Astrosociological Insights
Newsletter of the Astrosociology Research Institute
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Spotlight on global space governance . . .

"The *Montreal Declaration* articulates a path forward for addressing the challenges of global space governance."

This issue of our newsletter provides a lens to focus on the challenges, opportunities, and future direction of global space law and governance. This spotlight carries forward the conversation begun at the 2nd Manfred Lachs International Conference on Global Space Governance, held May 29 – 31, 2014 in Montreal, Canada.

Prompting questions for this discussion can be grouped according to focus, urgency, and responsibility. These include:

Terrestrial Diplomacy

- How can political transparency in space governance be implemented and sustained?
- What are the unrealized possibilities and practical challenges of governing by the International Code of Conduct, drafted in 2010?

Cooperative Approaches Toward Space Governance

- What lessons can be taken, both positive and negative, from the example of the International Space Station?
- How can the multidisciplinary nature of astrosociology contribute to a cooperative model of space governance?

Public vs Private Economic Interests

- How do private economic interests in space conflict with public interests? How can the conflict be mediated?
- What will it take for nations to ratify comprehensive and binding space agreements? Should private stakeholders be required to ratify as well?

Divergent National Interests: Inequality and Inequity

- How can developing nations secure greater access to space resources?
- What is the international willingness to commit to comprehensive, collaborative, and transparent space governance?

Mixing Military and Cooperative Activities in Space

- What are legitimate uses of the military in outer space?
- What should be the role of the United Nations in promoting the peaceful uses of outer space?

Divergent Intra-national Interests

- How can we create collaborative and sustainable space governance within partisan-divided terrestrial governments?
- What could currently marginalized groups add to space governance policies?

Interplanetary Space Governance

- Should we attempt to recreate terrestrial governments in non-terrestrial environments?
- How do we guarantee human rights and civil liberties in highly regulated non-terrestrial societies?

Other Public, National, and International Issues

- How do we address privacy issues arising from proliferation of public and private communications, data-gathering, and surveillance satellites?
- What government plans exist or should exist, for reporting, planning, and responding to extraterrestrial signals?

Future of Space Governance

- How much responsibility do powerful nations have to help less powerful nations become spacefaring?
- What would an ideal future organization for regulating space activities and policies look like?

There are many questions to direct our inquiry. Though probably more questions than these emerged from Montreal that May weekend, the Conference concluded with the release of a document outlining the next steps in the process toward creating answers. The *Montreal Declaration* articulates a path forward for addressing the challenges of global space governance. It anticipates the hopeful *establishment of a global governance regime for peaceful and sustainable space exploration, use, and exploitation for the benefit of all humankind*. Many of the articles in this issue of our newsletter strike that same chord.

Kathleen D. Toerpe, Editor

Recent Conferences 2014 . . .

ARI has presented papers or panel discussions at the following recent conferences:

2nd Manfred Lachs International Conference on Global Space Governance (Montreal, CANADA)

CONTACT 2014 (Mountain View and San Francisco, CA)

Scientific Preparatory Academy for Cosmic Explores - SPACE (Orlando, FL)

100 Year Starship (Houston, TX)

Global Space Governance in the 21st Century: A *'Regime Complex'* Perspective

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A Brief Note about the paper presented at The 2nd Manfred Lachs International Conference on Global Space Governance, 2014 Montreal, Canada

The human activities in and through outer space are noted for being constantly framed by a 'homo-astro ecosystem' where three dragging vectors, namely the evolution of global space governance, tireless space technology development, and a power game in global astropolitics, continuously interact with each other to reach a temporary equilibrium. Among these dragging vectors, it seems that the edifice of global space governance stands out as the most important one to reflect the bright, or at least, the rational side of such a homo-astro ecosystem. For that, understanding the managing patterns of global space governance sounds not only valuable for accumulating policy recommendations to wipe out current hurdles, but also meaningful for clarifying visionary goals to improve the homo-astro ecosystem. By recognizing these significances, we probe with one of the effective analytical concepts – *regime complex* – to study global space governance in the 21st century.

