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From the Editor:

Welcome to the second edition of PULSAR for 2009. This combined issue takes us right back to the early days of space art and asks the question: What was YOUR first space art piece? Was it traditional art or digital? Some of us started out before the space age, back in the days of vegetation and canals on Mars and tropical oceans on Venus. These early works of art done with paintbrush and later, airbrushes from the Chesley Bonestell era, based on the best science of earth-bound observation fuelled the imagination of the likes of Werner Von Braun, and in a quite literal sense inspired the space race. Others of us may have created our first space art purely in the digital realm, where five decades of rocket men and robots have shown our fellow worlds as they truly are: more alien and fascinating than what we thought. I started in between, creating my first works in oil paints and then progressing to digital art once the technology developed enough for it to be considered an artistic medium in its own right. In this issue we view some of the first works created by fellow artists.

The second part of this issue looks at the wonder of ringworlds. The rings of Saturn have fascinated astronomers for centuries and are visible in even modest telescopes (except this year where they appear almost edge on). These rings have been viewed up close by four spacecraft, and have featured in the latest Star Trek movie. The other giant planets in our solar system sport rings, though not as prominent as Saturn. What extrasolar ring-worlds await discovery by future astronomers using hi-tech equipment? For now though it is up to the space artist to take us to those ring-worlds where our technology cannot.

Cover: Biz Retro Rocket (top) &
Moonbase (bottom) by David A. Hardy FIABA
Dark Side of the Moon by Walt Barrow

Zen & the Art of the Brush
from the Listserv

What is the difference between a loose style and unfinished work? How much control and exacting detail should an artist put into a work before it is finished? Should an artist even step back and let the work design itself, if such a thing is even possible? These questions and more were discussed on the Listserv recently.

The subject line this thread, Zen & the art of the brush, is very apt. I find more and more that I get into some altered state of mind in a painting, often unaware of time, where I'm "in" the painting and trusting my instincts to work up different colors and values, keep some control, yet allow some looseness and randomness. As for ending, usually I reach a point where it is not very clear to me what to do next to make it any better. Usually that is the place to stop at least for a while. I may look at the image of my picture reflected in a car window and, seeing it afresh, see something that needs to be changed, & work on that. But generally then I stop, and (oh weird magic) start to come back "out" of the painting and look at it critically the next few days. That's when I may see something to touch up, but I'm more and more inclined to trust the original altered state and not change much. If it has been a success, it starts to get better each day without me doing anything! (i.e., I start to accept and like what I see, and sometimes even wonder how I did it!)

I've evolved my own definition of "mastery" of the medium -- which of course none of us ever achieve...

For me, this goal involves being able to "trust that instinct" and still get something good. The closer you can come to doing it, the more it means you really understand the medium you are using.

In this way of looking at things, the intellectualizing and planning how to achieve the painting you see in your head is an initial phase of the painting, or notes in a sketchbook: the gross composition, where to start, what layers or details need to be put down first, what color balances to strive for. But then, once you start applying paint, as you let your "instinct" take over, your "mastery" and years of experience start to take over and can be trusted.

(Bill Hartmann FIABA)

Yes, there is a lot of "letting go" in good art. I think getting into the zone is when the magic really happens. The best painting I ever did took me eight hours and has very little of me in it. It was a painting I tried to do three times over the course of two years -- vertical, horizontal, dark, light, etc--
and depicts a scene from Revelation, Christ Among the Lampstands. I had given up on the thing, but later I got an idea from some parallel passages in the Old Testament book of Daniel. I worked straight through the night. It took my subconscious (and, I believe, God's prodding) TWO YEARS to work out the problems, but I was in that glorious "zone" for those eight hours. Never felt tired until it was all over. Painting can be such a wonderful, spiritual, transcendental experience! That's why we're all here...yes?

(Mike Carroll FIAAA)

One of the benefits of this website is learning how other artists approach and "work through" a painting in their mind.

What one thinks is "an original discovery" turns out to be almost normal in the carrying out of the work on board, canvas, etc.

Sometimes, in the middle of painting a pic, I come to a "moment of choice"; when a new idea about how to proceed is in conflict with whether to stick to the original plan. One can make the wrong choice and the work put aside as a failure, but at other moments the new idea turns out better than the original concept! (Even the 'failed' pic can be given a new lease of life when looked at later, when the artist's 'involvement' is considered more impartially.)

