Catskills Astronomy Club News
February, 2008

John Kocijanski……Editor
Jim McKeegan……President
John Kocijanski…..Vice-President
Lisa Brody……Treasurer
Bud Wertheim……..Secretary

Club News:

The observation sessions on January 5th and 12th were not held due to poor weather and sky conditions.

The February observation sessions at Walnut Mountain Park are scheduled for the 2nd and 9th.

The next indoor dinner and a movie meeting will be on March 1st at Morgan Outdoors in Livingston Manor. The movie to be shown will be announced in the near future.

The club has selection of astronomy books, Stardate audio CDs, a Macintosh computer with astronomy software, and a Meade 8 inch reflector for members to borrow. Please contact John at 791-5240 or kocis@verizon.net if you are interested in borrowing any of these.

Astronomy News:

Here are some articles from various NASA sources that might be of interest.

NEWS RELEASE: 2008-003 Jan. 10, 2008

Even Thin Galaxies Can Grow Fat Black Holes

NASA's Spitzer Space Telescope has detected plump black holes where least expected -- skinny galaxies.

Like people, galaxies come in different shapes and sizes. There are thin spirals both with and without central bulges of stars, and more rotund ellipticals that are themselves like giant bulges. Scientists have long held that all galaxies except the slender, bulgeless spirals harbor supermassive black holes at their cores. Furthermore, bulges were thought to be required for black holes to grow.

The new Spitzer observations throw this theory into question. The infrared telescope surveyed 32 flat and bulgeless galaxies and detected monstrous black holes lurking in the bellies of seven of them. The results imply that galaxy bulges are not necessary for black hole growth; instead, a mysterious invisible substance in galaxies called dark matter could play a role.

"This finding challenges the current paradigm. The fact that galaxies without bulges have black holes means that the bulges cannot be the determining factor, " said Shobita Satyapal of the George Mason University, Fairfax, Va. "It's possible that the dark matter that fills the halos around galaxies plays an important role in the early development of supermassive black holes."

Satyapal presented the findings today at the 211th meeting of the American Astronomical Society in Austin, Texas. A study from Satyapal and her team will be published in the April 10 issue of the Astrophysical Journal.

Our own Milky Way is an example of a spiral galaxy with a bulge; from the side, it would look like a plane seen head-on, with its wings out to the side. Its black hole, though dormant and not actively "feeding," is several million times the mass of our sun.

Previous observations had suggested that bulges and black holes flourished together like symbiotic species. For instance, supermassive black holes are almost always about 0.2 percent the mass of their galaxies' bulges. In other words, the more massive the bulge, the more massive the black hole. Said Satyapal, "Scientists reasoned that somehow the formation and growth of galaxy bulges and their central black holes are intimately connected."

But a wrinkle appeared in this theory in 2003, when astronomers at the University of California, Berkeley, and Observatories of the Carnegie Institution of Washington, Pasadena, Calif., discovered a relatively "lightweight" supermassive black hole in a galaxy lacking a bulge. Then, earlier this year, Satyapal and her team uncovered a second supermassive black hole in a similarly svelte galaxy.

In the latest study, Satyapal and her colleagues report the discovery of six more hefty black holes in thin galaxies with minimal bulges, further weakening the "bulge-black hole" theory. Why hadn't anybody seen these black holes before? According to the scientists, bulgeless galaxies tend to be very dusty, letting little visible light escape. But infrared light can penetrate dust, so the team was able to use Spitzer's infrared spectrograph to reveal the "fingerprints" of active black holes lurking in galaxies millions of light years away.

"A feeding black hole spits out high-energy light that ionizes much of the gas in the core of the galaxy," said Satyapal. "In this case, Spitzer identified the unique fingerprint of highly ionized neon -- only a feeding black hole has the energy needed to excite neon to this state." The precise masses of the newfound black holes are unknown.

If bulges aren't necessary ingredients for baking up supermassive black holes, then perhaps dark matter is. Dark matter is the enigmatic substance that permeates galaxies and their surrounding halos, accounting for up to 90 percent of a galaxy's mass. So-called normal matter makes up

stars, planets, living creatures and everything we see around us, whereas dark matter can't be seen. Only its gravitational effects can be felt. According to Satyapal, dark matter might somehow determine the mass of a black hole early on in the development of a galaxy.

