

## ***Art to the Stars: an Historical Perspective on Space Art...***

*Arthur Woods \**



Most people are probably not aware that the idea of space exploration began in the mind of the artist or that artists have been intimately involved in space exploration from the beginning. Yet long before the first rocket penetrated the atmosphere, artists were making the concept of humanity traveling beyond Earth's atmosphere a reality.

Both a scientific treatise on lunar astronomy and a remarkably foresighted science-fiction story about a voyage to the moon, **Johann Kepler's** *Somnium*, written in 1634, is considered to be the first science fiction book about space. It accurately stated that the Earth's atmosphere becomes gradually thinner as one travels further from the planet. Since the first use of the telescope in 1610 and before the invention of the camera, astronomers recorded their observations of the heavens by making drawings of their observations. An early example would be the sketch of the *Whirlpool Galaxy* made by **William Parsons** in 1845 who had just constructed the world's largest telescope. In the mid-nineteenth century artists **De Montant**, **A. De Neuville** and **Emile Bayard** created woodcuts to illustrate **Jules Verne's** *"From the Earth to the Moon"* (1865) and his sequel *"Around the Moon"*. A few years later, **James Nasmyth's** illustrations were the first space landscapes to appear in a non-fiction book: *"The Moon"*. Perhaps the most notable artwork depicting the night sky from this period would be **Vincent van Gogh's** *Starry Night* painted in 1889. Considered to be one of his greatest works, it depicts the view outside his sanitarium room window at night, although it was painted from memory during the day.

In addition to the vast amount of science fiction literature about space that has for generations stimulated our imagination about exploring the cosmos, a highly diverse genre of visual art has also emerged called: *Space Art*. As humanity's breakout into space is considered to be one of the most significant achievements of the 20th century, it is no surprise that that space exploration became firmly integrated into contemporary culture. This is surely evident in the cinema as the many blockbuster films about space have become the most financially successful and popular forms of space art and, as

such, they have contributed significantly to keeping the idea of space exploration firmly embedded in the public's imagination.

Even among the practitioners of this genre, the term "*Space Art*" has many connotations and definitions as it includes a variety of artistic positions. Roger F. Malina, an astrophysicist who is also the editor of *Leonardo: Journal of the International Society for the Arts, Sciences and Technology* which has tracked the development of Space Art since 1968.

Malina defines Space Art as: "*Contemporary art which relies on space activity for its implementation*" and lists seven broad categories:

1. Fine art which exploits sensory experiences generated through space exploration. New landscapes become accessible through space photography and film. Space illustrators anticipated some of these and make use of the photographic record from space exploration.
2. Art which expresses the new psychological and philosophical conceptions developed through the exploration of space. The primary example of this is the concept of the Earth as a whole system - a concept made concrete by the first views of the whole Earth seen from space.
3. Art in space, viewed from Earth.
4. Art on Earth, viewed from space.
5. Art in space, viewed in space.
6. The applied arts such as space architecture, interior design and furniture design.
7. Fine art which takes advantage of new technologies and materials created through space activities. The most important of these make use of satellite systems to create simultaneous global artworks.

As to the ultimate relevance of Space Art to space activities Roger Malina states: "*The creation of contemporary art is inextricably tied to the process of creating human civilization Within this perspective, art making will occur as a part of space exploration, and in fact art making must be encouraged in space as one of the ways without which, in the long run, human use of space will be incomplete and unsuccessful.*"

The term *Space Art* is most often associated with "*astronomical art*" typically with images of the cosmos created by early space art pioneers such as **Lucien Rudaux**, **Chesley Bonestell**, **Ludek Pesek** and **David A. Hardy**, who not only anticipated some of the

results of space exploration, but in some senses made space exploration possible by generating public interest and support as well as by helping scientists and engineers plan and illustrate their experiments. The works of present day astronomical artists, most notably those by **Michael Carroll, Lynette Cook, Mark Garlick, William K.**

**Hartmann, Robert T. McCall, Ron Miller** and **Pat Rawlings** often appear in scientific magazines and in the publications of the space agencies depicting new discoveries and technological developments. Others, such as **Don Davis** and **Rick Sternbach**, have contributed their skills to the television and movie industries. The **International Association of Astronomical Artists** has over 150 members of this genre and is celebrated their 25th anniversary in 2009.