Shift to Multilateralism

To start, there has been a pattern shift in managing global space affairs, which occurred alongside the global politics paradigm changes, from the previous bipolar dichotomy to the post-Cold War multilateralism. In the current multilateralism trend, international regimes, which refers to '*the sets of governing arrangements, such as networks of rules, norms, and procedures, in the forms of international treaties, ad hoc technical arrangements, international organizations (IOs) and intergovernmental organizations (IGOs), regional cooperation mechanisms, international fora, or groups of nations, that regularize the behavior of member states and control the effects of regulations'*, have been amplifying their influence on the global space rule-making arena. As the lack of a sole international space regime remains a reality, international regimes have been increasingly establishing short-term solutions for current problems and seeking long-term objectives for future challenges. To this regard, it is particularly revealing to know why those space-related international regimes are rising, and how they affect the global space governance architecture towards the brighter side of our homo-astro ecosystem.

In fact, deploying international regimes as an instrument for satisfying national interests or attaining universal goals is not new. From the early space age, space powers have been exploring international regimes in order to gather allies to establish global rules in favor of

Global Space Governance in the 21st Century . . . (cont.)

general benefits of humankind as well as their own national interests. Nowadays, emerging space powers are probing similar models to rope both spacefaring and non-spacefaring partners in either formal or informal international institutions in order to empower their bargaining force and to influence the rule-making outcomes on general or specific space related issues. Indeed, there seems to be a redistribution of rule-making power from the hands of a few space powers to the multilateral tribunes within the space-related international regimes after the paradigm-change on governance patterns in the 1990s. We might say that a trend of democratization in the global space governance edifice is happening.

Changing Roles for Space Regimes

Additionally, as various specific space related issues are growingly interconnected with each other due to technical, political, socio-economic, or generational ecological concerns, it triggers heterogeneous, non-hierarchical international space-related regimes consisting of different governing principles and missions, institutional structures, rule-making procedures, working methods, to jointly work on one common space relevant issue-area, *e.g.* space militarization, human security protection and interconnectivity through the help of satellite communications and remote sensing technologies, environmental protection and disaster prevention throughout the integration of Earth Observation (EO) systems, space debris, or others. Those international space regimes are therefore required to coordinate, cooperate, or confront each other for making partly *ad hoc* arrangements or comprehensive plans to overcome current problems and foreseen challenges. Consequently, the international space relevant regimes no longer only play a perceived rigid role as regulator-arbiter, but also become one of the players that participate in the global space rule-making processes throughout their interactions with other related international regimes. The institutional interactions are in principle deemed to integrate the heterogeneity of different international regimes toward a workable global partnership for common actions.

Recently, we have seen many cases in the form of inter-institutional dialogue, cooperation or jointly making new international rules, just to name a few, such as the International Charter on Space and Major Disaster, the ITU-IADC-ISO dialogue between the International Telecommunication Union, the Inter-Agency Space Debris Committee, and the International Standard Organization on space debris and spaceflight safety issue, the ICAO-ITU Memorandum of Cooperation between the International Civil Aviation Organization and the International Telecommunication Union regarding the protection of GNSS for aviation safety concerns, the UN International Committee on Global Navigation Satellite Systems (ICG) that promotes the interoperability of different global and regional navigation satellite systems, and the Global Earth Observation System of Systems (GEOSS) which promote an integration for all EO systems to become one EO data system. Naturally, those institutional interplays also happen in the context of global astropolitics and supposed to satisfy both respective country's self-interests

Global Space Governance in the 21st Century . . . (cont.)

and common gains of humankind, *e.g.* the current competition between the EU-promoted a likely International Code of Conduct for outer space activities (ICOC) and the China-Russia co-sponsored draft for a Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects (PPWT). In sum, a conceptual framework - *global space regime complex* - is suggested to be used for looking at these institutional interplays for related interconnected issue-areas in order to understand more about the current edifice of global space governance.

