
THE YOUNG ASTRONOMERS NEWSLETTER

JAPANESE MISSION IS BUSILY EXPLORING AND SAMPLING ASTEROID RYUGU

We need a score card to keep track of the activities of the Japanese mission to the Asteroid Belt and its efforts to take samples which will be returned to Earth. The breakdown goes something like this: Mission **Hayabusa2** (launched in 2014) reached the asteroid Ryugu, in June, and is in the process of deploying several rovers and landers. Two rovers: MINERVA II 1A and MINERVA II 1B were allowed to gently settle to the asteroid surface on September 21. A third rover: MASCOT was released from Hayabusa2 on Oct. 3. And a fourth rover, MINERVA II-2 is scheduled to land in July 2019.

MASCOT was built by cooperating German and French space agencies. All of the rovers carry various instruments for analyzing surface properties. They are very small, only a couple of pounds each.

The main ship, Hayabusa 2 is also scheduled to carry out a sampling maneuver in early 2019. This entails shooting a copper pellet into the asteroid to create a crater from which a sample will be taken from the pristine subsurface.

Because Ryugu is such a small body, (900 m diam.) it has low gravity and this allows the various instrumental packages to descend with virtually no back-thrusting. Also, the low gravity allows the rovers to move about the asteroid by an inertial twisting motion of internal torque weights. This results in a hopping movement of the instruments.

Depending on maneuverability and control, Hayabusa 2 may take up to three tiny samples, totaling 0.1 g. This is a bit small, but it is 100 times more than the 1 mg sample brought back from asteroid Itokawa by the first Hayabusa in

2010. Project scientists assure us that these small samples are sufficient to give us valuable information about asteroids. Samples will be returned to Earth in late 2020.

Ryugu is classified as a C-type asteroid; meaning that it is rich in carbonaceous matter, like organic compounds. It also contains as much as 20% water, locked up as hydrated minerals.

Meanwhile, NASA has its own asteroid mission: OSIRIS-Rex. This craft will visit the asteroid Bennu in December and also bring back a sample. [For more details about Hayabusa 2 check: [directory - eoportal.org/web/satellite-mission](http://directory-eoportal.org/web/satellite-mission). Also: Space.com, Oct. 23] (editor's note: News from Space.com of October 5 indicates that MASCOT completed its mission of photos and scientific measurements. It did this in 17 hours before its batteries ran down. This was one hour longer than expected. So, MASCOT was able to fit in an extra "hop")

CASSINI REVEALED CHEMICAL DYNAMICS BETWEEN SATURN ATMOSPHERE AND ITS RINGS

During Cassini's final orbits just above the cloud tops of Saturn, the probe was able to report on the remarkable flow of a variety of molecules from the rings to the planet's upper atmosphere.

The rings consist mostly of water ice and the upper atmosphere is dominated by hydrogen and helium. But the rings also contain nitrogen, methane, carbon dioxide, and more, that rain down from the innermost D ring. There is also ammonia, carbon monoxide and complex organic species that are trapped in dust grains.

These all fall into the upper atmosphere where they are bombarded by protons and

other ions. Cassini used its on-board mass spectrometer to identify a variety of molecules and molecular fragments.

There is a net flow of material from the D ring to the planet, and, in turn, molecules migrate inward from the neighboring C ring.

J. Hunter Waite Jr. of the Southwest Research Institute and colleagues believe that the mass transfer of matter from rings to planet may result in the disappearance of the D ring in 7,000 to 66,000 years, and the C ring could last perhaps an estimated 700,000 to 7 million years. All this depends on the rate of replenishment of material by incoming comets.

After broadcasting its scientific findings, the Cassini probe made a planned suicide plunge into Saturn's atmosphere on September 15, 2017. [Chem. & Eng. News, Oct. 8, 2018].

BEPI-COLOMBO IS HEADED FOR MERCURY

The Italian-Japanese BepiColombo mission to Mercury was launched on October 20 and is expected to reach the nearest planet to the Sun sometime in 2025 after a circuitous route that includes passes of Earth, Venus, the Sun and Mercury (six flybys) before settling in on its home (polar) orbit around the planet. It's a tricky journey because of the strong gravity of the nearby Sun and the rapid movement of Mercury in its elongated orbit.

The spacecraft is named after the Italian scientist Giuseppe "Bepi" Colombo, who planned the details of the complex mission.

Only two spacecrafts have ever been to Mercury: Mariner-10 in 1974 and Messenger in 2011. They revealed an astonishing amount of details about the innermost planet: lots of iron in its core, a magnetic field, extremes of hot and cold temperatures, possibly ice deep in polar craters, strange geologic features.