Former astronaut **Alan Bean** and cosmonaut **Alexei Leonov** have created astronomical art works based on their personal experiences outer space – both while in orbit and on the surface of the Moon. Bean's paintings of lunar landscapes evoke "what it was like" for a human being to actually be walking on the Moon's surface. Leonov is credited with making the first drawings of space while in orbit and he also enabled the transport of paintings from his artist colleagues such **Andrei Sokolov** to the Russian space stations and discussed the accuracy of their renderings of the space environment.

Since the advent of spaceflight, a growing number of artists have initiated projects to explore outer space on their own terms by proposing to realize their art concepts in Earth orbit and beyond, by utilizing space technologies for their artistic purposes or with their own bodies and projects in weightlessness. As their approach to art is more related to the idea of actual space flight rather than to astronomy, this type of space art may be generally classified as "*astronautical art*". One of the early practitioners of this genre of space art was artist **Frank Malina** also as a pioneering space engineer who was co-founder of both the *Jet Propulsion Laboratory* in the 1940's and the *International Academy of Astronautics* in 1959 as well as being the founder of *Leonardo* – the academic journal on art, science and technology in 1968. His innovative kinetic art works created in the 1950's and 60's often incorporated both astronomical and astronautical concepts.

In 1962, four years after NASA was founded, Administrator James E. Webb recognized space exploration would make a profound cultural impact, in addition to advancing science and technology. He established the NASA Art Program to commission pieces from prominent artists that would illustrate and interpret the space agency's missions.

Since that time, the art program has enjoyed the participation of such art luminaries as **Robert Rauschenberg, Norman Rockwell, James Wyeth, Nam June Paik, Patti LaBelle, William Wegman, Mike and Doug Starn, and Annie Leibovitz.**

Once the actual exploration of space got underway, some art of has already made the journey to another planet and has even left the Solar System. In 1969, *The Moon Museum*, a small ceramic tile on which American artists **Robert Rauschenberg, Andy Warhol, Claus Oldenberg, John Chamberlain, Forrest Myers** and **David Novros** all drew designs was carried on Apollo 12. In 1971 a small human shaped figurine called *The Fallen Astronaut* by Belgian artist **Paul Van Hoeydonk** was left on the Moon during Apollo 15 as a part of an astronaut's personal effects. The first artwork to leave the Solar System was the *Pioneer Plaque* placed onboard the Pioneer 10 and Pioneer 11 spacecraft launched in 1972 and 1973, resp. Astronomers **Carl Sagan** and **Frank Drake** designed the plaques and the artwork was prepared by Sagan's then wife **Linda Salzman Sagan**. As a message to a potential extraterrestrial encounter, it included a drawing depicting a man, a woman, the transition of a hydrogen atom, and the location of the Sun and Earth in the galaxy.

Today, artists are still hitching rides for their artworks on satellites. As part of their *SYSTEM IV, Moving Plates* project Swiss artist **Andreas Baumann** and Austrian artist **Eva Wohlgenuthan** fixed an engraved plate to the Cluster satellite FM 6 - Salsa which was placed in orbit after a successful lift off on top of a Soyuz-Fregat launch vehicle on June 16, 2000. More recently, German artists **Ragnhild Becker** and **Gunar Seitz** had their aluminum sculpture *Weltraum Visitor* affixed to the radar satellite *Terrasar-X* which was launched into orbit on June 30m 2006 atop a Russian SS-18 rocket – which once was a military ICBM.

