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Star Points for May 2012

"Discovery"

by Curtis Roelle

In This Issue:

The Smithsonian Institution's National Air & Space Museum (NASM) has acquired a magnificent piece of flown space hardware. The space shuttle Discovery is now on permanent exhibit there following its retirement last year. During a long career, Discovery was launched into space 39 times — more than any other space vehicle in history. It's now located almost in our back yard, at the Steven F. Udvar-Hazy Center in Chantilly, Virginia.

The complete fleet of space shuttles and their "orbital vehicle" serial numbers are as follows: Enterprise (OV-101), Columbia (OV-102), Challenger (OV-099), Discovery (OV-103), Atlantis (OV-104), and Endeavour (OV-105). In addition are a few full-sized replicas and simulators scattered around the country, including Explorer at the Kennedy Space Center (KSC) in Florida and Pathfinder at the U.S. Space & Rocket Center Huntsville, Alabama.

Although Enterprise never went into space it did fly in approach and landing tests. Challenger and her crew perished during its tenth launch in 1986. Columbia and her crew were lost during its 28th landing in 2003. After each of those losses, it was Discovery that returned the United States shuttle fleet to flight status.

In 1983, nearly 29 years ago, Enterprise was exhibited at the Paris Air Show. On its return flight, mated to the back of a Boeing 747 Shuttle Carrier Aircraft (SCA), Enterprise made several circular passes around Baltimore and Washington. It was an impressive sight from Pikesville where I observed its pass.

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May Meeting: Wednesday, May 9, 2012, 7:30 p.m., at Bear Branch Nature Center

Speaker: Christian Ready will present "A Hubble Tour of the Universe" (rescheduled from February). See a description on page 5.

President's Message

by Jim Reynolds

Greetings all!

May is upon us, and WASI has a lot to offer in the coming weeks.

On May 9th is the monthly WASI meeting. On Saturday May 8th, you can join WASI at Soldier's Delight for an evening of stargazing (8:00 pm). Finishing off the month of May for official WASI events is the May planetarium show and star party.

If you're looking for any public outreach, Baltimore Project ASTRO is recruiting educator and astronomer partners and bringing them together for an annual workshop this May 25th at the Maryland Science Center in Baltimore. At the workshop, partners are provided with materials from the Astronomical Society of the Pacific, and they learn how to forge effective collaborations, how to make use of local astronomy resources, and how to implement hands-on, inquiry-based astronomy activities in their classrooms. If you know of anyone who might be interested in participating, please contact me (Jim Reynolds) at jreynolds@towson.edu.

Last month's meeting was outstanding. Vanessa Thomas gave a wonderful synopsis of her trip to see the launch of the Curiosity rover in Florida. I think everyone really enjoyed it. Curt Roelle shared his experience with the recent ATREX missile launch — complete with videos! Brian Eney also wowed everyone with news of his recent acceptance into an internship program with the SOFIA telescope in California. Three cheers for Brian!! I know he will make us all proud with his hard work and drive to excel in all his endeavors.

I have heard reports that the Messier Marathon went very well. I had hoped to attend, but had to cancel due to another commitment. I'm already looking forward to hearing about it at the May 9th meeting.

I hope that everyone has a terrific beginning of May. It will be great to see everyone at the May meeting (weather permitting) on the 9th.

Clear skies everyone!

Star Points, *cont.*

The following year I was in Florida for Discovery's maiden flight. I viewed its launch from the nearby Cape Canaveral Air Force Station. Discovery's solid rocket boosters lit up the sky like a second sunrise as it leaped from the pad, then rolled precariously clockwise until the orbiter was hanging beneath the shuttle's fuel tank, and headed out over the Atlantic Ocean.

Enterprise found a home in Virginia when the Udvar-Hazy Center opened in 2003. Since then it has been exhibited in the James S. McDonnell Space Hangar. However, that changed this April with the arrival of the well-worn space shuttle Discovery and its inclusion in the museum's permanent collection.

I attended multiple Discovery events over several days at the Udvar-Hazy Center. My friend Tom, a member of the Westminster Astronomical Society (WASI) and the National Air & Space Society (NASS), invited me to a NASS breakfast on the morning of Discovery's arrival. We dined on the roof of the museum's five-story-tall Airbus IMAX Theatre. After breakfast, we stood on the balcony observing and photographing Discovery's landing. The view was tremendous.

The SCA pilots made one more pass over the museum, then banked left and flew a wide circle to the west. On its final approach, with the SCA landing gear down, Discovery appeared to descend down into the trees as it reached the runway at Dulles International Airport, next door to the museum.