BepiColombo will split into two independent scientific observation platforms: the European planetary orbiter (MPO) and the Japanese made Mercury Magnetospheric Orbiter (MMO, nicknamed Mio) [both November issues of relevant news magazines: Astronomy and Sky & Telescope have feature articles about missions to Mercury.]

STRANGE CLOUD ON MARS NOT A VOLCANIC ERUPTION

A long, whitish cloud has been observed recently on Mars. It has appeared over the dormant volcano, Arsia Mons. Many would think that the cloud is the result of renewed volcanic activity. But actually, it is a weather cloud, a feature called an orographic cloud. The formation occurs when prevailing winds carrying water vapor rise up the side of the volcano and are cooled enough to cause water crystals to form. The snowy cloud is carried by wind to produce the long plume that we see. This has been observed with other volcanos on the red planet. [astrobob.areavoices.com, Oct. 26, 2018].

WILL OPPORTUNITY COME BACK TO LIFE?

Poor Opportunity! The solar panels on this Mars rover have been coated with dust since last summer. That was caused by a severe, and prolonged dust storm on the red planet.

No signal has been received since last June, and NASA has been trying to communicate with it by systematic signaling.

The dust storm is over and Mars is now in a breezy period. So, we hope that the solar panels may be cleaned off and the rover will come to life. [https://nasa.gov/mer/mission/Status_opportunityAll.html].

BIRTHDAYS IN NOVEMBER;

Edwin Hubble (Amer.), b. Nov. 20, 1889, d. Sept. 28, 1953. Proved that there were galaxies outside of our Milky Way; that galaxies were moving apart more rapidly at increasing distances (Hubble Law); classified galaxies according to shape.

Frederick William Herschel (Eng., German born). b. Nov. 15, 1738, d. Aug. 25, 1822. Proposed that the Milky Way was a flattened disk. He was the father of John Herschel, who discovered Uranus (1781).

Carl Sagan (Amer.), b. Nov. 9, 1934, d. Dec. 20, 1996. Astronomer who popularized astronomy for the public. Promoted attempts to contact cosmic intelligent beings.

Christian Doppler (Aust.), b. Nov. 29, 1803, d. Mar. 17, 1853. Mathematician and physicist. Observed that the frequency of light depends on the relative speeds of the source and observer.

Edmond Halley (Eng.), b. Nov. 8, 1656, d. Jan. 14, 1742 (new style calendar: b. Jan. 4, 1643, d. Mar. 31, 1727). Mathematician, meteorologist, astronomer. Computed the orbit of Halley’s Comet.

Harlow Shapley (Amer.), b. Nov. 2, 1885, d. Oct. 20, 1972. Studied the Milky Way shape and size as well as globular clusters and Cepheid variables.

Vesto Slipher (Amer.) b. Nov. 11, 1875; d. Nov. 8, 1969. Astronomer who performed the first redshift-based radial velocities of galaxies, later corroborated by the work of Hubble. This led to the acceptance that the universe was expanding.

MOON PHASES IN NOVEMBER: New: Wed. the 7th; **1st Qtr.:** Thurs. the 15th; **Full:** Fri. the 23rd; **Last Qtr.:** Fri. the 30th.

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LEONID METEOR SHOWER: Peaks around the 17th

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DAYLIGHT SAVINGS TIME ENDS ON SUNDAY THE 4TH

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THE PLANETS IN NOVEMBER: **Venus** disappeared from the evening western sky during the last week of October. But it now becomes our Morning Star for several months. Check low in the east before sunrise. **Jupiter** and **Saturn** are prominent in the southwest. Jupiter is just above the horizon at dusk. **Mars** shows up as a red “star” about half way up in the south.

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Forsyth Astronomical Society activities in November:

Saturday, the third: FAS observation at Stone Mountain Park (check website for cancellation due to weather.)

Saturday the tenth (1 – 4p.m.): FAS telescope workshop. If you are interested in telescopes or plan to buy one, come to Kaleideum on Saturday the 10th and talk to FAS members about the features of various telescope designs. Many telescopes will be on display.

Saturday the tenth: Public observation at Pilot Mountain. Rain date: December 1.

FAS monthly meeting: Wednesday the 14th 7:30 p.m. at Kaleideum.

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FAS website: <http://www.fas37.org> The front desk at Kaleideum often has details about FAS events.

Call: 336-767-6730 ext. 1000

Have a great November. Don’t eat too much turkey! Bob Patsiga, editor