"Maybe the bulge was just serving as a proxy for the dark matter mass -- the real determining factor behind the existence and mass of a black hole in a galaxy's center," said Satyapal.

Other authors of this study include: D. Vega of the George Mason University; R.P. Dudik of the George Mason University and NASA Goddard Space Flight Center, Greenbelt, Md.; N.P. Abel of the University of Cincinnati, Ohio; and Tim Heckman of the Johns Hopkins University, Baltimore, Md.

NASA's Jet Propulsion Laboratory, Pasadena, Calif., manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology, also in Pasadena. Caltech manages JPL for NASA. Spitzer's infrared spectrograph was built by Cornell University, Ithaca, N.Y. Its development was led by Jim Houck of Cornell.

For graphics and more information about Spitzer, visit http://www.spitzer.caltech.edu/spitzer and http://www.nasa.gov/spitzer .

-end-

NEWS RELEASE: 2008-004 Jan. 14, 2008

Ulysses Spacecraft Flies Over Sun's North Pole

The Ulysses spacecraft today is making a rare flyby of the sun's north pole. Unlike any other spacecraft, Ulysses is able to sample winds at the sun's poles, which are difficult to study from Earth.

Ulysses has flown over the sun's poles three times before, in 1994-95, 2000-01 and 2007. Last week, solar physicists announced the first indications of a new solar cycle. Visiting the pole at this time may lead to new insights about solar activity.

"This is a wonderful opportunity to examine the sun's north pole within a transition of cycles," said Arik Posner, Ulysses program scientist at NASA Headquarters in Washington. "We've never done this before."

Many researchers believe the sun's poles are central to the 11-year ebb and flow of solar activity. When sunspots break up, their decaying magnetic fields are carried poleward by vast currents of

plasma. This makes the poles a sort of graveyard for sunspots. Old magnetic fields sink beneath the polar surface 200,000 kilometers deep (about 124,000 miles), all the way down to the sun's inner magnetic dynamo, which generates the solar magnetic field. There, dynamo action amplifies the fields for use in future solar cycles.

"Just as Earth's poles are crucial to studies of terrestrial climate change, the sun's poles may be crucial to studies of the solar cycle," said Ed Smith, Ulysses project scientist at NASA's Jet Propulsion Laboratory, Pasadena, Calif.

Each previous flyby revealed something interesting and mysterious. One puzzle has been the temperature of the sun's poles. In the previous solar cycle, the magnetic north pole was about 80,000 degrees Fahrenheit (more than 44,000 degrees Celsius), or 8 percent cooler than the south. The current flyby may help solve this puzzle because it comes less than a year after a similar south pole flyby in Feb. 2007. Mission scientists will be able to compare temperature measurements, north versus south, with hardly any gap between them.

Ulysses also discovered the sun's high-speed polar wind. At the sun's poles, the magnetic field opens up and allows solar atmosphere to stream out at a million miles per hour. By flying around the sun, covering all latitudes in a way that no other spacecraft can, Ulysses has been able to monitor this polar wind throughout the solar cycle and has found that it is acting a bit odd.

"Twelve years ago, just before the previous 'sea change' between solar cycles, the polar wind spilled down almost all the way to the sun's equator. But this time it is not. The polar wind is bottled up, confined to latitudes above 45 degrees, " said Posner.

Launched in Oct. 1990 from the space shuttle Discovery, Ulysses is a joint mission of NASA and the European Space Agency.

For more information about Ulysses, visit http://Ulysses.jpl.nasa.gov .

-end-

NEWS RELEASE: 2008-111 Jan. 23, 2008

Orbiting Camera Details Dramatic Wind Action on Mars

Mars has an ethereal, tenuous atmosphere with less than one-percent the surface pressure of Earth, which challenges scientists to explain complex, wind-sculpted landforms seen with unprecedented detail in images from NASA's Mars Reconnaissance Orbiter.

One of the main questions has been if winds on present-day Mars are strong enough to form and change geological features, or if wind-constructed formations were made in the past, perhaps when winds speeds and atmospheric pressures were higher.