Tony, another WASI member and also a professional jet pilot for a major commercial carrier, was on the ground with his son to view the landing. "We headed into the trees," he said, "and got all the way up to the airport fence." From there the pair had a magnificent view as the SCA touched down. "We saw the smoke puff when the wheels hit and everything," exclaimed Tony.

Two days later, after being de-mated from the SCA, Discovery was delivered to the museum. Discovery slowly moved along the taxiway behind the museum until it stopped nose-to-nose with Enterprise. Enterprise had been wheeled out of its hangar, where it spent the previous eight years, to make way for Discovery.

The visual differences between Enterprise and Discovery were stark. Enterprise is a bright white very clean and pristine museum specimen. But Discovery is worn and scorched, with its chipped tiles a testament to the more than 365 total days it has spent in space. Discovery is a real space vehicle and is now accessible to the public.

Half of the 32 astronauts who have commanded one or more Discovery missions and many of her former crew were on hand for the reception. This group included Charles Bolden, the current NASA administrator. Bolden has traveled into space on four space shuttle missions including two on Discovery — once as pilot and once as commander — including the mission that launched the Hubble Space Telescope.

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Star Points, *cont.*

One crew member was introduced as "Discovery Payload Specialist 2." John Glenn, the first American to orbit the earth during his Friendship 7 project Mercury mission, returned to space for his second flight 36 years later aboard Discovery. The 90-year-old Glenn stood up and gave a speech praising America's pioneering spirit and how it led this country to its role as world leader in space.

I returned the next day for a special NASS preview of Discovery in its new exhibit hall where Enterprise was once parked. Several of her former crew gave guided tours to small groups of visitors.

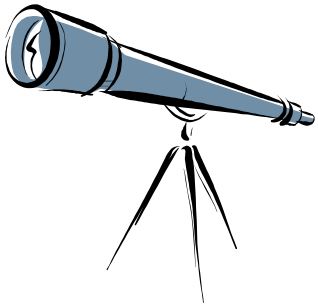
For me it was a special privilege to have been present for Discovery's first flight into space and for her final landing in Virginia where she will be visited by millions in the years to come.

On the way home I swung by Dulles and saw the Enterprise had already been mated onto the SCA for its trip to New York City. Later it will be transferred by barge to the Intrepid Sea, Air and Space Museum. Enterprise has served our metropolitan area well for the past several years and now she will enjoy a new home.

Seven days later I was at my job in Gaithersburg, Maryland. Shortly after the scheduled time of takeoff for Enterprise and the SCA I stepped outside into the parking lot. Several minutes later they made a very low slow and majestic pass directly over the building. Then they climbed into a cloud and Enterprise was on her way to New York.

"Star Points" by Curtis Roelle appears in the Carroll County Times *on the first Sunday of each month. Visit the website at* http://www.starpoints.org or send email to StarPoints@gmail.com.

Upcoming WASI Observing and Events



Monthly Meeting May 9, 7:30 p.m., at Bear Branch Nature Center (BBNC)

Soldiers Delight Public Stargazing May 12, 8 p.m., at Soldiers Delight Natural Environment Area in Owings Mills

Putting Telescopes into Space (Dr. Jane Rigby) May 22, 7 p.m., Alumni Hall at McDaniel College in Westminster

Planetarium Show May 25, 7:30 p.m., at BBNC

MAY MEETING PROGRAM

Hubble's stunning images of our universe will be showcased in a tour, beginning in our solar system, then onto newly discovered solar systems. The births, lives, and deaths of stars as well as colliding galaxies will be explored, looking all the way back toward the very edge of the final frontier. Your tour guide will be Christian Ready, a local astronomer who worked at the Space Telescope Science Institute in Baltimore and later at NASA's Goddard Spaceflight Center in Greenbelt, Maryland.

New member Pankaj "Doc" Desai will also give a short presentation on the first recorded transit of Venus, and Curt Roelle will present some photos of Space Shuttle Discovery's arrival at the Udvar-Hazy Center, and of Enterprise's departure.

Members are invited to gather for dinner before the meeting at 6 p.m. at Harry's in Westminster.

Minutes, Westminster Astronomical Society
11 April 2012, at Bear Branch

Called to order at 7:35 by Jim Reynolds, President.

Announcement:
Cafe Press will continue.

Treasurer's Report:
No Change.
WASI license plates are available.

Curt reported on the observatory effort
There are, now, discussions regarding actual location. Some problem involving a location near – in the trees ?????

Discussion of space telescope presentation. There will be a presentation at McDaniel by Dr. Rigby regarding telescopes in space on 22 May 2012.

Discussion of a future society meeting at Goddard with a tour.

Brian announced that his summer employment will be with SOFIA. This is both an honor and an opportunity.

Gary Frishkorn presented a description and photos of a rotary device for slicing and beveling glass disks.

