

Human Space Activity: The Spiritual Imperative

By Madhu Thangavelu (www.usc.edu/ur/federal_relations/experts/bios/1073.html)

When Pope Benedict called the ISS crew, to ask how they felt floating over our fragile blue planet, whether they see ravages of war, what they think of it, and whether the crew prays on-orbit, one wonders what was on the pontiff's mind and agenda.¹

Religion and scientific pursuits parted company centuries ago, at least in the eyes of the public, most notably in the West during the historical inquisition of Galileo, a devout Christian. He is reputed to have stood by his empirical evidence of the Copernican, sun-centered view of our solar system even under the threat of death by the preferred torture method of the day for heresy: burning at the stake. How dare a commoner employing lowly empirical objective logic challenge the supreme authority, especially on heavenly matters? The church, struggling with the dogma of the time, confined Galileo to house arrest for the rest of his life.

Religion and science have butted heads before and after Galileo and they continue to seek common ground, but to the layman the philosophies are irreconcilable. How can we expect a dogma that rests its case at every turn on divine intervention to come to terms with one that employs impeccable logic coupled with incremental data-gathering to bolster evidence to arrive at its conclusions?

The refined sensitivity of the human mind to the Cosmos and environment is clearly evident in the verses of the song called *Laudes Creaturarum* (Praise of the Creatures, also known as *Canticle of the Sun*), attributed to St. Francis of Assisi. The Sun and the Moon, the most prominent orbs that grace our skies, have a deep-rooted significance in every great religion as well as in Science, which employs state-of-the-art technologies to explore and understand the workings of these celestial bodies in our neighborhood and yet the philosophies could not be further apart. Perhaps that is how it is meant to be? Often, opposing philosophies are needed for the fertile mind in order to imagine and create new visions.

After all, religion was the primary purveyor of science, and especially astronomy, as is evident in the symbols and images projected in cathedrals and churches and temples all over the world. The heavens belonged to God and religion. Even today the architecture of religious structures, altars, and prayer spaces around the world aspire to the heavens and some elaborate geometries are summoned in their planning and design.² It is interesting to note that the term "Big Bang", though coined by Fred Hoyle, referring to the birth of our universe, was conceived by a clergyman, Monsignor Georges Lemaître of Belgium.³

¹ R. Z. Pearlman, "Pope Benedict XVI Makes 1st Heavenly Call to Astronauts in Space," May 21, 2011, www.space.com/11741-pope-benedict-xvi-calls-astronauts-space-station-sts134.html.

² R. Lawler, *Sacred Geometry: Philosophy and Practice* (London: Thames & Hudson, 1989).

³ G. Lemaître, "The Beginning of the World from the Point of View of Quantum Theory," *Nature* 127 (1931): 706, www.nature.com/nature/journal/v127/n3210/abs/127706b0.html.

People are born into religion and ritual and end their lives in the same way, even though most of us stray away from organized religion and liturgy for most of our lives. Never do we hear of a scientifically accurate christening of a new arrival or send-off for the soul of the departed. Religion and spirituality console and comfort the human soul in a way that science cannot.

Albert Einstein once responded to a question about his religious beliefs by saying that that he was utterly in awe and wonderment as Nature slowly gave up her secrets and that he was a religious practitioner of Science in that respect.⁴ Here we see a thought linking religion and spirituality. I think he was referring to spirituality, the essence of all religion, the belief in a supreme power of nature that seems to run the universe with some, yet to be wholly grasped, supralogical processes, with ultra-mathematical precision to which Vivekananda refers in his lecture on Immortality delivered at the Chicago World's Fair in 1893.⁵ Even atheists find the power of nature utterly overwhelming.

Religion stripped of all customs and liturgical practice may be termed spirituality. It is the essence of wonderment that explorers feel when they are exposed to Nature's secrets and subject to awe-inspiring new dimensions in human experience. The great director Peter Brook once said that the man-made world around us is conspiring at every moment to rob us of the sense of awe and wonder that the universe and nature continually presents to us.

Now, this unfathomable power seems to run into trouble with conventional scientific thought all the time; just ask Stephen Hawking or Richard Dawkins. Of course, it is taboo to bring up issues relating to religion or spirituality in modern scientific discussion, though many scientists are privately very spiritual in their beliefs. It is worthwhile to note that doctors practicing modern medicine use spirituality and prayer in the healing process and hospitals have religious or non-denominational spaces just for patients.

A definition that encompasses both of these great philosophies is that proposed by Tolstoy in his essay entitled "Confessions," in which he presents the idea that the greatest science of all is the science of the universe and humanity's place in it. He paints the range of human thought as that anchored at one end by theology and at the other by pure mathematics; no reconciliation this, but at least it puts philosophies along a continuum of human thought without artificial walls. John Templeton sought to bring discussion of Science and Religion closer and the Templeton Foundation offers annual prizes to those attempting to weave the philosophies together.⁶

⁴ Albert Einstein, "Response to Atheist, Alfred Kerr," quoted in H. G. Kessler, *The Diary of a Cosmopolitan* (London: Weidenfeld and Nicolson, 1971), 157.