The eye-opening new views of wind-driven Mars geology come from the University of Arizona's High Resolution Imaging Science Experiment camera (HiRISE). As the orbiter flies at about 3,400 meters per second (7,500 mph) between 250 and 315 kilometers (155 to 196 miles) above the Martian surface, this camera can see features as small as half a meter (20 inches).

"We're seeing what look like smaller sand bedforms on the tops of larger dunes, and, when we zoom in more, a third set of bedforms topping those," said HiRISE co-investigator Nathan Bridges of NASA's Jet Propulsion Laboratory in Pasadena, Calif. "On Earth, small bedforms can form and change on time scales as short as a day."

There are two kinds of "bedforms," or wind-deposited landforms. They can be sand dunes, which are typically larger and have distinct shapes. Or they can be ripples, in which sand is mixed with coarser particles. Ripples are typically smaller and more linear.

HiRISE also shows detail in sediments deposited by winds on the downwind side of rocks. Such "windtails" show which way the most current winds have blown, Bridges said. They have been seen before, but only by rovers and landers, never by an orbiter. Researchers can now use HiRISE images to infer wind directions over the entire planet.

Scientists discovered miles-long, wind-scoured ridges called "yardangs" with the first Mars orbiter, Mariner 9, in the early 1970s. New HiRISE images reveal surface texture and fine-scale features that are giving scientists insight into how yardangs form.

"HiRISE is showing us just how interesting layers in yardangs are," Bridges said. "For example, we see one layer that appears to have rocks in it. You can actually see rocks in the layer, and if you look downslope, you can see rocks that we think have eroded out from that rocky layer above."

New images show that some layers in the yardangs are made of softer materials that have been modified by wind, he added. The soft material could be volcanic ash deposits, or the dried-up remnants of what once were mixtures of ice and dust, or something else. "The fact that we see layers that appear to be rocky and layers that are obviously soft says that the process that formed yardangs is no simple process but a complicated sequence of processes," Bridges said.

"HiRISE keeps showing interesting things about terrains that I expected to be uninteresting," said Alfred McEwen of the University of Arizona Lunar and Planetary Laboratory, HiRISE principal investigator. "I was surprised by the diversity of morphology of the thick dust mantles. Instead of a uniform blanket of smooth dust, there are often intricate patterns due to the action of the wind and perhaps light cementation from atmospheric volatiles."

Paul Geissler of the U.S. Geological Survey, Flagstaff, Ariz., has discovered from HiRISE images that dark streaks coming from Victoria Crater probably consist of streaks of dark sand

blown out from the crater onto the surface. Scientists had wondered if wind might have blown away lighter-colored surface material, exposing a darker underlying surface. Geissler is comparing HiRISE images to images taken by NASA's Mars Exploration Rover Opportunity rover at Victoria Crater.

Bridges is lead author and McEwen is a co-author on the paper titled "Windy Mars: A dynamic planet as seen by the HiRISE camera" in Geophysical Research Letters in December.

Information about the Mars Reconnaissance Orbiter spacecraft is online at http://www.nasa.gov/mro . The mission is managed by JPL, a division of the California Institute of Technology, Pasadena, for the NASA Science Mission Directorate, Washington, D.C. Lockheed Martin Space Systems, Denver, is the prime contractor and built the spacecraft. Ball Aerospace & Technologies Corp., Boulder, Colo., built the HiRISE camera operated by The University of Arizona, Tucson.

-end-

NEWS RELEASE: 2008-013 Jan. 24, 2008

Giant Storm Eruption at Jupiter Unearths a Buried Past

Scientists around the globe have observed an astonishing and rare change in Jupiter's atmosphere -- a huge disturbance churning in the middle northern latitudes of the planet as two giant storms erupted.

Jupiter's winds are the strongest at middle northern latitudes, reaching about 600 kilometers per hour (370 miles per hour). Similar phenomena occurred in 1975 and 1990, but this event has never been observed before with high-resolution modern telescopes.

The storm eruption was captured in late March 2007 by NASA's Hubble Space Telescope, the NASA Infrared Telescope Facility in Hawaii and telescopes in the Canary Islands (Spain). A network of smaller telescopes around the world also supported these observations.