In 2003 the European Space Agency (ESA) launched the *Mars Express* to the planet Mars. The Mars Lander called *The Beagle 2* was to have sent its first signal back to earth letting the project team know it has landed in one piece. This signal was to be a piece of music composed by the pop band **Blur**. On board was a work by British artist **Damien Hirst** designed to test if the instruments were still working accurately. The Beagle 2 crashed on its descent to the surface of Mars and these works could not be completed. More successfully was NASA's *Mars Exploration Rover (MER)* mission which included a DVD with 4 million names collected from the public including a text based work called *Monochrome (for Mars)* by Australian artist **Stephen Little**. The European Space

Agency included a CD containing messages and artworks on its *Huygens* space probe that landed on the surface of Saturn's moon Titan in 2005. Later, the Phoenix Lander which arrived on Mars in May 2008 contained a DVD called "*Visions of Mars*" containing science fiction stories and artworks about Mars. This project was originally launched in 1996 on the failed Russian "*Mars 96*" space craft but finally made it to Mars 16 years later.

Up until very recently, artists exploring the concept of "weightlessness" had to be content to carry out their projects during parabolic flights on specially prepared large jets which typically provide a series of 20-25 second intervals of micro-gravity commonly referred to as "*zero-g art*". French choreographer **Kitsou Dubois** has translated her zero-g experiences into contemporary dance performances and installations while US artist **Frank Pietronigro** attempted - quite humorously - to apply paint to a canvas during a series of parabolic sessions.

Whereas Dubois's and Pietronigro's flights in the 1990's had to be arranged through their country's respective space agencies, today commercial zero-g flights are available to anyone and quite a number of artists around the world have recently taken advantage of this opportunity. The **Arts Catalyst** organization in the U.K. and the **Zero Gravity Arts Consortium** (ZGAC) in the U.S. have been quite active in this area and have arranged several zero-g flights for numerous artists as well as organizing exhibitions of these works. In Japan, a number of artists are collaborating with the Japanese space agency *JAXA* to arrange parabolic art experiments. Recently, **Lyn Hagen**, also from the U.K, organized a zero-g parabolic event in Russia including the participation of artists **Luke Jerram** and **Nasser Azam**. Hagan and Jerram became ill in the early part of the flight, a quite common occurrence; however, **Azam** was able to add the finishing touches to several paintings that he had begun before the flight. It is remarkable to note that his work: *Homage to Francis Bacon: Triptych I* sold in auction for \$332,500 in New York at Phillips de Pury's Contemporary Art Part II auction held on 14th November, 2008.

Also taking place in 2008, **Bradly Pitts**, carried out his zero-g project in the nude on the Russian Ilyushin 76 weightless trainer aircraft. Previously a propulsion engineer during the weightless testing of the *MIT SPHERES* project, an experiment now onboard the International Space Station, Pitts, who has a B.S. and an M.S. in aerospace engineering from MIT, did 80 parabolas with NASA before launching his own project. Perhaps the

most prominent zero-g passenger to-date was the British theoretical physicist and author **Stephen Hawking** who is also preparing for a sub-orbital spaceflight on *Virgin Galactica*, Virgin Airways effort spearheaded by its billionaire founder, **Richard Branson**, who will cover the \$200,000 tab for the flight into space.

A few artists have utilized space technology in orbit for the realization of their art projects on Earth. In 1980, American artist **Tom Van Sant** used a system of mirrors to create *Reflections from Earth*, and in 1986, *Desert Sun* which were recorded by a satellite passing overhead. French artist **Pierre Comte** used large sheets of black plastic to create *Signature Terre* which was photographed by the SPOT remote sensing satellite in 1989.

Artists such as **r a d i o q u a l i a** (**Honor Hager** and **Adam Hyde**) have used radio telescopes to capture the sounds of the cosmos and integrate this into their musical compositions. **Ezra Orion and Jean-Marc Philippe** *Messages from Mankind to the Universe* and have used radio telescopes to transmit messages and images into space. **Artists Nina Czegledy, Peter McLeish and Anna Hill** have incorporated cosmic atmospheric phenomena such as the *aurora borealis* into their works.

Slovenian artist **Marko Peljhan** designed *Makrolab*, a high-tech, art-science project which is a temporary sustainable laboratory designed to support 4 - 6 artists and scientists working and living alongside each other in isolation for periods of up to 120 days in remote environments. *Makrolab* incorporated many space technologies enabling the artists to track satellites and communicate with the outside world. The project has since evolved and includes work of many people from many different disciplines. The current setup of the project, *the mark II*, was designed by the architects **Matevz Francic** and **Aljaz Lavric**, the metal construction is the work of **Joze Miklic**.