Then there is the almost-mystical moment when the picture that is being worked on seems to "speak" to the artist and takes on a life of its own! Only painting moonrocks on the surface of a distant moon, I put aside the pic and went on to other things. Later, on taking another look at the 'finished' painting, I could now see that one area had the shape of a woman, wearing a tall headdress, carrying a baby in her arms!!! Where had THAT come from? (It's all in the mind?)

Years ago, I painted the pic of a small moonlet to show as if a sideview of an alien skull, with the planned title of Golgotha Moon ("The Place of the Skull"). Again, later, I
Today I attended the opening of Out of This World: Real & Imagined Landscapes of our Solar System at the Hearst Gallery at St. Mary's college in Moraga, California. This is the most attractive and professionally mounted space art show I have seen. This hidden gem of a gallery has been completely re-fitted and painted specifically for this exhibition. What makes this show unique in my experience is that not a single original painting is displayed. The entire show consists of digitally reproduced images... Epson prints. Had I known that, I probably would not have bothered driving up to have a look. Having seen the show, I am extremely glad I did. The reproductions are gorgeous. They are printed on matte canvas from an Epson 9800 44” printer using 9 archival inks. The canvases are wrapped around deep stretchers giving them weight and presence on the wall. Visitors walk through 3 or 4 rooms of well-lighted work with additional video screens, a globe, a Mars diorama and an interactive computer display. In one room many books are casually laid out on tables for viewers to relax and browse, from Conquest of Space to Visions of Space. The show opening was accompanied by a nice popular astronomy talk by Andy Fraknoi.

Roughly ten IAAA artists have provided all the images. Perhaps 80% are from digital paintings or renderings with the remainder being scanned from physical paintings. It is very interesting to see all the work, both physical and digital, presented in exactly the same medium and format. The blend is not at all jarring.

Clearly the show was put together with an eye to photorealism. In fact, it comes off more like a science museum show than an art exhibition. While well-written captions use each image as an opportunity to illuminate the planetary science being illustrated, very little is done to explore the art of space art. One introductory panel does set that stage very well, but there is little in the rest of the exhibit to reinforce or explore that further. All in all this is a beautiful show that will introduce viewers to aspects of astronomical art in a way I think we can all be proud of.

An hour later I was standing in an exhibition of California plein air landscape painting in the Hillside Club in Berkeley. I had such a physical response to the lush swatches of oil paint, the luster, the color, the accidental nature of the gradients and streaks in each brushstroke. The contrast left me intrigued and reflective. Here were two remarkable shows viewed in a single afternoon, worlds apart in so many ways. As much as I love pixels, there is nothing like paint and physical media. I hope to see many more exhibitions of both physical and digital IAAA work, but this is a beautifully done show that I hope gets a chance to travel.
**Ring-World**

**Cosmic Arches**

The story of ring worlds essentially began for us when Galileo first discovered 'ears' around Saturn through his crude telescope that changed shape and sometimes disappeared. These 'ears' were eventually understood to be giant rings circling the planet, and were soon realized to be a massive swarm of small particles permanently in orbit around the equator. Despite new, faint rings being discovered by steadily improving telescopes the complexity of the rings wasn't really understood until the two Voyager spacecraft flew by Saturn in 1981 and 1982. As the two robots whizzed past they discovered rings upon rings upon rings, and more, as will be seen in the article on their flybys. Twenty years later, the Cassini mission is exploring those same Saturnian rings in detail, as well as the rest of the planet and its moons. Mike Carroll has written another article about investigating Titan, Saturn's largest moon.

**Star Trek and Saturn**

We've seen the shot of Enterprise rising majestically above Titan's clouds in the latest Star Trek movie. Did Hollywood get the science right for once?

Finally we have the latest installment of Star Trek. Written for a new generation of Trekkies, the movie also used the newest generation of Saturn images and science to make a spectacular special effects shot of Enterprise floating out of Titan's atmosphere -- or did it? Was this scene scientifically accurate or Hollywood hype?

From Diamond Sky Productions:

"We, of course, are biased, but we think you will agree: The Enterprise has never looked so good."

No thanks! Saturn's inclination as seen from Titan is not 45 degrees or more! I'd rather buy space art in which "Saturn has never looked so good" that was created by a member of the IAAA who would of course get it right!

(Lonny Buimis)

Too true Lonny. Yet again, I see a prime example of wide-angle--itis distortion affecting the ring perspective, and at odds with the Enterprise. Boy, I really hate that... and what's with Titan's atmosphere clinging to the Enterprise? I know the atmosphere's dense but what's that about? Maybe not so annoying in the moving image perhaps?