Curt Roelle presented a description and photos of Wallops Island rocket launches, which released isotopic gasses at very high altitudes for high altitude wind studies.

Vanessa Thomas provided a presentation with many slides about her trip to Kennedy Space Center in Florida. She was among only about 150 people invited to view the launch taking a larger Curiosity "rover" to Mars. The vehicle is much bigger than the previous two. Arrival time is to be August (of this year). In return for the privilege of attending the attendees were expected to communicate by Twitter with people all over the country. This was designated as a "Tweet-Up."

Adjourned 9:45 PM

Respectively Submitted,
Robert L. Clark

Press Release

The Westminster Astronomical Society, together with Nature and the Carroll County Public Library System present

Transit of Venus Activities Supporting Carroll County as a Center of Science by Carroll County Libraries and the Westminster Astronomical Society

A transit of Venus is a very rare special astronomical event deserving of a great deal of public attention.

The Carroll County activities will involve all six branches of the Carroll County Library system, each with a pair of sessions: The **first event** will be, in May, a "warm-up" session at each library. These will discuss what a transit and/or an eclipse is and provide examples with scientific fun and games. The schedule for each library branch is:

Branch	Date & Time	
North Carroll	May 3	7-8:30 PM
Finksburg	May 5	2-3:30 PM
Taneytown	May 8	7-8:30 PM
Eldersburg	May 12	3-4:30 PM
Westminster	May 14	7-8:30 PM
Mt. Airy	May 17	7-8:30 PM

The s**econd event** will be the actual observation of the **Transit of Venus at each library** location starting at 5:30 on June 5, 2012. The transit will still be in progress at sundown (about 8:30) so you can still view it if you come late. Eclipse Glasses or Solar Cards will be available at the various sites. Telescopes for solar projection and for filtered viewing operated by members of the Westminster Astronomical Society will be located at each site.

In the event of clouds, rain, etc., there will be a remote hook-up so the attendees can view the transit on visual screens.

One of the activities at some libraries will be an attempt to partly reproduce the experiment used by Jeremia Horrox in 1639. Hopefully we can get better results than he did.

Background Information:
A transit of Venus is a very special astronomical event. It occurs when the planet Venus is between us (Earth) and the Sun. Transits of Venus occur in pairs and very infrequently. Observation of a Transit of Venus requires some type of telescope. For that reason they have been observed only 6 times, all of those times since the year 1600.

They occur in a pattern of pairs that repeats every 243 years, with pairs of transits about eight years apart. The individual pairs are separated by long gaps of 121.5 years and 105.5 years. The next Transit of Venus will occur in 2117, so if you want to see it, it's now or never.

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In 1883 John Philip Sousa composed a march titled "Transit of Venus March" commemorating the transit of 1882. It was published by the J.W. Pepper Company and lost until someone discovered a copy in the United States Library of Congress in 2003.

Observations of the Transit of Venus:
A transit of Venus cannot be safely observed without serious eye protection. You must use either

1. a telescope with a true solar filter (objective, not at the eyepiece)
2. a projected image from a telescope onto a sheet of paper (screen)
3. or "Eclipse Glasses" or Solar Eclipse Card.

A transit of Venus is a phenomenon somewhat like an eclipse of the Sun except that the image of Venus is too small to cover the Sun. We will see a black dot slowly crossing the face of the Sun. Typically it takes about six hours to complete the transit.

Observed transits have occurred in 1639 (the 1631 transit was not observable from Europe), 1761, 1769, 1882, 1889, 2004, and now, 2012.

The transit of Venus that occurred in 1639 was particularly important for the development of astronomy, because many important ideas had come together. That transit was the first one observable because it was the first one occurring after the invention of the telescope. The various steps depended upon the previous work and came together to form a watershed in the development of science. This confluence of ideas is described in The Watershed by Arthur Koestler.[1] (Yes, this is the same author as of Darkness at Noon.)

The Confluence of Ideas, by that time:
1) Copernicus had suggested that the planets occupied orbits around the Sun. Published in 1543. *Actually predated by Aristarchus in about 250 BC, but no one seems to have paid much attention until Copernicus came up with the same hypothesis.*
2) Galileo had, in 1610, seen Jupiter's moons orbiting Jupiter.
Thereby supporting the Copernican theory and getting himself in bad trouble with his old friend who happened to have become the pope.
3) Tycho had made numerous measurements of apparent planetary motion and kept excellent notes *which were made available to Kepler.*
4) Kepler had derived and stated his three laws of planetary motion from exhaustive examination of Tycho's observational data.
5) Sir Isaac Newton was about to invent The Calculus and its application to gravity, thus to planetary motion, giving Kepler's laws a strong foundation. In referring to the work of those previous to him when he said, "If I have been able to see further than others, it is because I have stood on the shoulders of giants."