An international team coordinated by Agustín Sánchez-Lavega from the Universidad del País Vasco in Spain presents their findings about this event in the January 24 issue of the journal Nature. The team monitored the new eruption of cloud activity and its evolution with unprecedented resolution.

"Fortuitously, we captured the onset of the disturbance with Hubble, while monitoring the planet to support the New Horizons flyby observations of Jupiter in its route to Pluto. We saw the storm grow rapidly since its beginning, from about 400 kilometers [250 miles] to more than 2,000

kilometers [1,245 miles] in size in less than one day," said Sánchez-Lavega.

The atmosphere of the gaseous giant planet Jupiter is always turbulent. Its circulation is dominated by a pattern of cloud bands alternating with latitude, and by a persistent system of jet streams, both of unknown origin. Changes in the cloud bands are sometimes violent, starting from a localized eruption and followed by the development of a planetary-scale disturbance. The nature of these disturbances and the power source for these jets remains a controversial matter among planetary scientists and meteorologists. The phenomena could be powered by the sun, as is Earth, by the strong internal heat source emanating from Jupiter's interior, or by a combination of both.

According to the analysis, the bright plumes were storm systems triggered in Jupiter's deep water clouds that vigorously moved upward in the atmosphere and injected a fresh mixture of ammonia ice and water about 30 kilometers (20 miles) above the visible clouds. The storms moved in the peak of a jet stream in Jupiter's atmosphere at 600 kilometers per hour (375 miles per hour). They disturbed the jet and formed in their wake a turbulent planetary-scale disturbance containing red cloud particles.

"The infrared images distinguish the plumes from lower-altitude clouds and show that the plumes are lofting ice particles higher than anyplace else on the planet," said Glenn Orton of NASA's Jet Propulsion Laboratory, Pasadena, Calif. Orton is second author of the paper.

In spite of the energy deposited and the stirring and turmoil generated by the storms, the jet remained practically unchanged when the disturbance ceased, keeping steady against these storms. Models of the disturbance indicate that the jet stream extends deep in the buried atmosphere of Jupiter, more than 100 kilometers (62 miles) below the cloud tops where most sunlight is absorbed.

"This confirms previous findings by the Galileo probe when it descended through Jupiter's upper atmosphere in December 1995. Although both regions are meteorologically different, all the evidence points to a deep extent for Jupiter's jets and suggest that the internal heat power source plays a significant role in generating the jet," said Sánchez-Lavega.

A comparison of this disturbance with the two previous events in 1975 and 1990 shows surprising similarities and coincidences, all of which remain unexplained. All three eruptions occurred with a periodic interval of about 15 to 17 years. The plumes always appear in the jet peak; the disturbance erupted with exactly two plumes. Finally, the plumes moved with the same speed of the jet peak in all three events. Understanding this outbreak could be the key to unlocking the mysteries buried in the deep Jovian atmosphere.

Understanding these phenomena is important for Earth's meteorology, where storms are present everywhere and jet streams dominate the atmospheric circulation. In this way, Jupiter represents a natural laboratory where atmospheric scientists study the nature and interplay of the intense jets

and severe atmospheric phenomena.

For images, visit: http://www.nasa.gov/topics/solarsystem/features/hubble20080123c.html and http://hubblesite.org/newscenter/ .

JPL is managed for NASA by the California Institute of Technology. The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency.

-end-

NEWS RELEASE: 2008-014 Jan. 25, 2008

NASA Scientists Get First Images of Earth Flyby Asteroid

Scientists at NASA's Jet Propulsion Laboratory in Pasadena, Calif., have obtained the first images of asteroid 2007 TU24 using high-resolution radar data. The data indicate the asteroid is somewhat asymmetrical in shape, with a diameter roughly 250 meters (800 feet) in size. Asteroid 2007 TU24 will pass within 1.4 lunar distances, or 538,000 kilometers (334,000 miles), of Earth on Jan. 29 at 12:33 a.m. Pacific time (3:33 a.m. Eastern time).

"With these first radar observations finished, we can guarantee that next week's 1.4-lunar-distance approach is the closest until at least the end of the next century," said Steve Ostro, JPL astronomer and principal investigator for the project. "It is also the asteroid's closest Earth approach for more than 2,000 years."