(Garry L. Hartwood FIAAA)

I'm gonna go out on a limb and say I LOVE the Saturn Enterprise shot. The colours of Saturn are the Cassini version - not the lemon yellow of the Voyager days. I don't mind that the angle and perspective is wrong... Star Trek is a movie. It would be a different story if the illustration was for a scientific paper or other use where the work had to be true to life.

(Steven Hobbs)

Sorry, I disagree. A good film director should be able to make a film really fantastic and still stick to being scientifically correct. That is what good science fiction films should be about - sticking to science fact or would could be possible. One thing I have learned since opening my gallery is that the general public's concept between fantasy, science fiction and Astronomy is too blurred.

Last but not the least the first ever painting I ever saw that moved me to such an extend was Dave Hardy's Titan paintings in both Challenge of the Stars ook. These he showed rings as they should be and I was so inspired and moved me, I was only 12 years of age that time and the pictures were only paintings not movies.

(Richard Bisley FIAAA)

**Jovian Moon** by David A. Hardy FIAAA
Honoring Professor Stephen Hawking

by Joy Day FIAAA and BJ Johnson FIAAA

Image & Glass Artists B.E. Johnson and Joy Alyssa Day are honored to have been selected by the Planetary Society to create a series of striking and memorable blown glass sculptures for their Cosmos Award for Outstanding Public Presentation of Science.

The Cosmos Award is named after the television series Cosmos, which was created by Planetary Society co-founder, Carl Sagan.

Ann Druyan, Carl Sagan’s widow and collaborator, Neil deGrasse Tyson, Director of the Hayden Planetarium, and Louis D. Friedman, Executive Director of The Planetary Society presented the award, a stunning glass sculpture of Saturn created by Joy and BJ, to Stephen Hawking at Cambridge University, England on February 27.

The Planetary Society created the Cosmos Award to honor individuals whose innovative presentations about science capture the public imagination. For over 20 years, Hawking has engaged the public in some of the most profound questions of existence. His book, A Brief History of Time, broke records as a non-fiction best seller and led to a documentary film of the same name. He continued to intrigue the public with his television series, Stephen Hawking’s Universe, and now reaches an entirely new audience with the children’s books he co-authors with his daughter Lucy.

James Cameron, creator/director of the Academy Award winning film Avatar, and Paula Apsell, producer of the PBS series NOVA, are both previous winners of the Cosmos Award. Each winner is a personification of the Society’s mission: To inspire the people of Earth to explore other worlds, understand our own and seek life elsewhere.

About the Sculpture

The glass Saturn sculptures are iridescent 5” (12.7 cm) diameter correctly oblate spheroids to scale (except for thickness which is really impossible) 11.6” (29.46 cm) diameter thin glass rings.

We diamond etch the rings on a vertical lathe, reproducing their positions in accordance with a brightness and position maps supplied by close friends working on the Cassini Mission to Saturn at The Jet Propulsion Laboratory. The Keeler, Encke, Huygens, Maxwell and Colombo Gaps and even the wiggly F Ring are represented and the Ring Spokes are softly visible. In one of the shots on our website, www.glasssculpture.org, you can see the Cassini Division in the ring shadow cast upon the planet’s surface; just as happens at the real Saturn.

The planet rests upon a small pylon rising from a beautiful ebonized base hand crafted by Rick Sternbach FIAAA of Space Model Systems, with whom we collaborate to create these wonderful gems.

Thank you, Rick!! It truly is an honor creating these with you.
Voyager and Saturn
by Steven Hobbs

The NASA/JPL Voyagers' revelations of rings around Jupiter, and other discoveries set a precedent for what to expect during a close encounter with the outer solar system planets. Saturn, often seen to be the jewel of the Solar System was therefore not planned to disappoint the Voyager team and the subsequent probe encounters in November 1980 for Voyager 1 and August 1981 for Voyager 2 far exceeded everyone's expectations.

The Saturnian system, with its rings visible through small telescopes and Titan, the only moon in the solar system possessing a substantial atmosphere has teased astronomers for centuries. Pioneer 11's earlier visit to Saturn had made a few new discoveries - two new rings and a new moon and much was hoped for with Voyager's sophisticated imaging system.