The 1639 transit was used by Jeremia Horrox to determine the distance from Earth to the Sun. The idea was to determine the exact difference in time between the first instant of the transit as observed at one location and the same observation at a distant location. The result was pretty approximate because it was difficult to transmit exact times and it turned out to be difficult to accurately measure the beginning times.

1) The Watershed by Arthur Koestler, 1959, The Macmillan Company, New York

NASA Helps Europe Study a Comet– Up Close and Personal

by Dr. Tony Phillips

Europe's Rosetta spacecraft is on its way to intercept comet 67P/Churyumov-Gerasimenko. Comets have been intercepted before, but this mission is different. Rosetta aims to make history by landing a probe on the comet's surface while the mother ship orbits overhead.

"Rosetta is the European equivalent of a NASA flagship mission," explains Claudia Alexander, project scientist for the U.S. Rosetta Project at NASA's Jet Propulsion Laboratory. "It will conduct the most comprehensive study of a comet ever performed."

Rosetta's payload contains 21 instruments (11 on the orbiter, 10 on the lander) designed to study almost every aspect of the comet's chemistry, structure, and dynamics. Three of the sensors were contributed by the U.S.: Alice (an ultraviolet spectrometer), IES (an ion and electron sensor), and MIRO (a microwave sounder).

The main event of the mission will likely be the landing. The 100-kilogram lander, which looks a bit like a cross between NASA's old Viking Mars landers and a modern microsatellite, will spend two weeks fastened to the comet's icy surface. The European-built probe will collect samples for analysis by onboard microscopes and take stunning panoramic images from ground level.

"First the lander will study the surface from close range to establish a baseline before the comet becomes active," explains Alexander. "Then the orbiter will investigate the flow of gas and dust around the comet's active, venting nucleus."

Rosetta's sensors will perform the experiments that reveal how the chemicals present interact with one another and with the solar wind. Alice and MIRO detect uncharged atoms and molecules, while IES detects the ions and electrons as the solar wind buffets the nucleus.

One problem that often vexes astronomers when they try to study comets is visibility. It's hard to see through the dusty veil of gas billowing away from the heated nucleus. The microwaves MIRO detects can penetrate the dust, so MIRO can see and measure its target molecules even when other instruments can't.

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MIRO is one of several experiments focused on the comet's structural properties. It will determine the comet's dielectric constant, emissivity, and thermal conductivity to determine whether it is made of a powdery loose material, has a detectable layer of loose material, or is hard as rock.

"We want to find out whether comets have retained material from when the solar system formed," says Alexander. "If the ancient materials are still there, we can get an idea of what conditions were like at the dawn of the solar system."

Rosetta enters orbit in 2014. Stay tuned for updates!

Check out "Comet Quest," the new, free iPhone/iPad game that has you operating the Rosetta spacecraft yourself. Get the link at spaceplace.nasa.gov/comet-quest.

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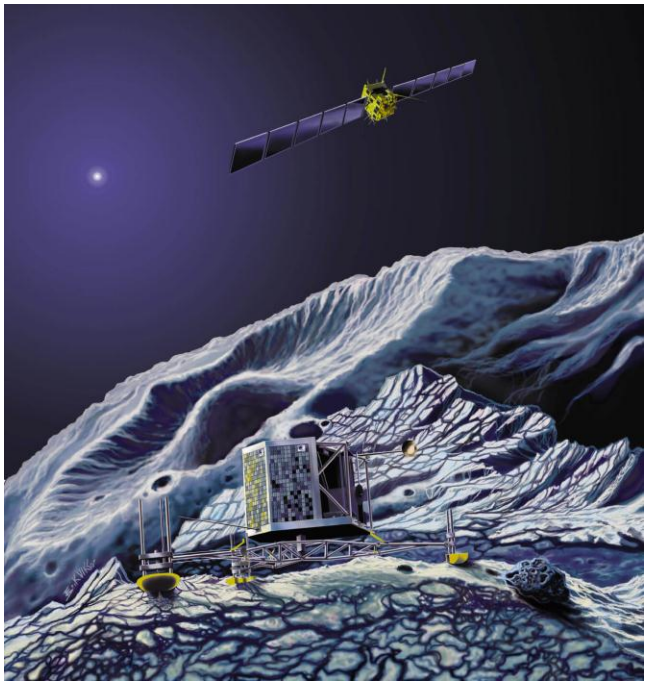

Rosetta's lander Philae will eject from the spacecraft, touch down on the comet's nucleus, and immediately fire a harpoon into the surface to anchor itself so it won't drift off in the weak gravity.