Prior to the explosion of the space shuttle *Challenger*, it was possible for artists to gain access on the space shuttle's cargo bay via NASA's "Get Away Special" (GAS) program. Launched in 1984, **Joseph McShane's** GAS experiment called *S.P.A.C.E.* contained a system of spheres used as a materials coating experiment, originally conceived of and viewed as artworks upon return to Earth. In 1986, four original paintings called *Vertical Horizons* by artist **Ellery Kurtz** were launched in a GAS canister with the aim to evaluate the effects of spaceflight on fine art materials. Both of the above art projects had to have a dual art and scientific function in order to meet NASA's requirements. However

in 1989, **Lowry Burgess's** *Boundless Cubic Lunar Aperture* flew on the space shuttle as a self-contained "non-scientific payload". This conceptual artwork included holograms and cubes made from all of the elements known to science and water samples from all the world's rivers as part of Burgess's *Quiet Axis* artwork.

Carried out in the context of the *AustroMir* mission in 1991, Austrian artist **Richard Kriesche** transmitted an interactive video performance called *ARTSAT* to the cosmonaut crew on board the Russian *Mir* space station who returned the altered signals after one orbit which then interacted with various devices on the ground. The West cigarette company commissioned German artist **Andora** to paint the outside surface of a Russian Proton rocket launched in 1992 with examples of his art and as an advertisement for the cigarette company.

In 1993, **Arthur Woods'** *Cosmic Dancer*, an aluminum sculpture painted with acrylics was sent to the *Mir* space station. This artwork, perhaps the first specifically designed for a human habitat in orbit, was an investigation of the properties of sculpture in weightlessness and an experiment determining the advantages and disadvantages of integrating art into the living and working environment of the cosmonaut crew. A video and photographic documentation was made by the cosmonauts of them "dancing" with the sculpture and they provided an informative commentary on having art included in their orbital habitat. The *Cosmic Dancer* project, which cost approximately 100,000 dollars to realize, was financed through the sale of an edition of 99 versions of the sculpture. The original sculpture, however, was never returned to Earth and may have been onboard the *Mir* when it was de-orbited on March 23, 2001.

Two years later, in cooperation with ESA in the development of their *EuroMir95* mission, **The OURS Foundation**, a cultural and astronomical organization set up by **Arthur Woods** and **Marco C. Bernasconi** in 1990 to develop art projects for space, was responsible for organizing *Ars ad Astra – The 1st Art Exhibition in Earth Orbit* which organized an international competition that enabled 20 original A4 sized art works from different artists to be sent to the *Mir* station. These were: **Alessandro Bartolozzi** (I), **Peter Binz**(CH), **Werner Beyeler** (CH), **Michael Böhme** (D), **Marcy Burt Butz** (CH), **Michael Carroll** (USA), **Chris Couvee** (NL), **Karl Draeger**(D), **Peter Eickmeyer** (D), **Marilynn Flynn** (USA), **Rudolf Halaczinsky** (D), **Rudolf**

**Hanke (D), Sarah Kernaghan (IRL), Mark Maxwell (USA), Edward Mendelsohn (GB), Elizabeth Smith (USA), Ruth Trapane (USA), Andrea Thüler (CH), Claudine Varesi (MEX) and Amy Zofko (USA).** The cosmonaut crew onboard the Mir consisting of Sergei Avdeev, Yuri Gudzenko and Thomas Reiter served as final jury and selected a watercolor by **Elizabeth Carroll Smith called *When Dreams are Born*** as their favorite. Their announcement of the winner was communicated during a live transmission which took place as the Mir passed over the Euro Space Center in Transinne, Belgium on November 30, 1995. Smith's work remained on the Mir while the other 19 artworks were returned to Earth and to the artists.