⁵ Swami Vivekananda, "Immortality" (lecture delivered at the World Fair, Chicago, in 1893). www.vivekananda.net/booksbyswami/JnanaYoga/13_Immortality.html.

⁶ See www.templeton.org.

Seeking new models for rapidly evolving governance of societies, moving from nationalism to internationalism and beyond, grappling with global issues and the economics of globalization, we seem to be at the threshold of a newly refined era.

Due to globalism, a wholesome new view of our planet and all its contents, the integration of the stewardship of planet Earth and nature in the wake of the effects of climate change, we are coming full circle to embrace the mystical philosophy of transcendentalism,⁷ articulated nearly two centuries ago by Thoreau and Emerson among others. This holistic notion of our planet is being advanced and enhanced by human space activity.

Teilhard de Chardin presents the case for the evolution of global consciousness and the arrival of the Omega Point for humanity⁸ and Vladimir Vernadsky talks about the Noosphere or the emergence of the global mind, a new layer addition to our planet on top of the geosphere and the biosphere.⁹ We live in the Anthropocene epoch and stewardship of Eden has now become the sole responsibility of our species. The Global Consciousness Project run by Princeton University and projects at the Institute of Noetic Sciences (IONS) are currently engaged in extending the Noosphere philosophy. Rapid advances in Information Technology are changing the scope of our situational awareness and a global brain with newly evolved and refined sensitivities towards humanity and life, ecology and environment is emerging. Vernor Vinge¹⁰ and more recently Ray Kurzweil talk about the acceleration of technology toward a point referred to as Singularity,¹¹ projecting visions of merging humanity and technology, blurred, fused and indistinguishable as separate; human evolution on an accelerated path ?

NASA spends a lot of time and resources focusing on the technology that sustains human space explorers engaged in scientific exploration: a term used to say that these highly specialized professionals are engaged in the pursuit of scientific discovery. It is a very narrow view of human space activity. Space commerce is brimming with ideas beyond the mature and revenue-generating satellite communications field that are awaiting exploitation, among them, beaming solar energy from space and providing extensive refueling operations for outbound vehicles. It is well known among engineers that erecting and deploying large structures such as the ISS or endurance-class spacecraft and space-based solar array farms require on-site human supervision. These crews will find spiritual solace after a hard day's work, looking out at the Earth's disc, from their private quarters in orbit.

⁷ Philip F. Gura, *American Transcendentalism: A History* (New York: Hill and Wang, 2007).

⁸ Pierre Teilhard de Chardin, *Le Phénomène Humain* (Paris: Editions du Seuil, 1955), English translation, *The Phenomenon of Man* (New York: Harper, 1961); P. R. Samson and D. Pitt (eds.) *The Biosphere and Noosphere Reader: Global Environment, Society and Change* (Abingdon: Routledge, 1999).

⁹ Georgy S. Levit, *Biogeochemistry, Biosphere, Noosphere: The Growth of the Theoretical System of Vladimir Ivanovich Vernadsky (1863-1945)* (Berlin: VWB, 2001).

¹⁰ Vernor Vinge, "The Coming Technological Singularity," paper presented at the VISION-21 Symposium sponsored by NASA Lewis Research Center and the Ohio Aerospace Institute, March 30-31, 1993, www.aleph.se/Trans/Global/Singularity/sing.html.

¹¹ T. S. Perry, "Ray Kurzweil and Neil Gershenfeld: Two Paths to the Singularity," June 1, 2008, spectrum.ieee.org/computing/hardware/ray-kurzweil-and-neil-gershenfeld-two-paths-to-the-singularity.

As the government astronaut corps around the world continues to shrink, a growing number of human space explorers are wealthy individuals without the professional background or rigorous training of government astronauts. They are seeking to experience spaceflight, to feel outer space in their bellies and souls, and to witness the fragile planet directly while floating above it. The driver seems to be spirituality; physically seeking, experiencing, and appreciating man's place in the universe. We call them space tourists. Space adventurers or spiritual tourists, a better term, perhaps?

Are there areas of science and technology that weave into religion and spirituality? It appears that human space activity offers a venue to explore possibilities. While robotic spacecraft roam the solar system, sending us intriguing images from worlds afar, the yearning of humanity to be physically present there is what drives NASA and others to pursue space exploration. Without a vibrant human space activity component, NASA may not have a reason to exist.

As the crew lifts off into orbit, though their eyes are on the cockpit monitors and their ears tuned to mission control jargon above the roar of those mighty engines, they are praying for a successful and smooth launch. That is because, despite checks and cross checks and counter checks, despite the best efforts of ground crew and controllers, many things can still go wrong in such a complex system. The monitoring of the final minutes before launch is so rigorous and intense that the entire sequence is handed off from the crew to a set of computers. When your life is in the hands of machines, prayer is important.

