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From the Editor:

Welcome to the first edition of PULSAR for 2009. As memories of the boom and bust era of 2008 fade from us we move into a year of change and uncertainty. Change there has surely been, as the new US president is inaugurated, and what has been called the worst economic slump since the Great Depression heralds a frugal year for many.

2009 is also the Year of Astronomy and the early days of this final single digit year of the New Millennium have seen an exhibition in Paris by many of our members to commemorate astronomy and the exploration of space. It is this year that we remember the lives of the world’s early astronomers, and focus on our closest neighbor that inspired Galileo to turn his telescope heavenward – the moon.

Our moon looms large in terrestrial skies and provided early astronomers a starting point for charting other worlds. Discoveries of craters, valleys and mountains laid the groundwork for early planetary science. Much later the moon provided a convenient destination for our first spacecraft, followed by humans.

Although no person has stood on the moon for decades our satellite has again become a focus for a renewed push to extend humanity’s presence beyond low Earth orbit. A number of nations have already sent unmanned probes to the moon in recent days and the US is designing hardware to return to the moon and stay. Let’s hope that NASA continues building despite the recent changes in economy and government leadership.

Steve

Cover: Biz Retro Rocket (top), Moonbase (bottom) by David A. Hardy and Dark Side of the Moon by Walt Barrows

Returning Member Profile - Spike MacPhee

I was an astronomical art collector from 1967 to 1980, when I far outran wall space and mutated into a curator of what I had. Though I’ve thrilled continuing to appreciate all the work that you collectively and many others have created across the decades.

My collector’s status is resuming thanks to VWs [virtual worlds]. I’ve been in Second Life since 2006, in the science continent, the SciLands, on my island Spindrift. There I have room to acquire and display lifesize copies of the Lunar Module and the Pilgrims’ ship Mayflower, and had my Space Gallery built this summer housing my Rick Sternbachs and Ron Millers that I own, plus a William K. Hartmann, a Don Davis, and a not yet posted Lonny Buimis [because I haven’t asked his permission].

http://www.flickr.com/photos/22159806@N07/sets/72157605978636910/ is my flickr set of Spindrift Space Gallery pics; the guy in tie-dye is my Second Life avatar Paradox Olbers.

I don’t keep up with most of the list postings because of time, but I will start in real-time now. I’m pleased to rejoin the IAAA again!

More on Spike next issue...
IYA 2009; Unesco, Paris

by Lionel Bret

From 19-23 of January the IAAA participated in an art exhibition in Paris that marked the beginning of the International Year of Astronomy. Fellow IAAA'er Lionel Bret, ably assisted by our own Kara Szathmary performed a Herculean effort in receiving art shipped from as far away as Australia. Lionel describes his experience of the exhibition:

The Symposium itself, working on the last corrections for the little astronomy guide I'm working on, my mother's hospitalisation last Thursday and her surgery last Friday.

As I previously wrote, the lack of four paintings (two of John Kaufmann, one of Kevin Davies and one of Sean Brady) plus the problem to play the slideshow in PowerPoint were regrettable.

It would have been more practicable if we initially knew that video presentations had to be played on DVD players needing QuickTime - we lost several days.

David Valls-Gabaud did his best but as he was part of the organising committee and a participant for several conferences he was obviously lacking in time.

The Symposium was a very interesting event, about 200 conferences and presentations in 5 days, two astronomical walks to visit astronomical sites in Paris, 2 Films, a concert, Theatre, the conference dinner and the exhibition.

I regret not to have had three or four clones to be able to be present for everything and for not having a digital camera (mine died a few months before, I've sent you some pictures of the exhibit taken by a friend working for Ciel et Espace magazine).

There were about 65 paintings, 65 photographs and 20 sculptures at the exhibition, Salle Miro.

Except for an Italian artist presenting astronomical photos (mainly the sun corona during eclipses) on canvas most painting were rather astronomy inspired pictures.