*Primsa*, a sculpture by artist **Pierre Comte** was taken to the International Space Station by French astronaut Claudie Haigneré in 2001. The sculpture consisted of 14 small painted spheres each 2.5 cm in diameter with seven limbs extending from its axis and was allowed to float in weightlessness. Over the years, astronauts and cosmonauts have often along taken art works with them on their missions into space – mostly small paintings or prints - including artworks by **Pamela Lee, William K. Hartmann** and **Eric Victor**. Also to have flown art on the Mir station was the German artist **Charles Wilp**, (1932 - 2005) who called himself an "*artronaut*". Wilp also made a number zero-g flights and sculptures from the wreckage of an Ariane 5 rocket.

In 1995, American artist **Richard Clar** created *Collision* which he calls: "an orbital debris constellation sculpture in low-Earth orbit". Using a super computer, a simulation was made of the orbiting constellation of space debris as viewed from geosynchronous orbit. Composer **Mark Mantel** created a musical composition to accompany a video of the simulation. "*Star City*" is a 4-channel DVD/Video installation by British artists **Jane & Louise Wilson** that was filmed at Star City, a Russian space-training centre just outside of Moscow in the year 2000. In this work, the artists highlighted two sides of the former Soviet Union; the advancements of space travel are depicted alongside the worn, neglected physical spaces of a past era and a dense political history. *Wave UFO* - a huge architectural sculpture of whale-like proportions (approx. 5m x 11m x 5m) created by Japanese artist **Mariko Mori** in 2003, brings together art, science, performance, music, and architecture in an integral work of art which fuses new technologies of computer graphics, video projections, and engineered structures in order to expand the art experience about a journey into space.



A highly controversial form of space art is that of orbital sculptures. The idea for such works can be traced to the 1960's and the first *Echosatellites* which were launched by the US. These passive communication satellites – reflective spheres 30 to 40 meters in diameter - were significant because, in addition to their scientific objectives, many people actually saw these quite visible objects passing overhead in the night sky.

Space technology such as this was not lost on artists and the first such “art-in-space” concepts called “*spaceworks*” were proposed by **Albert Notarbartolo** in 1975. While he recognized the controversial nature of such concepts, he hoped that support for the launching of the first spacework would be obtained as a cooperative international venture under the auspices of the United Nations to symbolize the solidarity of mankind. Since then, the few art-in-space proposals that have been publicized and developed to some degree have indeed sparked enormous controversy. Yet, most of the proposals have turned out to be technically, financially or politically unfeasible to realize.

French artist **Pierre Comte** was one of the first to propose an inflatable sculpture in orbit called *Arsat* - a solar sail type sculpture designed to create a brilliant star that would circle the planet. His sculpture was selected as the runner-up in the Eiffel Tower 100th anniversary (1989) competition. Third place in the competition was **Dieter Kassing**, an engineer working for the European Space Agency (ESA) proposed *Space Disk* - a 50 meter in diameter object with a Morse Code message creating a “blinking star” in the night sky. The winning proposal called *L'anneau Lumiere* was submitted by the architectural Group Spirale (**Alain Coquet, Jerome Gerber, Jean Jacques Leonard, Alain Robert, and Jean Pierre Pommereau**). Their project consisted of a 24 kilometer in diameter ring of 100 six meter in diameter reflecting balloons which would have been visible as a circle in the sky larger than the Moon - a concept that turned out to be technically unfeasible to realize.

In 1985 **Arthur Woods** initiated a project called *O.U.R.S. - the Orbiting Unification Ring Satellite* designed to celebrate the coming new millennium with a symbol of global peace and unity. This one kilometer in diameter inflatable toroidal sculpture was designed to be visible as a “circle in the sky” approximately one-quarter the size of the Moon. The sculpture employed a technology that under development by the European Space Agency in which a chemically impregnated membrane that would harden or rigidize in the presence of sunlight. The sculpture, as it was technically defined in 1988, would have weighed 19.7 tons and would require an entire Ariane 5 for its launch. In

2003 the European Space Agency (ESA) commissioned Woods, to look at the *O.U.R.S.* concept again in light of new technological developments. Based on the results of that study it was determined that the overall mass of a similar sized sculpture could be reduced to approximately 5 tons.