The concept '*global space regime complex*' refers to '*two or more partially overlapping and non-hierarchical international regimes that happen to interact with each other in governing a general or particular problematic space–related issue-area based on the cooperation, competition, or pragmatism rationales'*. In our ongoing academic project, it is noted that being able to identify the issue-linkage items from the salient inter-institutional interplay cases, categorize various regime interaction patterns within the regime complex of different space related issue-areas would help in looking at optimal general or specific models to improve the edifice of global space governance, hence, reducing tensions and conflicts, amplifying cooperative synergies, rationalizing duplicate governing efforts, and ultimately maximizing the sustainable uses of outer space resources. There are numerous cases demonstrating that complex institutional interplays are related to the current global space governance, which are foreseen to be investigated in our forthcoming studies, for example, for the issue-areas related to the realms of security and strategy, human (and asset) safety, economic growth and social development, and finally, that of ecological sustainability.

Military Deterrence: Humanity and the *Schwarzschild Kugelblitz*

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Lurking in the depths of space may be bizarre remnants of the Big Bang – Primordial Black Holes (PBHs), which could have been formed in the fireball that was the early universe. These objects, some much tinier than an atom, can be so massive as to weigh as much as a mountain, the Earth, or even many times the sun. Some of still undiscovered objects may be evaporating now; others may have vanished eons ago, while still others may be loitering throughout the universe. Someday, in the distant future, it may even be some possible for us to make our own PBHs. Truly stupendous lasers, many orders of magnitude more energetic than the lasers of today, would focus their single blast of radiant energy onto a spot in space. That energy would be trapped in a self-generated black hole the size of a quark and the weight of a mountain. That black hole would be a *Schwarzschild Kugelblitz*[1] (SK). It would not swallow up the world, as some people

Humanity and the *Schwarzschild Kugelblitz* . . . (cont.)

fear. Rather, it would be a source of colossal energy. If harnessed for peaceful purposes, this energy could power our cities and hurl spacecraft to other worlds. However, the maelstrom of particles, streaming out from the SK at or near the speed of light, would form an expanding sphere of radiation, lethal for many miles. To put it in perspective, a modest SK, the size of a single quark and weighing a million tons, would in one second, release the energy of 2500 Hiroshima-type atomic bombs, and it would do so continuously for 5 years, until it finally evaporated. At 20 miles from the SK, titanium shielding would vaporize; at 200 miles, abhorrently lethal conditions would exist.

An Orbiting Doomsday Machine

From electricity generation to nuclear medicine, the peaceful uses of nuclear power, from which our society has greatly benefited, have largely not been deterred by its potential misuses. Nuclear arsenals have not been, nor should they be, a justification for abandoning MRIs. Nuclear power offered the human race tantalizingly irresistible access to energy on a scale previously unattainable. Schwarzschild Kugelblitzes would merely up the ante. Safely harnessed, a SK would make fast interstellar travel possible. People could reach other star systems within a human lifetime of travel. However, an unshielded SK in Low Earth Orbit (LEO), circling the Earth every 90 minutes, spewing its radiation in all directions, would likely create unsurvivable conditions planet-wide. Although uncertain, it may even strip away our planet's atmosphere. Militaristically, a SK-generating laser deployed in LEO exceeds the minimum requirements of deterrence and becomes a doomsday machine. Yet, we've deployed nuclear weapons and other weapons of mass destruction as deterrents since 1945, and we're still here, even after numerous close calls. Perhaps we've just been lucky.

The Latest in a Long Line of Double-edged Swords

Is such an orbiting genie deterrence? The answer would be yes, if (and only if) it was believed and feared that those in control of the laser system were prepared to "rub the lamp" and bring about an apocalypse as the penalty for noncompliance. For nuclear weapons, so far at least, it's worked. A single SK in LEO could create the conditions of a full-scale nuclear war, probably far worse. Although such a system could potentially allow its controllers to demand that space be used only for peaceful purposes, albeit through the threat of an apocalypse, extreme measures must be taken to prevent an unscrupulous group or nation from attaining this technology – people such as "...some misanthropic sociopath like a Hitler or a Stalin eager to kill everybody, a megalomaniac lusting after 'greatness' and 'glory,' a victim of ethnic violence bent on revenge, someone in the grip of unusually severe testosterone poisoning, some religious fanatic hastening the Day of Judgment, or just technicians incompetent or insufficiently vigilant in handling the controls and safeguards...".[2]

Humanity and the *Schwarzschild Kugelblitz* . . . (cont.)

