

IO – December 2005

Issue # 2005-12

www.eugeneastro.org

Eugene Astronomical Society, Annual Club Dues \$25, Board Members: President: Richard Boyd- checkerkit@comcast.net, Stephen Caruana, Fred Domineack, Jacob Stranlien Sam Pitts- IO editor- sampitts@comcast.net 688-7330 Io (*EYE-oh*) is nearest to Jupiter and fastest orbiting of the four Galilean moons

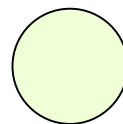
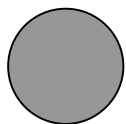
EAS is a Proud Member of:



Monday- December 5th MEETING EUGENE ASTRONOMICAL SOCIETY At The Science Factory Planetarium

The meeting will begin at **7:00 PM** in the Planetarium. John Flinn, well known local photographer and EAS member, will present another of his famous slide shows. John will show us some of his latest aurora photos, and some of his pictures of Winter constellations and recent planetary conjunctions. He'll also show "a few slides of ancient rock structures that were made to view and celebrate the winter solstice such as Newgrange the Hitching Post of the Sun at Macchu Picchu and the natural one at the end of Lookout Reservoir (Diamond Peak)".

Come early and help others learn about their scopes. Those of you, who are new or not sure about your equipment, show up early and some of our members will assist you in understanding your equipment better. If you are planning on getting a scope please come out and ask questions, we're glad to assist you in making a good solid choice to maximize your viewing pleasure.



December 1 & 31	December 8	December 15	December 23
New Moon	First Quarter	Full Moon	Last Quarter
Sunset: 4:35 PM	Sunset: 4:34 PM	Sunset: 4:34 PM	Sunset: 4:38 PM
Sunrise 7:27 AM	Sunrise 7:34 AM	Sunrise 7:40 AM	Sunrise 7:45 AM
Mercury Rise 6:08 AM	Mercury Rise 5:45 AM	Mercury Rise 5:54 AM	Mercury Rise 6:18 AM
Venus Set 7:29 PM	Venus Set 7:27 PM	Venus Set 7:18 PM	Venus Set 6:59 PM
Mars Set 4:58 AM	Mars Set 4:29 AM	Mars Set 4:03 AM	Mars Set 3:37 AM
Jupiter Rise 4:41 AM	Jupiter Rise 4:21 AM	Jupiter Rise 4:01 AM	Jupiter Rise 3:37 AM
Saturn Rise 9:05 PM	Saturn Rise 8:38 PM	Saturn Rise 8:09 PM	Saturn Rise 7:35 PM
Uranus Set 11:28 PM	Uranus Set 11:01 PM	Uranus Set 10:39 PM	Uranus Set 10:04 PM
Neptune Set 9:35 PM	Neptune Set 9:08 PM	Neptune Set 8:42 PM	Neptune Set 8:11 PM

All times are for Eugene, Oregon Latitude 44° 3' 8" Longitude 123° 5' 8" for listed Date

Magazine subscriptions go to Richard Boyd: checkerkit@comcast.net



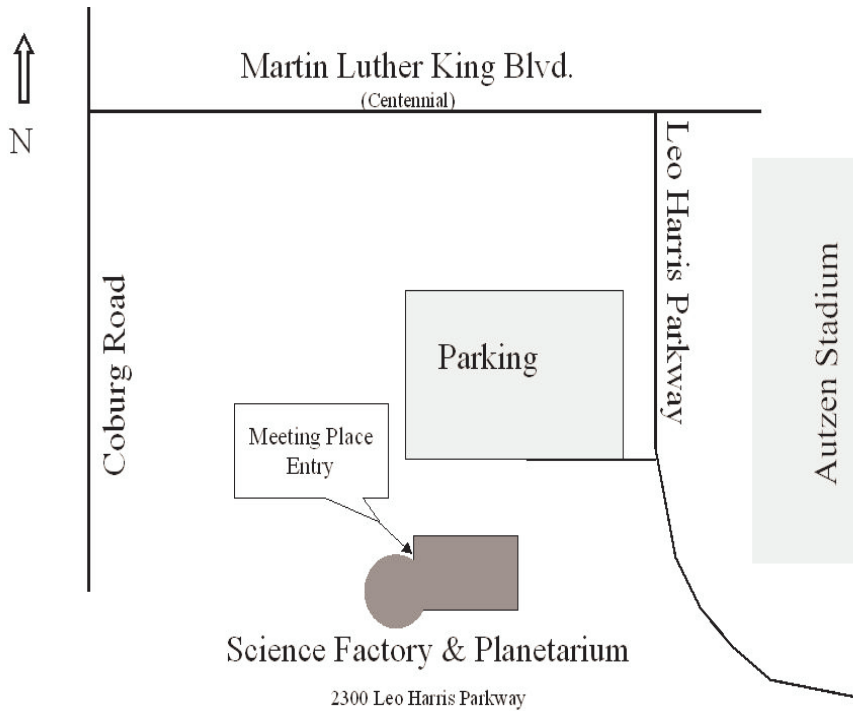
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Map to Eugene Astronomical Society's
Monthly Meetings in Eugene, Oregon