Scientists at NASA's Near-Earth Object Program Office at JPL have determined that there is no possibility of an impact with Earth in the foreseeable future.

Asteroid 2007 TU24 was discovered by the NASA-sponsored Catalina Sky Survey on Oct. 11, 2007. The first radar detection of the asteroid was acquired on Jan. 23 using the Goldstone 70-meter (230-foot) antenna. The Goldstone antenna is part of NASA's Deep Space Network Goldstone station in Southern California's Mojave Desert. Goldstone's 70-meter diameter (230-foot) antenna is capable of tracking a spacecraft traveling more than 16 billion kilometers (10 billion miles) from Earth. The surface of the 70-meter reflector must remain accurate within a fraction of the signal wavelength, meaning that the precision across the 3,850-square-meter (41,400-square-foot) surface is maintained within one centimeter (0.4 inch).

Ostro and his team plan further radar observations of asteroid 2007 TU24 using the National Science Foundation's Arecibo Observatory in Puerto Rico on Jan. 27-28 and Feb. 1-4.

The asteroid will reach an approximate apparent magnitude 10.3 on Jan. 29-30 before quickly becoming fainter as it moves farther from Earth. On that night, the asteroid will be observable in dark and clear skies through amateur telescopes with apertures of at least 7.6 centimeters (three

inches). An object with a magnitude of 10.3 is about 50 times fainter than an object just visible to the naked eye in a clear, dark sky.

Scientists working with Ostro on the project include Lance Benner and Jon Giorgini of JPL, Mike Nolan of the Arecibo Observatory, and Greg Black of the University of Virginia.

NASA detects and tracks asteroids and comets passing close to Earth. The Near Earth Object Observation Program, commonly called "Spaceguard," discovers, characterizes and computes trajectories for these objects to determine if any could be potentially hazardous to our planet. The Arecibo Observatory is part of the National Astronomy and Ionosphere Center, a national research center operated by Cornell University, Ithaca, N.Y., for the National Science Foundation. JPL is a division of the California Institute of Technology in Pasadena.

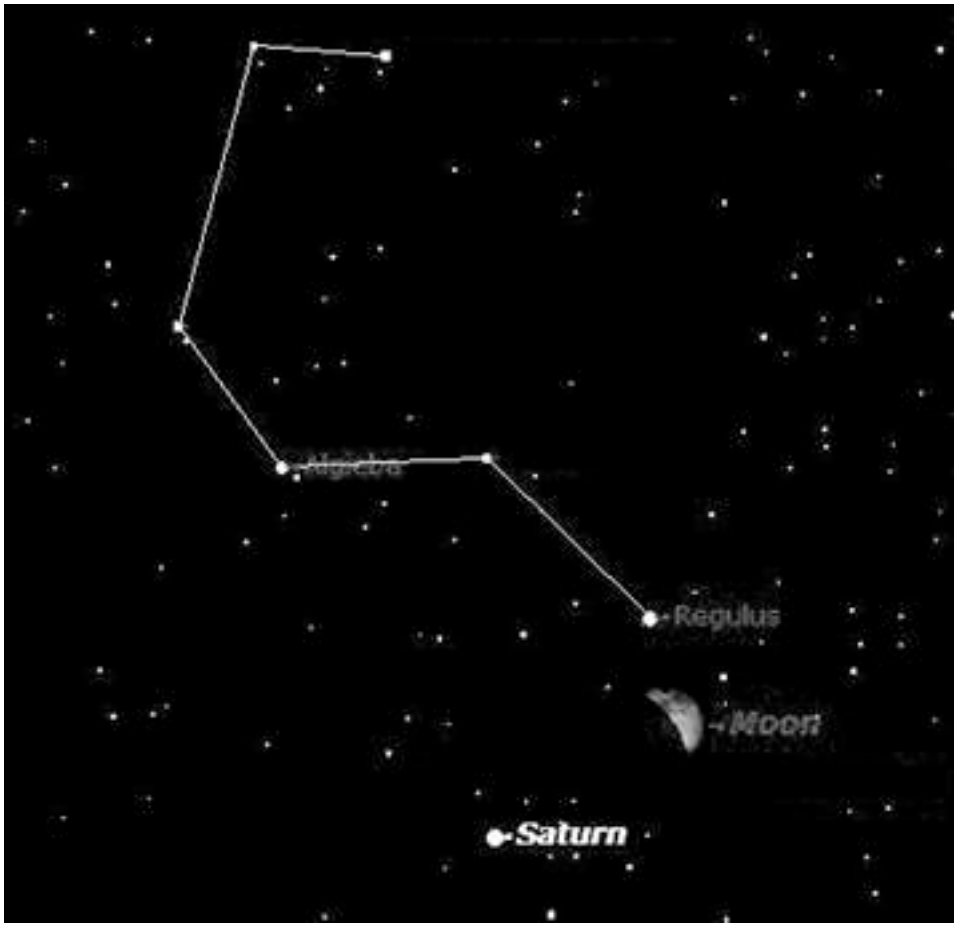
For more information, visit http://neo.jpl.nasa.gov .