As the two spacecraft closed in on Saturn, with Voyager 1 leading the way all eyes were on the ever clearer incoming pictures of the rings. Strange spoke like dark formations seem to float above the rings and Voyager 1 underwent a risky reprogramming to take a closer look. The rings themselves, originally thought to be homogenous bands of debris revealed themselves to be made of hundreds upon hundreds of ringlets. An outer ring, the F ring even turned out to be braided - a phenomenon later attributed to the gravitational interaction of shepherd moons.

As Voyager 1 dipped below the ring plane closeup images of Saturn's violent cloud system came into focus. Despite receiving a fourth the amount of light and heat from the sun Saturn still managed to sport winds ten times faster than cyclones on Earth, and humbler versions of Jupiter's storms and eddies.

As with Voyager's Jupiter encounter Saturn's moons durnfounded mission scientists. Thanks to a massive prehistoric collision the small Mimas sports a crater a third the size of itself. The collision almost smashed the moon to bits. Enceladus, as with Europa suggested itself as an ocean world covered with ice. Yin and Yang moon Iapetus couldn't seem to make its mind up whether it wanted a bright or dark surface, and took half each. The imaging team expected Voyager 1's look at Titan to top these successes, and be the crowning glory of the Saturnian encounter.

Titan

A difficult decision had to be made in the planning of Voyager's Saturn encounter. The original planetary Grand Tour concept had involved Voyager 2 to visit the four gas giants, Jupiter through to Neptune while Voyager 1 would pass by Jupiter, Saturn and Pluto. However during mission planning the opportunity to view the enigmatic moon Titan close up proved irresistible. Pluto was sacrificed, and Voyager 1 had been configured to make Titan its last flyby before leaving the Solar System forever.

Titan began to grow in the monitors of Mission control as Voyager 1 began to leave the solar system. As Voyager 1 skimmed close to the orange moon's cloud tops its cameras revealed... nothing. Titan's atmosphere proved too dense hiding its surface permanently from view. The gamble had failed. The opportunity to explore Pluto was lost. The Titan encounter brought some valuable return, fixing the composition of its atmosphere and its surface temperature. Titan's surface would remain hidden until the Cassini Huygens' mission dropped a probe on its surface in 2005.

The Last Picture Show?

Voyager 2 started towards its own investigation of Saturn in 1981 - and brought trouble. The Voyager project had been so successful as to almost saturate the planetary science community. Thousands of images of fantastic new worlds flooded the public, as well as enough data to keep scientists busy for decades. As Voyager 2 closed in on Saturn a more sober attitude was taken as it was realized that no major revelations would occur, as with Voyager 1. Voyager 2 would primarily refine what was already discovered by its sister probe. This realization, along with a change of government threatened to cut Voyager's budget and end the mission at Saturn. Voyager 2 would fly past Uranus and beyond, and send data back to an Earth that was no longer listening.

Nevertheless Voyager 2's Saturn encounter was looked forward to
and provided closer looks at Saturn's atmosphere and rings. Using its photopolarimeter—a device Jupiter's radiation had knocked out in Voyager 1—Voyager 2 was able to provide pin-sharp imagery of Saturn's rings. A star shining behind the rings dimmed sequentially as its light was cut off by bands of ring material and this was used by the photopolarimeter to map a cross section of the ring down to the resolution of a city block—and discover ringlets within the supposedly empty Encke division.

This chance discovery of extra ring particles had a more sinister aspect to Voyager 2. By necessity the space craft had passed behind Saturn, temporarily losing contact with Earth before passing through a predetermined ring gap. As it reemerged into radio contact Voyager was fighting for its life. A collision with ring material in a theoretically empty ring gap had knocked Voyager for a six. Thrusters were firing unexpectedly, and telemetry from two instruments were off the charts. Moreover, Voyager's critical camera scan platform had seized. Returned images were merely showing empty space. The only craft in a generation that had any chance of bringing closeup pictures of the two outer gas giants was blinded.

Using the same ingenuity that was shown earlier when Voyager 2's primary radio transmitter had failed, system engineers went to work on the problem. Dr Ed Stone was Voyager project manager at the time:

'Fortunately, the project had four years between the Saturn and Uranus encounters to address this along two parallel tracks. First, we began a series of diagnostic commands to start moving the platform again, and then diagnose the problem. We also started life testing of laboratory models of the stuck gear box. It was determined that the jam occurred because the lubrication was inadequate when there was sustained platform motion at the highest slew rate, so we designed the Uranus sequence using only the low and medium speed slew rates. Second, as a backup we designed an alternative sequence in which the entire spacecraft was rolled in order to point the instruments at the planet, the moons, and the rings. Of course, such a 'roll sequence' provided a much smaller number of observations. Fortunately, the sequence was not needed because the platform performed perfectly at the lower slew rates at both Uranus and Neptune.'