To test the feasibility of the *O.U.R.S.*, a six meter in diameter prototype sculpture was proposed and developed for the International Space Year (ISY) as the *OUR-Space Peace Sculpture*. In 1998, a "Letter of Intent" for the launch of the sculpture was signed with *Glavcosmos* a commercial agency for the Soviet/Russian space program and, in 1990, a full size test sculpture was constructed by the Russian space company *NPO Energia* which was also responsible for building the Mir station. In the wake of the dissolution of the Soviet Union, final funding for the project did not materialize in time for the International Space Year (ISY) and the project was postponed. While hardly visible to an observer on Earth, the deployment of the *OUR-Space Peace Sculpture* from the Mir station was to have been filmed by the cosmonauts during a space walk and the video of the deployment transmitted live to Earth.

American artist **James Pridgeon** proposed the 1990 *Goodwill Games Constellation* - an orbital sculpture consisting of two inflatable Mylarized balloons 30m in diameter attached to a Kevlar tether several kilometers in length. This structure would create two stars symbolizing East and West, with a brightness equivalent to that of Venus. A similar project in 1995 called *The Star of Tolerance* was proposed by French businessman **Nersi Razavi** to celebrate UNESCO's *Year of Tolerance*. Once launched and inflated, the two balloons, respectively 164 feet and 98 feet in diameter, would be tied to each other by a mile-long cable and would rotate around each other, circling Earth every two hours. Reflecting bright sunlight toward the darkened ground, they would be seen as a rotating binary planet.

**Razavi's** project and the winning project by **Groupe Spiral** to celebrate the 100th anniversary of the Eiffel Tower stimulated the most protest from the astronomical community which, when these types of artworks were first proposed, loudly protested that such projects would interfere with their work. Some space scientists were afraid that these would lead to advent of using the night skies for advertising purposes. Their comments were picked by the media and, in order to avoid controversy, space agencies in the US and Europe has been very reluctant to endorse such art-in-space projects. In reality, no astronomer or other organization complains loudly when the International

Space Station - an object brighter than any star – passes over their communities and telescopes in the night sky. However the main factor limiting the realization of orbital art so far has been the high cost and complexity of such projects, any of which would cost many millions of dollars to realize.

Since 1982, The **International Association of Astronomical Artists** (I.A.A.A.) has been conducting workshops in "planetary" locales, chosen for their resemblance to other worldly formations and features. The workshops enable the astronomical artists develop their painterly skills while promoting artistic exchange and camaraderie. Contemporary space artists and space professionals have also been meeting regularly since 1990 when the **OURS Foundation** organized the *1st European Space Art Workshop* in Montreux, Switzerland. Between 1997 and 2004, a series of Space Art Workshops were organized by the **OURS Foundation** and **Leonardo/OLATS** where artists and scientists exchanged ideas and formed collaborations. In 2013, *ISAW4: 4th International SpaceArts Workshop* organized by **Taksha University (TU) and Taksha Institute for Space Arts (TISA)** will be held in California.

The interest in these events has grown steadily and has developed into symposia endorsed by the **International Academy of Astronautics**, the **International Astronautical Federation** and the **European Space Agency**. These workshops are now often held at the official conferences and congresses of these organizations which also have their own sessions on the cultural uses of space. Exhibitions of space art are often included in these international gatherings of the space community such as those organized by the **OURS Foundation** at the International Astronautical Congresses (IAC) held in Oslo, Norway, Turin, Italy and Melbourne, Australia., **Leonardo/OLATS** and the **Art Catalyst** organized an arts and humanities symposium called "*Less Remote – The Futures of Space Exploration*" held at the 2008 **International Astronautical Congress** in Glasgow, Scotland.

Space architects **Barbara Imhof, Susmita Mohanty, Andrea Vogler & Jesper Jorgensen** are developing aesthetic environmental concepts for space habitats and incorporating space technologies into structure designed for extreme environments on Earth. **Jacques Arnould, Annick Bureaud, Martha Blassnigg, Roger Malina, Michael Punt, & David Surman** are among those in academia that have been critically examining the philosophical dimensions of the human imagination and the cosmos in a series of articles and lectures. NASA recently engaged the well-known media

artist **Laurie Anderson** as an artist-in-residence and artist **Dan Goods** is currently employed as such by the Jet Propulsion Laboratory while Japanese artist **Ayako Ono** was an artist-in-residence at ESA's ESTEC facilities. ESA recently commissioned a study about the cultural utilization of the International Space Station which was carried out by the **Arts Catalyst** and **Leonardo** organizations.