-end-

Mid Evening Observing Highlights for February

Saturn is can be found in the eastern sky below the constellation Leo. Orion is prominent in the southern sky as is the Winter Triangle of Betelgeuse, Sirius, and Procyon. Look for the open star clusters M41 just south of Sirius. The Big Dipper is standing on its handle in the northeast. The constellation Andromeda is setting in the northwest. Mars is still bright and high in the southwestern sky between the constellations Gemini and Auriga. New moon occurs on February 6th. Full moon will occur on February 20th.

On the evening of the 20th a total lunar eclipse will occur. The start of totality will be at 10:00 for the east coast of the United States. The moon will be just below the “Sickle” of Leo. Saturn will be just to the east of eclipsed moon. The image below shows a view of the event at around 9:30 that evening when the moon is in partial eclipse.



Member Photos

This picture of Comet Hale Bopp was taken in March of 1997 by John Kocijanski using a Pentax 35mm film camera. It is a ten minute exposure showing the comet below the constellation Cassiopiea with the Double Cluster of Perseus in the top left of the image.

NASA Space Place

No Mars Rock Unturned

by Patrick L. Barry

Imagine someday taking a driving tour of the surface of Mars. You trail-blaze across a dusty valley floor, looking in amazement at the rocky, orange-brown hillsides and mountains all around. With each passing meter, you spy bizarre-looking rocks that no human has ever seen, and may never see again. Are they meteorites or bits of Martian crust? They beg to be photographed.

But on this tour, you can't whip out your camera and take on-the-spot close-ups of an especially interesting-looking rock. You have to wait for orders from headquarters back on Earth, and those

orders won't arrive until tomorrow. By then, you probably will have passed the rock by. How frustrating!

That's essentially the predicament of the Spirit and Opportunity rovers, which are currently in their fourth year of exploring Mars. Mission scientists must wait overnight for the day's data to download from the rovers, and the rovers can't take high-res pictures of interesting rocks without explicit instructions to do so.

However, artificial intelligence software developed at JPL could soon turn the rovers into more-autonomous shutterbugs.

This software, called Autonomous Exploration for Gathering Increased Science (AEGIS), would search for interesting or unusual rocks using the rovers' low-resolution, black-and-white navigational cameras. Then, without waiting for instructions from Earth, AEGIS could direct the rovers' high-resolution cameras, spectrometers, and thermal imagers to gather data about the rocks of interest.

"Using AEGIS, the rovers could get science data that they would otherwise miss," says Rebecca Castaño, leader of the AEGIS project at JPL. The software builds on artificial intelligence technologies pioneered by NASA's Earth Observing-1 satellite (EO-1), one of a series of technology-testbed satellites developed by NASA's New Millennium Program.