Two days after the initial incident, commands were sent to Voyager 2 in an attempt to move the scan platform and photograph Saturn, now being left behind. The returned image was crude and badly framed but was enough to restore faith that the little craft was again in working order. Faith was also restored in higher circles. The Voyager project was given funding to fly on to Uranus and Neptune.
Making Titan for LPSC
by Michael Carroll FIAAA

A few years ago, I did a painting of the Ganesa Macula formation on Saturn's largest moon, Titan. Ganesa is a mysterious site whose radar signature resembles that of the pancake domes on Venus. My painting was for my book Alien Volcanoes, and as I had been doing a lot of digital art recently, I opted to do this one traditionally, on stretched canvas with nice, gooey acrylic paint. That was in 2007. But the painting got noticed by some people at NASA (never assume our friends in the sciences are not watching us). This year, new data came to light on a controversial site on Titan called Hotei Arcus. Members of the Cassini team got in touch, as they needed an image of what the place might look like through human eyes.

Hotei Arcus is called "The Smile." Seen in the infrared by Cassini's VIMS, it is a bright, semicircular feature lying just north of the 30°S latitude and spreading from roughly 90° to 70° latitude. What intrigues researchers is that the site seems to have changed from one orbital pass to another. This implies geological activity, perhaps cryovolcanism. Radar of the site is not very detailed, so I was asked to show detail that is suspected to exist, and to show plumes or outgassing that indicates flow of cryolavas (super-chilled volcanic flows).

To do the painting, I drew a bit map based on a fly-over movie done by Randy Kirk of University of Arizona. Kirk took data from two overlapping radar passes and constructed a 3D map of the region, then made it into a movie. This was of critical help to me as I transformed the grainy radar images into a map for my Terragen program. Terragen reads bright as high as dark as low, so I inverted the dark "flows" on the image but saved the bright mountains. Once the Terragen images (I did about twenty) were generated, I had to guess what was beyond the resolution of Cassini's radar and VIMS. One can just make out rivers descending out of the rugged mountains to the south. The raised dark flows look vaguely lobate, but the details are anyone's guess. I worked with Rosely Lopes and Randy Kirk to do the image, showing the rivers embaying against the cryoflows in playa regions. Most of the details are hand painted in Photoshop. I imported parts of photos from Death Valley for the playas, with extensive hand retouching. I used Huygens colors to do my sky, complete with methane showers.

Working with the scientific community is the very best way to do astronomical art. Scientists are often eager to help us "get it right", and when we do, they can often use our stuff to help push forward the frontiers of science. Ah...it's good to be a space artist!
From 30 July to 2 August the Mars Society held their 12th annual convention at the University of Maryland in Washington DC. For me this was an opportunity to pursue a life's dream and meet real live scientists who had worked (or were working on) Mars missions. It was also a chance to meet fellow IAAAners. After about 15 years of mail and email I finally met our own Mikey Carroll and Paul Hoffman who arrived later to deliver the fantastic DVD of work done by our organization. Mike had donated a painting for the convention to the theme of "No Turning Back".

The painting says it all, beginning with Apollo on the Moon, a future launcher connecting Earth to Mars, the Mars rover Opportunity trundling away from Victoria Crater and finally a manned Mars lander.

The conference itself was terrific with Dr Robert Zubrin, society founder opening the conference. It was interesting to learn of the origins of the Mars Society, starting with a few dedicated folk launching Mars Underground at a time where NASA and most of the world had gotten bored with Mars. Mars Underground became the Mars Society and these guys who pushed to keep the Red Planet from being forgotten are now running a terrestrial analogue station at Devon Island amongst other ground breaking activities. I got to see first hand one of the Devon Island team's remote controlled aircraft, a raven-like device that rolls up into a tube. Dr Steve Squyres showed a movie and gave a talk one night and of course was truly a celebrity to us mere Mars mortals. His passion for Mars and his rovers was inspirational to us all, though it made him very hard to photograph as he was constantly on the move. Other notables included Dr James Garvin, Chief scientist at NASA Goddard, Dr Chris McKay who worked on the Phoenix Mars mission last year, Andy Chaiken, NASA historian and Mike Carroll, again. He did a superb job at filling in as guest speaker for the dinner at the last minute due to illness of the original speaker, Dr Caroline Porco.

