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ASTRONOMY NEWS

The Japan Aerospace eXploration Agency (JAXA) had its first successful planetary orbit mission late last year with the Venus Climate Orbiter. The spacecraft is also known as Akatsuki, meaning "dawn" in Japanese. It is a fitting name for studying the planet sometimes known as the "morning star".

This is particularly exciting since you could say this mission took the long way around. It was launched on May 20, 2010 and scheduled to go into orbit December 6, 2010. However, its main engine failed just as it initiated orbital insertion. The team quickly adjusted its trajectory to orbit the Sun instead and bought time to find another solution.

The mission was only designed to last four and half years, so JAXA put the craft into hibernation to save power. They came up with a plan to use the attitude thrusters, which normally help orient the spacecraft, to insert the probe into Venus's orbit when they caught up to each other again. This plan worked and on December 7, 2015 Akatsuki successfully went into orbit around Venus.

Venus is known for its thick atmosphere that acts as an insulating blanket. This atmosphere traps heat, making Venus the hottest planet in our Solar System. Akatsuki is equipped with six instruments, including five cameras, to study this atmosphere in detail. With the long stasis and close flybys to the Sun, there has been some deterioration of the heat shielding which put stress on the equipment. The team will take about 3 months to assess the instruments on board and the craft will start its scientific mission in April 2016. So far JAXA has confirmed three of the cameras are working well and they have started taking some images of the planet.

The three working instruments are the Longwave Infrared Camera (LIR), the Ultraviolet Imager (UVI), and the 1-micron Camera (IR1). LIC will study the cloud temperatures in Venus's upper atmosphere. UVI will study the distribution of sulfur dioxide and other chemicals in the atmosphere. Finally, IR1 will look through Venus's clouds to search for active volcanism on the surface. The other three instruments that are still undergoing testing include the 2-micron Camera (IR2) that will look at the lower atmosphere of Venus, the Lightning and Airglow Camera (LAC) that will study lightning and oxygen in the atmosphere, and the Ultra-Stable Oscillator (USO) for precise distance measurements and communication.

Despite the five year delay, this mission will help us shed new light on Venus. It came to fruition all because of hard work and determination, key factors in space exploration of any kind! ★



DIRECTOR'S NOTE

Hello Friends!

We have a busy winter coming up. We had to turn away so many people when we premiered our Pink Floyd show this Fall, we decided to bring it back for three more weekends. Shows will be March 11, 12, 18, 19, 25, and 26th at 10 p.m. Tickets are \$2.00 for members.

We are also bringing in samples of meteorites from China for a small display in our lobby due to open in early February. This is in honor of MSU's theme year "The China Experience" and will stay up through at least September 2016.

MSU's annual Science Festival will be held April 12-24. This year we will be participating through the festival's Statewide Astronomy Night (SWAN) on the evening of April 15th. We will host a talk, a free planetarium show, as well as observing and activities at the MSU observatory. Visit sciencefestival.msu.edu for more information.

For public shows, we started the new year with a new feature show, *Skywatchers of Africa*. We will be switching to *From Earth to the Universe* April 15th. For our family show we have brought back *Perfect Little Planet* and will switch to *The Little Star That Could* March 13th.

Thank you for your support!
Shannon Schmoll
Director, Abrams Planetarium ★



OBSERVING NOTES

We are changing the observing notes slightly to talk about the stories and fun facts around the interesting objects in the sky. The *Sky Calendar* can help you find these objects and the observing notes will give you some things to reflect upon when stargazing. Let us know what you think by emailing abrams@pa.msu.edu!

ORION

- Keep an eye out for Orion the Hunter, midway up the sky in the south in February. He will make his way westward as the months go on. He has two bright stars that are known for their distinctive colors in the sky. The first is the red Betelgeuse that marks his shoulder on the upper left of the constellation. Its name derives from the Arabic for "Jawza's Hand" with Jawza being the Arabic name for Orion. The red color indicates a relatively cool surface temperature for a star of 3500 Kelvin (5840 Fahrenheit).
- Similarly, there is the foot of Orion known as Rigel on the bottom right of the constellation. Rigel is a brilliant blue which indicates it is a hot star with a surface temperature of 11,000 Kelvin (19,340 Fahrenheit). The name Rigel is Arabic for foot and derives from the label "left foot of Jawza."

TAURUS and PLEIADES

- Taurus is also up this time of year and will rise before Orion. Use Orion's belt to point upward to find the "V" that makes up bull's face. Most of these stars are part of the Hyades star cluster, the closest cluster to the Solar System at only 153 lightyears away.
- The bright red star in the face of Taurus is Aldebaran and is not associated with the Hyades. It is another red giant star

similar to Betelgeuse. Some refer to Aldebaran as the angry eye of the bull. However, its name translates from Arabic to "the follower." It was given this name because it appears to follow the Pleiades star cluster.

- To find the Pleiades, continue the line from Orion's belt upwards, though the face of Taurus, and you will see something that looks almost like a "mini-dipper." The Pleiades are also known as Subaru in Japan and were the basis for the Subaru car company's logo.

AURIGA

- Auriga is high in the sky above Orion in the winter time. The name Auriga stems from Latin and is known as the Charioteer. It is associated with many charioteers in mythology including Erichthonius of Athens who is said to have invented the four-horse chariot and Myrtilus whose chariot was destroyed during a race.
- Auriga has the very bright star Capella which gets its name from the Latin "Capra" meaning goat. In some writings, Capella is associated with Amalthea, a female goat that breast-fed the greek god Zeus as an infant. Just to the lower right of Capella is a small triangle of stars known as "the kids." Many depictions of Auriga show a charioteer holding a mother goat and her kids in one arm and a the reigns from a chariot in the other.

JUPITER and the PLANETS

- Starting the last week of January through the third week of February is a wonderful time for planet watching. All five of the naked eye planets will be visible in a grand panorama from east to west before sunrise. This has not happened since 2005. From January 23rd through February 5th, the moon will also be up. It

will move from west to east amongst the planets each morning. This means, for two weeks, all six naked eye solar system objects will be visible at the same time!

- You may notice that the planets fall along a distinct line known as the ecliptic. The Solar System formed from one big cloud of gas that collapsed down due to gravity. In this process, most of the material went into the Sun, but some ended up in a flat disk around our star. It is from this flat disk that the planets formed. The planets are all still situated in that disk more or less, which appears as a line in our sky.
- The most visible planet for the months of February through April is Jupiter. In early February it will rise right around 9 p.m. and rise earlier each night. It is right under Leo the Lion.
- In Hindu astrology, all of the naked eye planets are associated with a god. Jupiter is associated with Brihaspati, who was the guru of the gods.
- Galileo first pointed a telescope at the planet in 1610 and found the four Galilean moons: Io, Ganymede, Callisto, and Europa. All were named after lovers of Jupiter in Roman mythology. Even with a small telescope, you can see these four moons of Jupiter, though there are now over 60 confirmed moons orbiting the planet.
- Jupiter's massive size influences the solar system. There are regions in the main asteroid belt with few asteroids known as the Kirkwood Gaps. Asteroids in these gaps are in just the right spots to line up with Jupiter more often, causing them to be nudged to different orbits. ★