Are SK-creating Lasers Inevitable?

In historical retrospect, the development of atomic weapons seemed inevitable. Science had attained the required maturation, and so we built them, thousands of them. Although their deterrence value is still being extensively debated, we keep them around. We created a self-sustaining nuclear industry. So, too, it may someday be for SK-generating lasers. However, the development of lasers capable of creating a Schwarzschild Kugelblitz is probably in the very far future, but given time, it seems as inevitable as atomic power. Given the militarization of everything from stone spears to gunpowder to nuclear power, it seems inescapable that physics and technology permitting, SKs will one day join this long list. For "wherever man has learned to function, regrettably he has also learned to fight."[3] In the intervening time (maybe many centuries), we can address the sociological, political, and moral challenges which face us, and work toward the long term stability of our political institutions. That way, when science is capable of creating our own black holes, humanity will be ready.

[1] *Schwarzschild* refers to the mathematical equations used to describe the black hole. *Kugelblitz*, which translates literally to *ball lightning*, was coined in 1955 by John Wheeler.

[2] Carl Sagan, *Pale Blue Dot: A Vision of the Human Future in Space*, p. 163, New York: Random House, 1994.

[3] John Glenn, 1968.

All Ships Float in Space: Developing Countries and the Revolution of Space Law

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Numerous books and articles address the complex morass of space law and international politics, but the scholarship we desperately need to develop a stable legal framework for space exploration isn't more history, it's economics. Nations with active space programs view the cosmic commons as the next logical target for resource exploitation, but the non-space actors of the developing world demand a cut of the spoils. Therefore, space actors have largely abandoned the multinational decision-making process that formed the four widely accepted treaties. Instead, they now rely mostly on bilateral accords between likeminded space actors. The key to bridging the divide is the creation of a treaty that makes the current system obsolete.

A successful treaty must be accompanied by a central authority and be sustainable in the face of constantly evolving geopolitical and technological realities. The central authority

All Ships Float in Space . . . (cont.)

would be charged with the distribution of licenses, the collection of fees, and the general enforcement of the treaty's terms. It is inspired, in part, by global satellite communications giant, INTELSAT, which is an offshoot of the United Nation's International Telecommunication Union (ITU). Membership to INTELSAT is open to any State that is a member of the ITU, but every nation has access to the system's broadcasts, regardless of membership. INTELSAT is subject to a unique governance regime. Shares and votes within the organization are allocated in proportion to each member's use of the network, and the allocation is periodically updated to reflect current use. Therefore, States that use the system more heavily are given a greater share of revenue garnered from satellite usage fees, and have more votes on substantive matters concerning the use of the network.

Similar to INTELSAT, the treaty would take into account investment and actual use of the celestial commons when allocating voting and profit shares. However, the votes and shares of governments would be bolstered by the investment and use of private entities registered with the respective governments. This comports with Outer Space Treaty (OST) Article VI explaining that States party to the treaty bear responsibility for activities in outer space, even for non-government entities; Article VII, assigning States liability for damage done by objects launched from sovereign territory; and Article VIII's provision which mandates that a State shall retain jurisdiction and control over any object or personnel who conducts operations under the State's registry.

The treaty would provide the terms that States would use in acquiring temporary exclusive economic zones; however, it would not govern scientific and economic relationships directly; thus, preserving the customary international law governing the International Space Station (ISS). An important component of the ISS's legal regime is that ISS partners are free to barter their unused utilization rights to each other.

However, the treaty would account for the shortcomings established by a fundamental flaw in the ITU legal framework. Under ITU, the orbital slots that countries apply for, must be used by the countries requesting the slots. This system naturally favors space actors and near space actors, as they are the only ones capable of acquiring the slots. In the 1980s, Tonga acquired six orbital slots. The country then leased one and auctioned off the other five for $2 million per year. This was deemed to be a violation of the OST, resulting in the ITU mandating that orbital slots be used by the States requesting them. This is unfortunate, as it is possible to allow a State to auction orbital slots while simultaneously observing the terms of the OST. Article II of the OST prohibits national appropriation, but does not prohibit the leasing of the space commons by an international body for scientific or economic use. If positions in space can be leased to developing countries, then these non-space actors can sublease to space actors and earn their spoils.