The IAAA artwork was shown during the dinner, providing a great backdrop to the evening's events and accompanied by a string band. The images shown have inspired at least a few attendees to think of a future where humans will actually stop talking about going to Mars and go there.

My favourite part of the conference was participating in the Art of Space panel. During planning the size of this panel grew as more members showed interest in participating. I think it was the largest panel of the conference! Mike moderated the panel, and we had a great line-up of artists, historians and curators. Bert Ulrich and Jim Dean representing the NASA Art Program gave a terrific presentation of artwork commissioned by the Space Agency over the decades since the start of the Space Race. We all got to present and field art type questions as work not only of far away planets that we've yet to visit were presented but also historical space scenes, such as the first suborbital flights of the Mercury Seven, viewed through the eyes of artists. The panel showed that art not only has a place in helping people visualize the surfaces of alien worlds (something space probes are increasingly helping us with) but also adding a human perspective to space exploration.
Near Earth Asteroid
by Dan Durda FIAAA

I've been wanting to do a 'humans to a near-Earth asteroid' piece for quite some time. This has been a subject of some personal commitment for about a decade now - I've written several popular articles and book chapters on the subject, have collaborated with NASA teams studying mission architectures, and discussed the subject with the interview board when I made the final cut for the 2004 astronaut selection.

Recently, both within the Constellation architecture as part of NASA's Vision for Space Exploration and now as a part of the 'flexible path' option suggested by the Augustine Commission, human missions to near-Earth asteroids (NEAs) have really come to the forefront of consideration for the future of US manned spaceflight.

I have been doing a lot of composite digital pieces lately by building physical spacecraft models, photographing them, and then digitally incorporating them into background work rendered via packages like Celestia, with a lot of additional hand-painted elements in Photoshop. I like the 'realistic' look of physical models, and well, I just haven't spent the time to learn some of the nice hardware rendering tools. (A funny side story there - when I visited Industrial Light and Magic a couple years ago to give a talk there, I was showing some of my spacecraft art to one of the effects artists and he jokingly asked "Do you want a job here?")

So, my original intention was to complete this new piece in just that way - build a physical model of a small asteroid, buy or build physical models of an Orion CEV spacecraft and an astronaut in a Manned Maneuvering Unit, and proceed in my usual fashion. For various reasons, mostly having to do with the unsatisfactory small scale of the spacecraft and astronaut models I had access to, I was rather unhappy with the look of the preliminary products I was generating. I decided I had to try another route.

To still capture the 'photorealistic' look I was wanting to achieve, and to match anyway the style of previous photographic pieces used on other Cambridge University Press planetary science book covers, I decided to assemble photographic elements from various NASA and JAXA imagery and composite the elements together into a final single work.

The asteroid itself is in fact one of the slightly lesser known Hayabusa images of Itokawa. I wanted to use an Itokawa-like asteroid since that small, rubble-pile NEA is very likely a good model for the small scale NEA we'll most likely have access to for an early mission. The Earth and Moon are also photos from Apollo and ground-based imagery, chosen to match the asteroid sunlight phase angle (with some judicious element rotations, of course).

The Orion spacecraft was grabbed from a NASA public domain rendering. There were several orientations to choose from - I wanted one that showed off well the basic plan form of the spacecraft but also had a realistic lighting direction that I could match to the composition I had in mind.

The suited astronauts are digital images of astronauts working outside the International Space Station, again chosen to best match the sunlight phase angle I had in mind.

The final step was to piece it all together in Photoshop and adjust until it all looked about right. A shadow of one astronaut superimposed on the asteroid helped to reset the scale and add some depth to the piece. I contemplated laying a spacecraft shadow across the asteroid as well for the same purpose, but did not want to clutter the composition too much and I also wanted to try to set some depth by implying that the spacecraft is out of the plane of the piece a bit, closer to the viewer and hovering at a safe distance away from the asteroid.

The piece seems to work well enough. The basic compositional idea has heritage of course in the well-known Bill Hartmann piece from several years back, and I think serves as a complement to the very nice new piece that Pat Rawlings recently completed that shows more close up the details of how complex the surface operations on one of these small worlds might end up being.

With any luck at all, we'll be seeing these scenes for real in the near future...