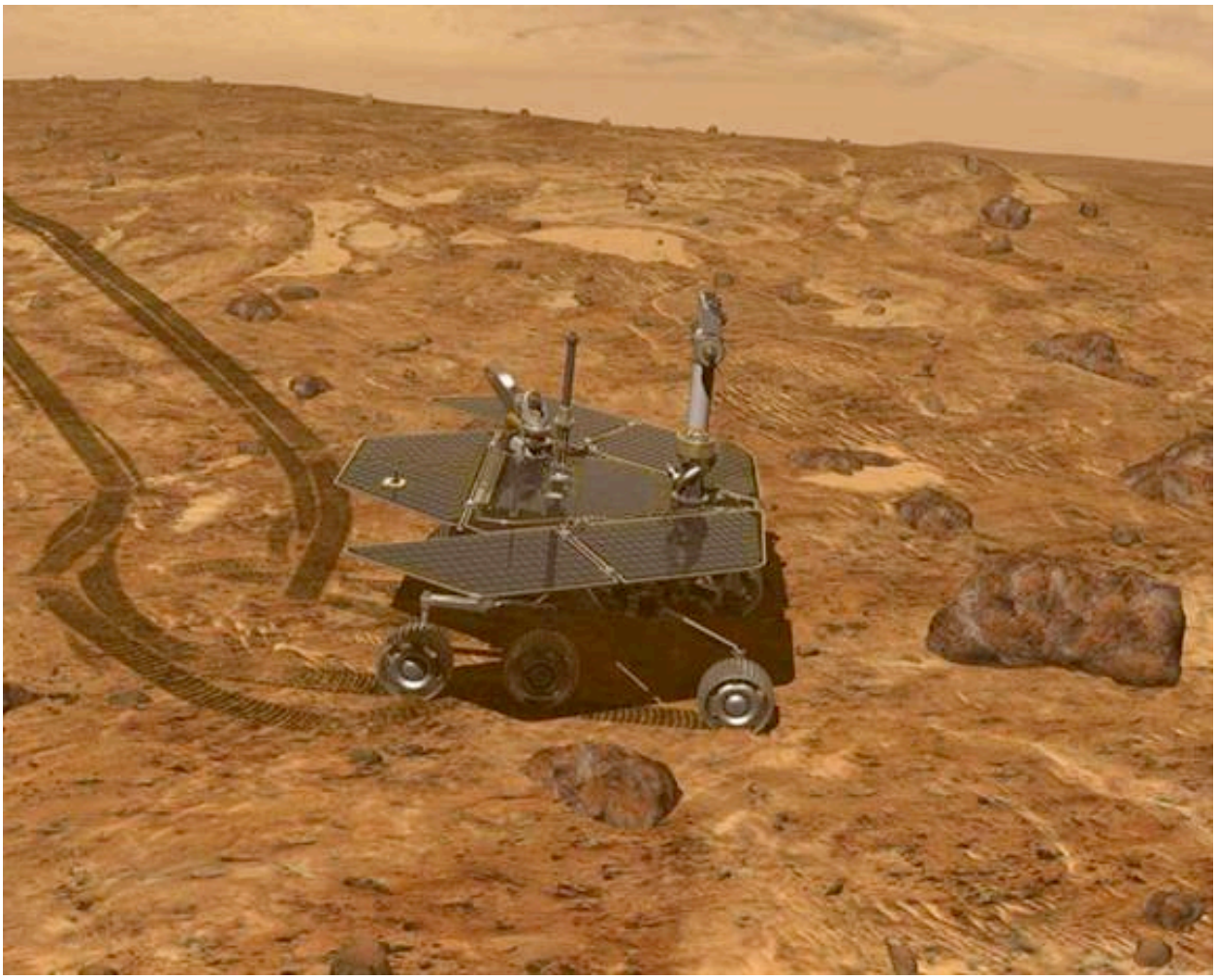
AEGIS identifies a rock as being interesting in one of two ways. Mission scientists can program AEGIS to look for rocks with certain traits, such as smoothness or roughness, bright or dark surfaces, or shapes that are rounded or flat.

In addition, AEGIS can single out rocks simply because they look unusual, which often means the rocks could tell scientists something new about Mars's present and past.

The software has been thoroughly tested, Castaño says, and now it must be integrated and tested with other flight software, then uploaded to the rovers on Mars. Once installed, she hopes, Spirit and Opportunity will leave no good Mars rock unturned.

Check out other ways that the Mars Rovers have been upgraded with artificial intelligence software at http://nmp.nasa.gov/TECHNOLOGY/infusion.html#sciencecraft.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



Caption:
Are these rocks of any scientific interest? With the new AEGIS software, the Mars Rovers, Spirit and Opportunity, will be able to judge for themselves whether a scene is worth a high-resolution image. (Artist's rendering.)