The central authority would raise revenue to fund its operations. In order to do this, it would oversee a system of tradable permits. For operations involving mineral extraction, a number of licenses would be approved for a particular swath of resources. An example is the total accessible volume of helium-3 on the

All Ships Float in Space . . . (cont.)

moon. The volume itself would be broken down into smaller plots of land and distributed principally to space actors who are capable of reaching and exploiting the resources. Reserved licenses would be made available to non-space actors who could then sublease their licenses to space actors, thus ensuring that all States have the ability to benefit from the use of the resources.

To encourage private investment of space activities, the revenue system would operate under similar organizational controls employed by Public Utility Commissions (PUCs). When making investments, corporations and individuals are concerned with their expected return on the investment (ROI). The ROI is a calculation of the most tangible financial gains or benefits that can be expected from a project versus the costs for implementing the suggested program or solution. In order to encourage private investment, it is necessary that the proposed operation project a high ROI. However, it is clear from the Moon Treaty that developing countries expect to share in the profits of such exploration. This is a disincentive for private investment. The treaty's solution is to set a profit threshold where all profits below are kept by the private entity, and all profit above would be subject to revenue by the central authority for the interests of all parties to the treaty.

The treaty ties together the interests of space actors, non-space actors, and corporations. By reconciling the OST with the spirit of the Moon Treaty, space actors are free to conduct scientific, exploration, and exploitative activities in the space commons without getting permission to do so. Non-space actors benefit by having access to the natural resources on the Moon and other celestial bodies without having to develop a mining apparatus. By mending the rift between the developed and developing countries, a sustainable treaty provides the essential legal stability necessary to create the jobs of tomorrow and encourages economic development in developing countries.

Global Technologies and the Right to Communicate

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International telecommunications law is a vital part of space law. Telecommunications law at the beginning of the formation of space law regulated relationships between nation-states. Today, however, international law has come to include the individuals and non-state actors as the global technologies facilitate multi-channel communications among actors of all levels. This has changed the social implication of communication greatly. Communication is no longer a one-way mode of information transmission, but is an interactive exchange of information and ideas.

Global Technologies and the Right to Communicate (cont.)

Therefore, telecommunications governance concerns not only state-to-state discourse but also dialogue among all stakeholders of the global technologies.

Transformative Technologies

Global technologies, namely satellites and the Internet, are technologies that have a transformative effect for society. Remote sensing technology makes it possible for artificial satellites to constantly observe the large communities of the Earth and collect global data. These satellites sense the globe in a borderless manner, and the collected data is used for a vast variety of applications and purposes, and provide consistent global accessibility to communication. At the same time, the Internet and digital social media technologies have created a virtual online space where individuals and social entities communicate and connect with each other. In other words, the Internet facilitates interactive communication in cyberspace, and satellites provide the global data and accessibility needed to engage in this communication. These two types of technologies, satellites and the Internet, have together transformed the communication environment by dramatically increasing the volume, speed, and distance of information flow, and provide increased opportunities and space for communication.

A closer look at these technologies and their implications in society and the legal framework governing them is necessary. This examination is extremely important to the development of the human rights law regime because human rights in history has been discovered and enabled largely by technological advancement and the utilization of it. The use of satellites and the Internet demonstrates the empowering effect of global technologies in bringing forward the collective human right to communicate in the international human rights law regime of the 21st century. Indeed, satellites and the Internet are two parts of the same human right to communicate.

The institutional structures for space law and human rights law were created at about the same time. Carl Q. Christol referred to this timing by stating, "[T]hat the United Nations has been moving simultaneously in the field of space law and the international law of human dignity is vastly to its credit. The concurrence of these efforts in time should not be regarded as purely coincidental. They are interrelated aspects of a common plane."[1]

Right to Information

The "right to information" is a fundamental human right as laid out in the Universal Declaration of Human Rights (UDHR) of 1948 as an essential element of a right to freedom of expression. The UDHR Article 19, for example, reads: "[E]veryone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive, and impart information and ideas through any media and regardless of frontiers."[2]

Global Technologies and the Right to Communicate (cont.)