IAAAers' pictures were representing a neat tendency and were easy to identify.

Anyway it was a nice little exhibit. I don't know if the frequention was high (see upper remark for clones) added to the fact it was not obvious for non attendant public to visit the exhibition, there doesn't seem there was such a great advertising, the visibility hours and the security constraints were a bit dissuasive. The positive fact is that it could be seen by many professionals in the astronomical field, the ones attending for the opening of the IYA and the ones attending for the IAU Symposium.

I can't say for the moment if it has been neatly positive for the association, I'm still lacking backup.

I apologise to have said that it was perhaps not a very good idea to present the calendars because I realise it was one, so you've the confirmation I am actually a bad commercial...

I've recovered all the displayed paintings and I'll send them back soon in the days to come. About the paintings which didn't arrive in time, I've refused to receive them so they'll be sent back directly be to the poster.
IAC 2008; Glasgow
by Ed Buckley

On the subject of exhibitions, the IAAA was also involved in an exhibition last year. Ed Buckley shares his experiences of this event and raises some interesting points on space art:

Whilst enjoying meeting visitors and admiring the artworks displayed on the IAAA stand at IAC2008 in Glasgow, U.K., some thoughts about Space Art generally, came to mind. Strange as it may seem, Space Art is not adventurous enough!

In general, Space Art is very good technically, but there is a “sameness” about a black sky containing a planet, or a moon --- or Space Shuttle --- and photographs from space mirror this. In a Civic Art Exhibition of “traditional” art, to which anyone could submit their work, there was a plethora of landscapes; one after another.

Something similar was noticed at the IAAA stand, with some visitors just walking through and only glancing at, rather than enjoying, the works displayed on its walls. In the past, voices have been heard declaring “Oh, it’s only a computer-image --- not REAL art!”

Space Artists are required to offer possible purchasers what they want in order that the artists can make a living from their work, but an artist needs to also “connect” with the viewer, to reach out to uncommitted minds as well as give continued satisfaction to those already enthralled by the Dream of Space --- and it could widen their market!

Although there can be admirable skill in portraying planetary scenes within (and without) our Solar System, there is a tendency to minimise colour in favour of cold realism. Artists! Be daring with colour sometimes!

Pull viewers in to your work much as the bright colours of flowers attract bees --- or you can intrigue the viewer!

There were examples displayed on the IAAA stand: Bob Parkinson’s were, in a sense, “puzzle-pics” by portrayal of subject; one showed a line of tiny, naked figures stretched across an ultra-violet representation of the Sun, with a mountain dipping into a sea where swam a whale --- and the title included a strength of Sun-block cream --- decidedly not your usual kind of Space pic! Danger from global warming, perhaps?

Bob could only rarely visit the stand as his prime task was to ensure the entire Astronautical Congress went according to plan, so was unable to provide an explanation at the time.

His pics were executed with free and colourful brushwork that gave them a “rawness” not to the liking of those expecting simple, “glossy” space scenes --- and they were unframed! Although “proper” frames add quality and value to a painting while glass protects the painted surface, they may discourage buyers who will have to transport them across a continent --- with airline baggage-handling posing particular hazards.

More conventional in nature was Arthur Gilbert’s ‘BACK TO THE MOON’, showing a blue, cloud-streaked Earth just above the Moon’s horizon, its lower curve notched by a large blackoulder centrally-placed in a row of them, all viewed in the glare of the planet, so that one did not at first notice the distant activities of spacemen and machines on the crater’s rim. Did all this “just happen”, or was it cunningly planned to lead the eye through the painting? To linger over it?

‘JUPITER’S CLOUDSCAPE’, by Richard Bizley, a three-foot-long panorama which allowed the viewer (in mind at least) to “travel” to the giant world when standing about nine inches in front of the painting with slightly-closed eyes, letting its sides fade from view...... Marvellous!

Female artists often view Space in different ways to that of male artists, displaying a propensity for brighter, colourful artwork, sometimes almost abstract in design --- a “softer” type of Space --- a pity there were not more exhibiting.