December 26th Graze in Eugene, OR

Will zoom map later

Derek will observe near I-5 @ 1.2 miles South (Green Line)

Any other observer should be North of that – Closer to / or On the Red Line

Will adjust for proper altitude of area in early November

Visit Derek's Web Site: http://www.poyntsource.com/BREIT_IDEAS/index.htm

Near Earth Fly-by Asteroid

Dec 22 - Asteroid 2003 YT70 Near-Earth Flyby (0.061 AU)

Dec 27 - Asteroid 2004 YG1 Near-Earth Flyby (0.067 AU)



Great Image of Mars By Jeff Phillips

We had rain and fog when Mars was closest three weeks ago, but its not too late to look. I got a picture of Solis Lacus last evening before the fog moved in. Should be able to see the dark spot visually in a small scope again tonight or tomorrow.

Hayabusa's Contributions Toward Understanding the Earth's Neighborhood



Artist's conception of the Hayabusa spacecraft deploying one of the surface target markers that will be used to guide the spacecraft's descent to the surface of asteroid Itokawa.

Don Yeomans August 11, 2005

Beginning in early September 2005, the Japanese Hayabusa spacecraft will rendezvous with near-Earth [asteroid \(25143\) Itokawa](#). Itokawa, a 600 meter sized, potato-shaped asteroid, is named after Hideo Itokawa, a Japanese rocket pioneer. Although the primary objectives of the Hayabusa mission are to test new technologies, the mission will also provide a wealth of scientific returns. For the three month period from September through November 2005, the science instruments on board the Hayabusa spacecraft will undertake an intensive study of near-Earth asteroid Itokawa. After closely observing the asteroid for several weeks, a few pellets will be fired from the spacecraft at close range into the asteroid's surface and about a gram of the pellet's impact ejecta will be collected into a sample capsule. This capsule will then be brought back to Earth and parachuted into the Australia outback in June 2007 so that some of the asteroid's surface minerals can be studied in Earth-based laboratories. This will be the first asteroid sample return mission.

After the successful launch of the spacecraft on May 9, 2003 from the Japanese Kagoshima Launch site, the mission name was changed from MUSES-C to Hayabusa. Hayabusa, which is Japanese for "falcon," will act much like its namesake,

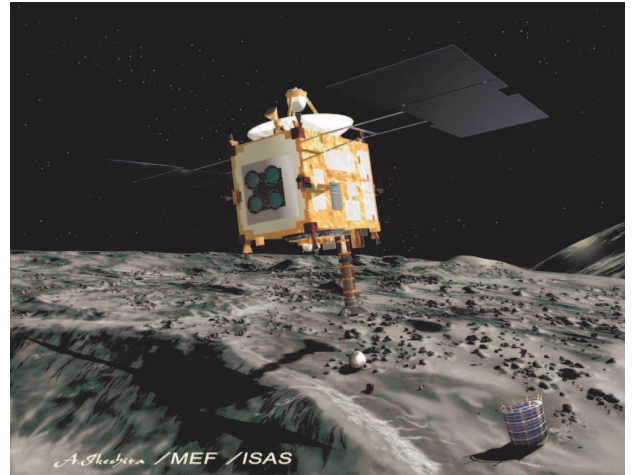
descending to the asteroid's surface, capturing its prey and returning it to Earth. While the scientific knowledge of near-Earth asteroids will be significantly advanced by the Hayabusa mission, the primary goals are to test four advanced technology systems: the electric propulsion (ion drive) engines; an autonomous navigation system; the sample collection system; and the sample capsule that re-enters the Earth's atmosphere.