However, the enabling effect of the global technologies pushes this right farther. The right should be not only to impart and receive information freely, but also to interact and communicate with each other. A right to communicate can achieve the ultimate purpose of the right to freedom of expression.

Because of the widespread use of global technologies in recent decades, a "right to communicate" should be given a status as a new human right in the international human rights law regime. This is a right of an individual as well as a collective right of groups of peoples, because a group right can consummate the right of the individual at the level of society. Communication validates human equality, and contributes to discovery of truth and greater transparency, which is the key feature of accountability and the democratic progress of society as a whole. Communication fosters mutual understanding, tolerance and peace, which is the common good that the right to communicate seeks, and satellites and the Internet together enable increased opportunities for participation in such communication.

As observed in the recent networked social movements across the globe (2009-2014), it is when people communicate in society that the communication has the potential to become a political instrument through which issues are debated and public interest is generated. It is therefore crucially important for Internet governance to preserve its open and unrestricted design to combat oppressive use of the technology. Remote sensing principles, which do not require the sensing states to obtain prior consent of the sensed states, for example, support the human rights use of the sensing technology in detecting, documenting, and evidencing the human right violations in many politically and geographically closed regions of the world.

Articulation of the human right to communicate in international human rights law and telecommunications law will enhance mutual understanding and respect, and promote international cooperation among all participants in such communications. .

The main purpose of the Astrosociology Research Institute (ARI) is to develop astrosociology as a multidisciplinary academic field consisting of the social and behavioral sciences, humanities, and the arts. - www.astrosociology.org

Montreal Declaration

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The 2nd Manfred Lachs International Conference on Global Space Governance, held at McGill University, in Montreal, Canada, on 29-31 May 2014:

Having brought together over 120 experts from 22 countries (space-faring and non-space faring nations) involved in various aspects of space activity and regulation;

Having served as an objective venue for the conduct of international and interdisciplinary deliberations on different aspects and perspectives of global space governance;

Recognizing that the current global space governance system that was created during the 1960s and 1970s has not been comprehensively examined by the international community since its establishment;

Recognizing that the concept of global governance is comprehensive and includes a wide range of codes of conduct, confidence building measures, safety concepts, international institutions, international treaties and other agreements, regulations, procedures and standards;

Noting that numerous developments have occurred in the world in general, and the space sector in particular, with serious implications for current and future space activities and for the sustainable use of space for peaceful purposes for the benefit of all humankind (i.e. the global public interest in outer space),

Believing that the time has come to assess the efficacy of the current regime of global space governance and to propose an appropriate global space governance system that addresses current and emerging concerns;

HEREBY resolves by consensus to:

- call upon civil society, academics, governments, the private sector and other stakeholders to consider establishing a Working Group to prepare for and convene an international conference to deliberate and agree upon recommendations to governments and relevant international organizations aimed at the establishment of a global governance regime for peaceful and sustainable space exploration, use and exploitation for the benefit of all humankind;

Montreal Declaration (cont.)

- ensure that the proposed international conference is held as soon as possible with global participation by all key stakeholders (i.e., state and non-state actors) including: international intergovernmental organizations; relevant regional organizations; non-governmental organizations; appropriate state ministries (departments) and space agencies; academic institutions; appropriate commercial enterprises; and concerned individuals;
- call upon the McGill University Institute of Air and Space Law to take the lead in initiating, completing and broadly distributing through all forms of media, an international interdisciplinary study that examines drivers of space regulations and standards prior to, and in support of, the proposed international conference, targeting a global audience;
- ensure that the above-mentioned study examines, inter alia:

  (i) changing global economic, political and social conditions and space infrastructure dependence;

  (ii) identification and assessment of all known space threats;

  (iii) space opportunities and the need for sustainable and peaceful use, exploration and exploitation of space for all humankind;

  (iv) safety, technical and operational gaps to be filled; and

  (v) appropriate space governance standards, regulations, arrangement, agreements and institutions relevant to current and emerging issues of space activities.