The IAAA could have had better ‘visibility’ had we been located in spaces (between us and the main displays) occupied by stands that remained empty of exhibitors, although points in favour of our location in a corner of the large Hall were the close proximity to a snack-serving area --- and both sets of Toilets!

Despite difficulties, we made our presence felt with use of the Site Office’s photocopiers to create notices so placed as to direct people towards our stand and the IAAA can expect more visits to our website.

Well, that about wraps things up......Oh! Wrapping! Artists, if you place your work in a flapped, easily-resealable “envelope” of bubble-wrap; slide that into a larger, similar, one; then both into a sturdy protective box bearing Destination, and Return Addresses, it helps setting up and re-packing times tremendously, whilst ensuring that your artwork returns with the same care and protection as you gave it --- and can be used again!

Jackie and Bob
Moon

Companion of Worlds

They are the cohorts of the solar system, always close to their parent bodies. Like children, they come in all shapes and sizes, ranging from mere large rocks orbiting asteroids to the massive Ganymede, larger than the planet Mercury. They are moons, companion of worlds and they have helped shaped our understanding of the solar system.

Our own Moon in particular has been a part of life on our home world since life began. Its stabilizing effect on Earth's axis has kept our seasons mild enough for life to flourish. It was also the first body that early astronomers were able to study up close and marvel at its changing shape from night to night – as well as marvel at its craters and mountain ranges.

Our Moon was also the first target for robotic explorers and has been the only world other than Earth that live humans have stood on. Until we return we must contend ourselves with the plethora of unmanned spacecraft that have returned data not only from our Moon, but also moons of other worlds, including Titan and the enigmatic Enceladus. The joint NASA/ESA Cassini Huygens mission has been in orbit around Saturn since 2004 and these two moons are proving to be among the strangest in the solar system. Read Michael Carroll's volcano article to find out the latest Cassini discoveries.
Before Apollo, the Robots
by Steven Hobbs

Despite being the first to take advantage of German V2 missile technology after the Second World War, America was taken by complete surprise when Sputnik, humanity’s first space satellite was launched from Russia in 1957. This single event began the space race between the two world nations, many seeing it as a contest between American democracy and Soviet communism. This competition may be viewed harshly, but it can be argued that the manned moon landings would not have happened without it.

Beaten to the punch to reach orbit America tried desperately to beat Russia to the moon with the US Air Force’s Pioneer series probes, starting with Pioneer 1 launched a year after Russia’s success with Sputnik. Unfortunately it was not to be. Pioneer 1’s booster failed to impart enough energy for it to reach the moon and it, and two later Pioneers fell screaming to earth after only reaching a maximum altitude of 114000 km.

Russia again triumphed when the beach ball sized Luna 1 flew within 5995 km of the moon on 4 January 1959. During flight Luna 1’s third stage blew out a 1 kg cloud of sodium gas out into space to help ground trackers monitor the spherical probe through its journey. Luna 1 revealed the absence of a magnetic field on the moon, as well as measuring the solar wind, a stream of ionized gas flowing from the sun and permeating interplanetary space.

Russia then launched Luna 2, a 390 kg spherical craft that deliberately impacted the moon in September 1959. For the first time in history, a man made object was resting in the grey Lunar dust. As if to press the point the Soviet Premier Nikita Khruschev presented a copy of Luna 2’s pennant to the US president Eisenhower during his visit to the USA.

America’s new space agency, NASA was reeling at this point. It received a further blow on Sputnik’s second anniversary when Luna 3 was sent around the moon’s far side. More sophisticated than anything that had reached the moon before it, Luna 3 photographed the lunar far side with wide and narrow angle 35mm isochrome film cameras. As the probe’s elliptical orbit brought it closer to earth, the film was exposed, then developed, fixed and dried on board. The final image was converted to an electrical signal that was laboriously transmitted to mission controllers on the ground. Although the process stopped before the crude images could be refined 70% of the moon’s far side, was mapped. For their trouble the Luna 3 scientists received a case of expensive champagne from a rich French eccentric that had promised the wine to whoever could show him the moon’s far side.