A year after launch, on May 19, 2004, the spacecraft returned to Earth and made a close approach (altitude = 3725 km), thereby gaining the extra velocity it needed to reach the near-Earth asteroid Itokawa. During the Earth swing-by, the spacecraft also took images of the Earth and moon to test and calibrate the on board camera called AMICA (Asteroid Multi-band Imaging Camera). These Earth and lunar images can be viewed at: <http://www.isas.ac.jp/e/snews/2004/0519.shtml>. Because the efficiency of the solar panels were slightly degraded as a result of a solar flare in late 2003, the ion engines no longer receive quite as much electricity as they should so the spacecraft's arrival at the asteroid was delayed from mid-summer until September of 2005.

Upon arriving at the asteroid, the Hayabusa spacecraft will spend about three months hovering above the asteroid with its high gain antenna pointed toward Earth and its science instruments pointed toward the asteroid's surface. Using the spacecraft camera, the entire surface of the asteroid will be mapped so that its size, shape and volume can be determined. The Hayabusa spacecraft carries infrared and X-ray spectrometers that will identify the asteroid's most common minerals and chemical constituents. In mid-September, the spacecraft will evolve down to its so-called "gate position," 20 kilometers above the asteroid's surface, where it will begin the global mapping of the surface features and determine its surface composition. Toward the end of September, the spacecraft will move to its "home position," which is only seven kilometers above the surface. At this home position, a more detailed surface map will be generated and the surface composition differences will be examined as the asteroid rotates underneath the hovering spacecraft.

In the second half of November, the spacecraft will collect up to three surface samples as its sample horn captures small pieces of the asteroid ejected when tantalum pellets are fired into its surface at 300 meters per second. With these surface samples tucked safely into the spacecraft's sample capsule, the spacecraft will return to Earth, arriving in June 2007, and the sample capsule will parachute to the ground in Australia. The samples will be analyzed in various laboratories to study their detailed chemical composition and determine which meteorite examples in Earth-based collections provide the best match for Itokawa's particular composition. Once this question is answered, then future Earth based observations can be used to identify the likely minerals in other asteroids that share the same spectral characteristics as Itokawa.

During the first descent to fire a pellet into the surface, a small coffee-can-sized surface hopper, called MINERVA, will be dropped slowly onto the asteroid's surface. For one to two days it will slowly leap about the asteroid taking surface temperature measurements and high-resolution images with each of its three miniature cameras.



Artist's conception of the Hayabusa spacecraft and the Minerva surface hopper.

Hayabusa's observations will address each of three major issues concerning asteroids:

- 1.) their role as the building blocks of the solar system, 2.) their potential for impacting Earth and 3.) their future use as raw materials for building space structures.

 1. The scientific interest in asteroids is due largely to their status as the remnant debris from the inner solar system formation process that occurred some 4.6 billion years ago. Since the chemical compositions of asteroids have remained relatively unchanged since their formation, knowledge of their elemental makeup would provide an understanding of the chemical mix from which the inner planets, including Earth, formed.
 2. From time to time, near-Earth asteroids collide with Earth. Should one of them be found upon an Earth threatening trajectory, scientists would need to understand its composition and structure before a successful strategy could be undertaken to deflect the object away from Earth.
 3. Some of the near-Earth asteroids that are potentially the most hazardous because they can closely approach the Earth are also the objects that could be most easily reached and exploited for raw materials. The minerals, metals and water ices on near-Earth asteroids and comets could be used to manufacture the space structures and rocket fuel that will be required to explore and colonize our solar system in the 21st century. We need to examine the chemical composition of some of these objects to understand which among them are richest in mineral wealth and other raw materials.

The Hayabusa asteroid sample return mission is the next giant step forward in understanding the role of near-Earth asteroids in the origin of the solar system, their potential threat to Earth and the future use of their raw materials to expand the human presence beyond Earth.

Additional information:

Hayabusa Project (JAXA main site)

<http://www.isas.ac.jp/e/enterp/missions/hayabusa/index.shtml>

SPACE NEWS (JAXA) -- Hayabusa acquired images of the earth and the moon.

<http://www.isas.jaxa.jp/e/snews/2004/0519.shtml>

Planetary Society:

http://planetary.org/news/2004/hayabusa_earth-swingby_preview.html