a detector to capture these X-rays and we can determine the elements in the sample by looking at the energy of the X-rays – each element emits X-rays with very specific energies, an energy signature if you like. PIXE is good for detecting lighter elements, essentially sodium through to calcium.









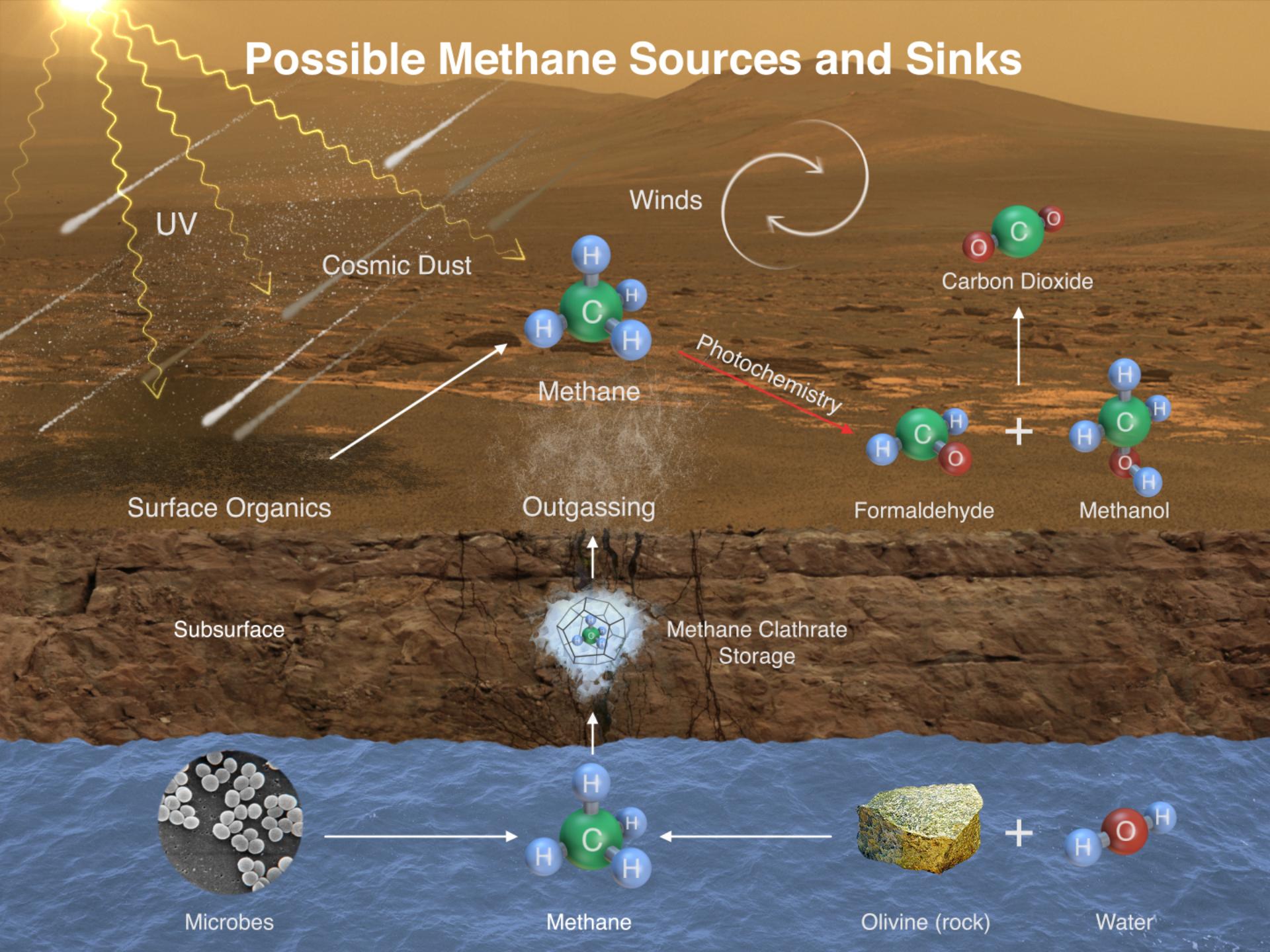


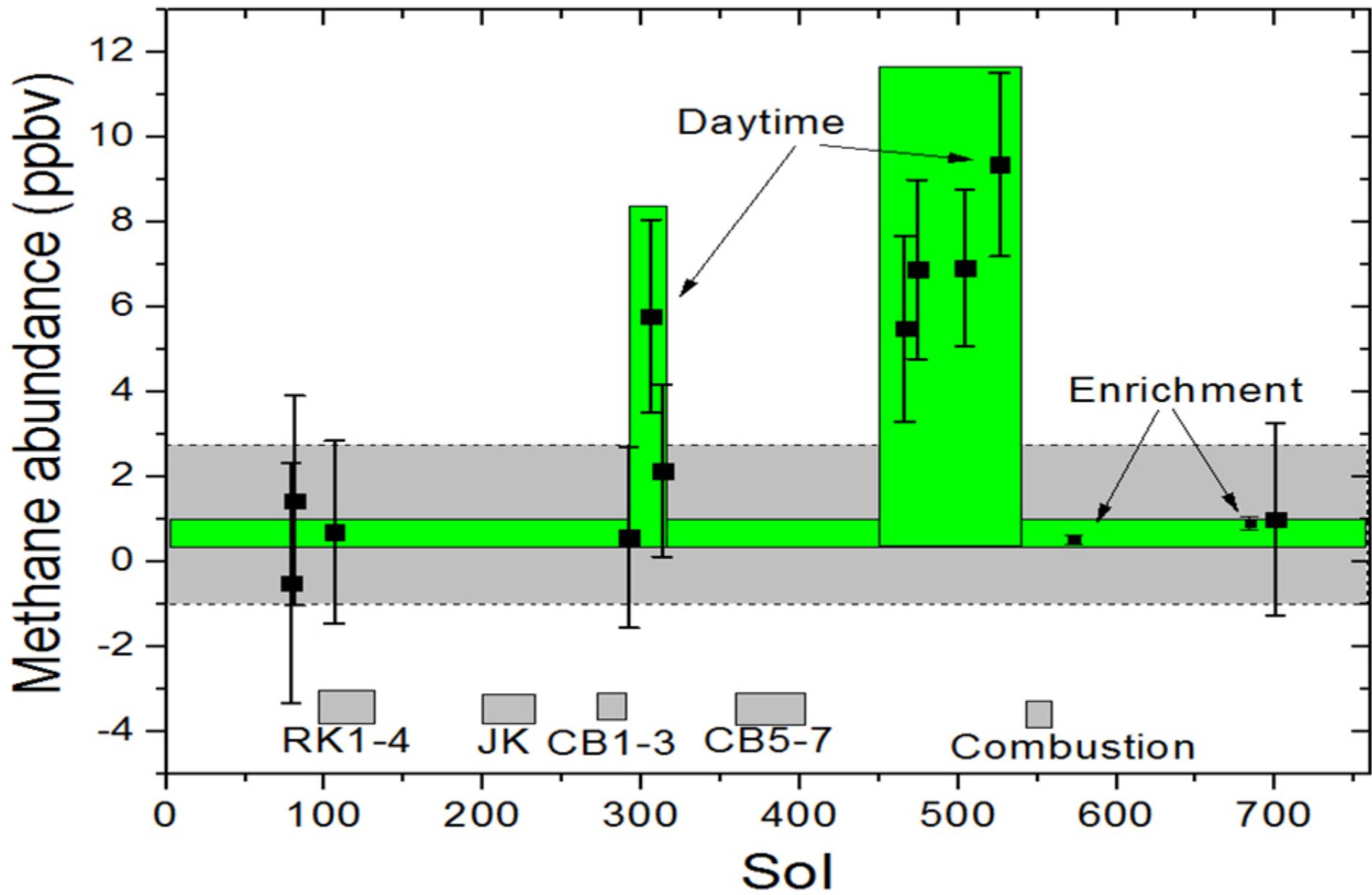


Phobos and Demos in Occultation



Possible Methane Sources and Sinks







Certificate of Mars Map Crater Naming

Uwingu hereby certifies that the crater name

Dennis Chamberland

was officially submitted by

Dennis Chamberland

on March 5, 2014 and accepted into
the Uwingu Mars Map with the following citation:

It is the name of an a science fiction author Dennis Chamberland

Crater Diameter: 2.69 km (1.67 mi) Mars Latitude: 26.90° N, Longitude: 161.39° E
Uwingu Mars District 5291, Province 623



Questions?

Dennis Chamberland
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321-861-2014

dennis.w.chamberland@nasa.gov