Around the world in artist's ateliers and in workshops the next generation of art-in-space projects are being discussed, planned and developed. Projects currently under development include future art-in-space works by the late French artist **Jean-Marc Philippe** (1939-2008) who had been developing *The Sphere of Mars* and his *KEO* satellite for a number of years. The supporters and collaborators of the *KEO* project plan to continue its development. U.K. artist **Anna Hill** is currently working on her *Space Synapse* multi-media sculpture designed for the International Space Station after being hosted at ESTEC, the European Space Agency's scientific facilities in Noordwijk, Holland. In Japan, **Tohoku University** has organized a competition for "*1mm art*" to be attached to a scientific satellite planned to be launched in 2009. In October 2008, **ITACCUS** the Technical Committee for International Cultural Utilization of the IAF (International Astronautical Federation) announced the formation of a Working Group, which will explore ideas for cultural utilization of space and make recommendations for action.

More recent examples of artists exploring space in a contemporary manner includes: In 2010, **Christian Waldvogel** worked with the Swiss Air Force to create "*The Earth Turns Without Me*". In this project, the Earth's rotation was cancelled by travelling westward in a military jet across the Alps at the speed at which the Earth turns in Switzerland (1158 km/h). In 2011, **Arturo Vittori** and **Andreas Vogler** designed a kinetic sculpture called "*Atlas Coelestis Zero*" which was sent to the ISS on the last mission of the US Space Shuttle. In 2012, **Trevor Paglen**, has attached an archival disc called "*The Last Pictures*" that shows 100 black and white images of life on our planet to the exterior of a communications satellite that blasted off into orbit.

The interest in contemporary space art appears to be on the rise and a number of important museum exhibitions have recently taken place and are planned for the near future. In 2012-2013 "*Falling Without Fear*" took place at the **Harwood Museum of Art** in Taos, New Mexico. From January to May 2013, "*Free Enterprise: The Art of Citizen Space Exploration*" can be visited at the **University of California Riverside**. Additional

exhibitions of contemporary space art are being planned in Canada in 2013 and in 2014 in Germany.

Before the advent of "Space Tourism", only astronauts or cosmonauts with artistic training such as **Alan Bean** and **Alexi Leonov** could claim the distinction of actually having been "there". Yet, this situation changed when **Richard Garriott**, the well-known video game programmer visited the ISS as a "space tourist". Not only did he take along an art exhibition incorporating art created by his mother, by various sculptors and art submitted by artists through a competition, **Garriott** did some painting during his time in space. Before his flight he practiced alongside his mother, an accomplished artist, on several zero-G flights with canvases and paint to experience the environment while creating zero gravity art. He believes the art reflects the emotional experience of being in space and the physical effects of zero gravity. His ticket to create art in space cost more than \$20 million.

Other artists, who don't happen to be multi-millionaires, will have to have some patience while the new space tourism industry currently under development by space companies such as *Virgin Galactic*, *Bigelow Aerospace*, *Space X*, *XCOR*, *EADS Astrium* actually begin flying tourists - and artists - to the edge of space for only \$200,000 ( or less ) per ticket. While the trip will surely be exciting and inspirational, the ten seconds of weightlessness at the edge of space will be a real challenge for artists.

The importance of the artist's role in the exploration of outer space has had much to do with helping humanity to have a broader and more enlightened understanding of why space exploration and space development are such vital activities to the future well-being of our species. As this awareness grows, artists, with their sights set on the stars, will continue to be at the forefront of space exploration while making the "Space Age" a reality.

*\* Arthur Woods was a witness to the beginnings of the US space program when he lived near Cape Canaveral and the Kennedy Space Center from 1959-1970. He is a member of the International Academy of Astronautics and a former Fellow on the International Association of Astronomical Artists. He has been an active space artist since 1985 and he currently lives and works in Switzerland.*