The 1960’s started full of promise for both sides of the Iron Curtain. The US had commenced on an ambitious lunar program called Ranger that would eventually spawn the highly successful Mariner and Voyager spacecraft to the planets. Meanwhile the Soviets had begun to design spacecraft that would use retrorockets and air bags to soft land a probe on the Moon. Part of Ranger’s mandate would be to determine whether the moon’s surface would be strong enough to support the weight of a manned spacecraft. Some scientists believed that eons of meteor bombardment had led to the creation of vast seas of lunar dust that would swallow low men and spacecraft whole.

Unfortunately despite being hailed as ‘brave attempts’ by the press at the time the early Rangers failed. The ever watchful Soviets promptly chided America by mentioning that the pennant left behind by Luna 2’s moon impact two years ago was getting lonely. It is somewhat ironic that America’s Mariner 2, spawned from the Ranger project had managed to journey all the way to Venus, a target many times further away two years before the nation achieved success on the moon.

Following the string of Ranger disasters the project manager was promptly sacked and the Ranger craft were stripped of most science experiments to virtually become a meteor with a camera. Finally, Ranger 7 impacted on the moon on 30 July 1964. For the two minutes before its destruction it returned 4300 of the clearest images taken of the moon at the time amidst shouts and wild cheering among an audience of overworked, over tired mission controllers. Following another successful mission with Ranger 8, JPL took a big risk with their last spacecraft and pushed for Ranger 9’s mission to be viewed live on major television networks. Children were glued to their television sets as Ranger 9 raced to its demise in the crater Alphonseus.

For once the Russians also experienced significant problems with their lunar program. During what the Soviets called ‘a series of experiments’ in the early 1960’s their first few soft landers failed to launch, missed the moon entirely or crashed, their delicate electronics scattering in the lunar dust. Finally in 1966 Luna 9’s retrorockets fired, slowing its downward plunge to the lunar surface. After an anxious wait Soviet scientists received Luna 9’s transmissions right on time, signaling the first ever probe to successfully soft land on the moon. Luna 9 survived on the moon for three days, transmitting panoramas consisting of dust and rocks stretching to a horizon that due to the moon’s smaller size appeared much closer than on earth.

The west, defeated yet again in the race to the moon tried desperately to
rob the Soviets of some of their glory. Luna 9's image transmissions were received by the Jodrell Bank tracking station, then an important radio receiver facility in England. A British radio astronomer allegedly intercepted images and leaked them to the western press. The very next day Luna 9's pictures appeared in the Daily Express, beating the Soviet Newspaper, Pravda to the punch and infuriating the Russians. Despite this Luna 9 proved that a spacecraft wouldn't sink into a sea of lunar dust, making it possible for future manned landings.

Pravda was able to make new headlines when two months later the Communist Party anthem was played from Lunar orbit by the first spacecraft ever to do so, Luna 10. Luna 10 demonstrated that a spacecraft could achieve a stable lunar orbit and, by using an on board Geiger counter, determined that radiation levels were well within human tolerances. These findings had direct implications for manned lunar spaceflight and sent NASA into a panic.

NASA's answer to the Soviet Luna lander series was the Surveyor program, which was rushed forward to prepare for the Apollo moon landings. Landing gear designed from lunar data gathered by the Ranger program cushioned Surveyor's final four meter free fall to the ground. Science packages of increasing sophistication enabled the Surveyors to return the first colour photographs of the lunar surface, the lunar soil directly with scopes and spectrometers. The Surveyors were complimented by five Lunar orbiters, each containing 75 kilograms worth of camera that provided images from lunar orbit as shown by the right.
Moon Update - Volcanos!

by Michael Carroll

Thanks to the Cassini mission, Saturn has given us two new sites in which to study cryo—or super-chilled—volcanoes: Enceladus and Titan. Planet-sized Titan has long been thought a likely place for volcanic activity. At 5,150 km in diameter, Titan’s substantial mass and density suggest that plenty of gravitational and radiogenic energy is available for internal melting. Additionally, its eccentric (non-circular) orbit around Saturn provides tidal friction, though much less than Io’s. Prior to Cassini, various models of Titan’s interior suggested substantial layers of water-ammonia liquid underneath an icy shell. With enough surface fracturing, liquid could erupt, causing cryovolcanism.

