

Big year for exploration of smallest planets

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As we start a new year, we should review two notable planetary missions of 2015. The Messenger spacecraft finished its survey of Mercury, while the New Horizons spacecraft successfully reached Pluto. These two worlds are the smallest planetary bodies of the solar system. Mercury is the closest to the sun, Pluto the farthest from the sun.

Mercury was first explored by Mariner 10 in 1974. Mariner was able to survey only about half of the planet's surface, but its three flybys detected a tenuous helium atmosphere, a weak magnetic field that was only about 1 percent of the strength of Earth's, and an iron-rich core.

Messenger (MERcury Surface Space ENVIRONMENT GEochemistry Ranging) also completed three flybys in 2008-09, then became the first spacecraft to orbit the planet in 2011. It was able

to map, in color, nearly the entire surface of the planet. Messenger found signs of past volcanic activity, and water ice and organic molecules in the permanently shadowed areas of craters near the North Pole.

Data from the probe's laser altimeter suggests Mercury's central core is solid iron, but its outer core is molten iron. Sulfur contamination of the iron is thought to prevent solidification of this outer layer.

To maintain its orbit, Messenger had to use its maneuvering thrusters because of the gravitational effects of the sun. Messenger's orbit began to decay in late 2014 after its thruster fuel was exhausted. On April 30, it spiraled into Mercury's surface, crashing near the crater Janacek, located in a large basin called Suisei Planitia.

New Horizons is the first mission to Pluto. Launched in 2006, before Pluto was demoted to dwarf planet status, the spacecraft

carries a portion of Clyde Tombaugh's ashes. He discovered Pluto in 1930.

During a flyby of Jupiter in 2007, New Horizons used the planet's gravity to speed it on its way to Pluto. This maneuver shaved three years off its flight time. The spacecraft spent the next seven years mostly in hibernation, only powering up 50 days a year to test its systems and send weekly messages to indicate all was well. New Horizons came out of its last scheduled hibernation in December 2014, and by January was making observations of Pluto and its moons.

At present, it takes almost five hours for radio signals to travel from the spacecraft to Earth. It'll take a year to transmit all the data back to Earth. Thanks to New Horizons, we have images of cratered (older) and smooth (younger) ice sheets, mountains that may be ice volcanoes, a thin hazy methane atmosphere and detailed views of Pluto's tiny spin-

ning moons. The probe still is operational and may visit the tiny dwarf planet 2014MU69 in 2019.

FROM EARTH: Observing Pluto visually is disappointing, even with the largest of telescopes, but Mercury is one of the five planets observed since antiquity. The others are Venus, Mars, Jupiter and Saturn.

Thirty minutes after sunset on New Year's Day, Mercury will shine 10 degrees above the southwest horizon. It will appear lower in the sky until Jan. 20, when it will start appearing in the predawn sky. Its proximity to the sun and correspondingly fast orbit make it the only planet capable of being both a morning and evening "star" in the same month.

If you want to learn more about astronomy, the Popular Astronomy Club of the Quad Cities meets at 7 p.m. on the second Monday of every month at Augustana College's John Deere Planetarium, 820 38th Ave., Rock Island.