Done in Montreal, this 31st day of May 2014.

Human Space Activity: The Spiritual Imperative

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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

Human Space Activity: The Spiritual Imperative (cont.)

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

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.

Human Space Activity: The Spiritual Imperative (cont.)

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

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 global9mind, a new layer addition to our planet on top of the geosphere and the biosphere. 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

Human Space Activity: The Spiritual Imperative (cont.)

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.

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

Human Space Activity: The Spiritual Imperative (cont.)

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?

Human Space Activity: The Spiritual Imperative (cont.)

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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.

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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.

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).

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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.

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

Editor's Note ***ARI staff, board members, and advisors regularly participate in a broad range of professional conferences, reflecting the inclusive nature of astrosociology. Each of our issues will feature one or more of these first-person "conference reports."***

Report on the 2nd SPACE Conference

Simone Caroti
Senior Research Scientist
Astrosociology Research Institute

Organized by the Scientific Preparatory Academy for Cosmic Explorers (SPACE), the 2nd SPACE Conference took place on Friday June 20th and Saturday 21st, 2014 at the Marriott Renaissance Orlando Airport Hotel in Orlando, FL. Over the course of those two days, a number of sessions were conducted, each belonging to one of the three categories into which the conference had been subdivided – Humanities, Technology, and Science. On Saturday, a Featured Speaker and Student Sessions were added to the mix.

I attended the Friday sessions. Therefore, I will limit myself to my impressions of that day. The venue, compact and well organized, was easily accessible to everyone, and the audio-video

support adequately met the requests of the various presenters. The atmosphere was at once professional and relaxed, pleasant enough to allow everyone to present, listen, and ask questions within a friendly context, something that greatly helped the exchange of ideas.

The most notable contribution of the day for the humanities, I thought, was Virgiliu Pop's "Space Settlement Versus Poverty Alleviation – A False Dilemma," which did exactly what the title promised: in twenty minutes of efficient presentation, Dr. Pop advocated "a paradigm change in the way space agencies address the public, not only by explaining the significant impact of space activities in their daily life, but also by dismantling the ill-conceived notion that space activities are an unaffordable expense and that priorities ought to lie elsewhere" (Quoted from the abstract). Through the effective use of graphic aids, flow charts, and raw data, Dr. Pop illustrated the misconceptions that lay at the heart of the space-vs-poverty-alleviation argument, boiling them down to three main problems stemming from the ironically high profile of the space program, especially in the U.S.:

1. The belief on the part of the public at large that federal expenditure for the space program is far higher than it actually is.

2. The tendency of other government programs to point at the space exploration and habitation budget in order to draw the public's attention away from their spending/budgetary requests.

3. The practice of using the space program as a scapegoat "to mask one's personal lifestyle" (Quoted from the presentation).

After Dr. Pop's presentation, it was my turn; the only thing I feel comfortable saying about my presentation on generational space travel as a viable option for human exploration/colonization is that it was kindly received and intelligently critiqued in the Q&A session. My interlocutors asked perceptive questions that opened up new areas of inquiry. I'll be busy in the near future.

Third and last for the humanities session was an offbeat, interesting presentation by Prof. Melih Zafer Arican of Bahcesehir University in Istanbul, Turkey. Prof. Arican teaches photography, and for the conference, he presented on the usefulness of photography in enhancing the effectiveness of public outreach on space-related matters – in bringing space closer to home, so to speak. The presentation was very effective, layman-friendly enough that someone like myself, who does not really know much about photography at all, could follow it and understand the basic concepts at its heart. Those concepts are the following: first, there are techniques for image manipulation and photo-shooting that can present images of space in any kind of desired light, thus allowing outreach programs and PR officials the chance to work out strategies for the best form of communication with the greatest visual impact, depending on such variables as venue, audience, topic, and context. Second, there are dedicated channels within our overall communications networks that can most effectively deliver the right images to the right audience (Prof. Arican referenced Marshall McLuhan's work in this context) and thus shape this

audience's perception of space. Third, editing the pictures, by which Prof. Arican meant the process of choosing, describing, and *naming* them (and here he used the example of the famous Pillars of Creation image from the Hubble Space Telescope), is of great relevance to the task of communicating their meaning in such a way as to stimulate public interest.