Another reason to think that Titan may have cryovolcanic activity is the atmosphere, which is about 95% nitrogen, with a few percent methane. Methane is photo-dissociated in Titan’s atmosphere; the Sun breaks methane down to recombine with other constituents of the atmosphere, forming organics like ethane, propane, and acetylene. That methane is somehow being replenished. We now know that large lakes of methane or ethane re-supply some of the atmospheric methane, but cryovolcanism may also resupply methane and other gases.

Titan may have several cryovolcanoes simmering beneath its blanket of orange smog. One site is Tortola Facula, the “Snail”. About 30 km across, this corkscrew formation appears to have been formed by a series of flows piling up around and on top of each other. Mission planners hope to image Tortola with the high-resolution radar later this year.

The most prominent feature revealed by Cassini’s radar passes is a circular structure interpreted to be a cryovolcanic dome, named Ganesa (after the Hindu god of good fortune). Ganesa is 180 km in diameter, larger than the domes on Venus. It could be a shield rather than dome; since we do not yet have topographic information over this feature, we cannot know for sure. A shield is typically made of many thin, low viscosity flows, while a dome forms by more viscous flows. If we establish the shape of Ganesa, we will also have clues to the composition of the cryomagma.

Our second stop on this Saturn-volcano tour is the strange little world Enceladus. Its pristine ice surface is, in places, a tortured jumble of twisted ridges and cracked plains nearly devoid of craters. Some of these resurfaced areas bear a geological age of less than 200 million years. At scant 504 km across, Enceladus’ geologically young surface was mystifying. Enceladus’ eccentric orbit may lead to tidal forces similar to those on Io, but recent models suggest otherwise. Cassini’s instruments have detected an atmospheric coma of water, carbon dioxide, and methane extending 4000 km from the moon’s surface. Images reveal surface flows diverted by low-lying hills. One image shows a possible cone with a caldera-like hollow at its summit.

Positive identification of cryovolcanic activity on Enceladus came from a trio of flybys spanning February to July of 2005. Multiple jets of icy material rose hundreds of miles above the frosted surface. Since then, Cassini has flown directly through several geysers. The spacecraft has detected water vapor, carbon dioxide, methane, trace amounts of acetylene and propane, and possibly carbon monoxide and molecular nitrogen.

Researchers estimate that Enceladus is losing 150 kg of water to space each second. The plumes emanate from a series of canyons and ridges bordering a flat region in the southern hemisphere. Fractures encircle four darkened, low-lying plains called “tiger stripes”. The rifts are 500 meters deep, bracketed by 100 meter high ridges. Local temperatures reach the freezing point of water (compared to the surrounding daylight surface temperature of -201°C or -330°F). The heat is concentrated along the tiger stripes, and scientists have recently announced the source location of several vents.

Enceladus’ unique volcanism opens possibilities for finding active geology on bodies once thought too small for such processes. It also multiplies the potential sites for exobiology. Subsurface water on Enceladus may have been stable for millions or billions of years. This fact, coupled with evidence for organic material at the eruptive sites, makes Saturn’s moon an intriguing target for astrobiologists. Tiny Enceladus joins the ranks of Mars and Europa as a site where future explorers may search for life among alien volcanoes.

For more on these exciting places, see Mike’s book, Alien Volcanoes (Johns Hopkins University Press).

Enceladus stripes image courtesy NASA