Upon arrival at ISS, the first thing on their minds is to look out at planet Earth. The ISS now sports the Italian-made cupola, a large and exquisite window that looks toward planet Earth, and it is perhaps the most aesthetic component of the entire facility. Of course, it is no secret that the ISS crew spends a lot of its free time just looking out this cupola and marveling at the dynamic colors and drama the Earth gliding below them offers, even as the day becomes night and back again, all in a matter of minutes, as they orbit the planet. As they gaze at Earth through this large cupola, the crew is immersed in a spiritual experience.

I have had astronauts stare me back in the eye when posed the question, how does it feel to be walking on the surface of the Moon?

Well, you really have to be there to experience it, they say. Words will not do. It appears their sensory systems are turned up to highest alertness levels, heartbeats racing like athletes during peak performance, and they are soaking in terabits of information. This rush of data is simply too hard to debrief, in technical terms, prose, or poetry. When faced with such a high, though they are fully aware that it is Newton and Kepler's Laws that guided them there, their minds and souls quickly gravitate toward the scriptures. And human space explorers seek that intense spiritual experience and are willing to risk their lives for it.

Most crews of space missions come back changed forever. This phenomenon is addressed in several books, notably in *The Overview Effect* by Frank White.¹² Astronauts do not see national boundaries, they do not see warring nations, and they rarely notice the ravages of humanity and industry on the face of the planet.

All they see is a stunningly vibrant planet, lots of blue, aquamarine ocean, virgin white snow-tops on mountain ranges, and scattered puffs of cloud cover, dynamic with flashes of electric blue lightning, as the continents whizz by below them in absolute silence, no one asking them for country of origin or standing in line for visa verification. They see the whole world as one giant harmonious living entity and globalism, that feeling of oneness with nature, takes root in their hearts and souls. A common humanity becomes reality from orbit and Cosmopolitanism, the philosophy of acceptance and inclusion of all peoples, the richness and strength of plurality of diverse old cultures and heritage of customs and shared values become obvious. E Pluribus Unum rings loud and clear from orbit.

In worldly affairs and governance, in daily life and commerce, culture and religion, ritual and spirituality all trump science and technology every time. Science and technology are but tools, sophisticated tools of our time, merely used to fulfill human urges and nourishment for our intellect. When faced with the raw wonder and awe of nature, humans always gravitate toward spirituality. That is why when Apollo 8 slipped into lunar orbit, the crew recited from Genesis and Aldrin made communion before he stepped on the Moon.

Yes, perhaps human spaceflight can bring science and religion closer together as more people from various nations, cultures, and walks of life experience space first hand. Pope Benedict is known for his intellectual acumen and academic rigor as much as Pope John Paul was for his charismatic persona. Perhaps Pope Benedict had these thoughts of science-technology-theology synergy in mind when he dialed that ISS number in-orbit?

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Madhu Thangavelu conducts the ASTE527 graduate Space Exploration Architectures Concept Synthesis Studio in the Department of Astronautical Engineering within the Viterbi School of Engineering and he is also a graduate thesis adviser in the School of Architecture at USC. He holds degrees in both engineering and architecture and has contributed extensively to concepts in space architecture, especially dealing with extraterrestrial development. He is the author or co-author of over 50 technical papers in space architecture, lunar base design, and human factors. He is co-author of the

¹² Frank White, *The Overview Effect: Space Exploration and Human Evolution*, 2nd ed. (Reston, VA: American Institute of Aeronautics and Astronautics, 1998).

book *The Moon: Resources, Future Development and Settlement* (1999), published by John Wiley and Sons and second edition by Springer/Praxis in 2007.

He is the invited author of the chapter “Living on the Moon” in the *Encyclopedia of Aerospace Engineering*, a major reference work published by John Wiley and Sons in 2010 and the on-line second edition updated in 2012. He is a member of the USC team that won the NASA NIAC Phase I award in 2011 and Phase II award in 2012. He is a former AIAA officer, having served as Vice Chair for Education in the Los Angeles section.



Editors’ Notes: Madhu Thangvelu is a strong advocate for articulating the philosophy of space. He states:

Scientists and Engineers (in particular) have a tendency to get lost in the tools and toys they make, though some of us do arrive at philosophy for the meaning of what we do and why, via the long route of experience. By then, alas, for the most part, our life’s work is done. It is a good idea to set us all a solid foundation in space philosophy, so we can all have a steady handle on our works, as nature reveals her secrets... slowly, ever so slowly, but surely.

He is a member of the Board of Editors for the *Journal of Space Philosophy*. His latest projects may be found at denecs.usc.edu/hosted/ASTE/527_20111. His graduate students at USC do professional research – he and some of them will be presenting at the ISDC-2014 Conference in Los Angeles, 15-18 May 2014. ***Bob Krone and Gordon Arthur.***