I approached the rest of the presentations, which belonged to the technology and science sessions, somewhat gingerly. My background is in literature and culture, and I often lose track of the argument as soon as numbers and/or technical language need to be used (which is hardly the fault of those delivering the presentation, of course), so I was concerned I might get lost on that day as well. It didn't happen, though, or at least it didn't happen to the extent I feared. The presenters were careful to deliver their arguments in a format that, while inevitably requiring a certain amount of technical language, was also discursive enough that even I could understand the gist of the matter at hand. Of particular interest to me was Dr. Shen Ge's presentation, "Asteroid Mitigation Technology – A Real Way to Deflect Asteroids." It was the presentation I could follow the most easily, probably because, besides Dr. Ge's effective public-speaking skills, the thought of a monstrous asteroid hitting the Earth tends to first attract and then retain my attention.

So, it was a good day, and a fruitful one. The only problem I saw is the usual problem, the one we struggle to solve because it is embedded in the very dynamics that have made necessary the creation of an organ like ARI in the first place: we were missing all the rest of the people.

Everyone in the room that day was a comprehensively educated, well-trained, bright professional in one or another space-related field, and therefore we were the ideal audience for the understanding and acceptance of the various messages broadcast in that context. However, precisely for this reason we were also the *wrong* audience in the sense that we were already predisposed to receive and accept those arguments. We need to find a way to attract inside that room (or an equivalent space anywhere else) people whose walk of life and general disposition do not trigger inside their minds any more thinking about space than that necessary to watch *Star Trek* at the Cineplex. *They* are the ones who need to know that NASA only receives 0.5% of the total federal budget, while programs like the F-35 go grotesquely over budget and over time (and result in a poorly designed aircraft). They are the ones to whom we need to say that generational space travel requires the development of the most advanced life-support and environmental systems we can devise, and they are the ones who need to see the right pictures through the right channels with the right titles. We do what we can with what we have, and to the extent that people in different subsets of the same field do need to talk to each other, initiatives like the SPACE Conference will always be necessary, but we need the rest of the people: cops, nurses, plumbers, cooks, bus drivers, drill sergeants, firemen, night managers at McDonald's, shoe salespeople, sommeliers, teachers, and radio announcers (complete the list as you prefer).

How, though?

About this Issue's Contributors

Xavier L.W. Liao is on faculty in the Political Science Department at the Ghent Institute for International Studies in Belgium. His research interests include space security, safety, and sustainability and the regional and international collaboration on space activities.

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Chris Brown, is a Space Law Researcher, Commercial Litigator, and Intellectual Property Attorney. He serves on the Space Law Project Group of the Space Generation Advisory Council to the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS). He is also a Team Member, of the American Bar Association, Air and Space Law Section. He is currently with the law firm of Trenam Kemker P.A., in Tampa, Florida.

Sayuri Tanaka Dijkwel received his LL.M. in Air and Space Law from the University of Mississippi School of Law. His research area is in global information technologies.

Madhu Thangavelu is an astronautical engineer and architect. His research focus in on extraterrestrial development and in articulating a philosophy of space. He also leads the graduate Space Exploration Architectures Concept Synthesis Studio in the Department of Astronautical Engineering at the Viterbi School of Engineering and advises graduate students at the University of Southern California's School of Architecture. He is a member of the Board of Editors for the *Journal of Space Philosophy*.

Simone Caroti is adjunct faculty in the English Department at Purdue University. His research focus is on the study of science fiction, both as a literary mode in its own right and as a reflection on the variables inherent in the human adventure in space. He currently serves as an Officer, Board Member, and Senior Research Scientist with the Astrosociology Research Institute with the goal of linking science fiction to the broader field of astrosociology.

Notes from the CEO

Jim Pass, Ph.D.

Contributions to this Issue

The focus of this issue on *global space governance* is timely, as it addresses an increasingly important area of policymaking and research. It follows the conference sponsored by the Institute of Air and Space Law at McGill University called the *2nd Lachs International Conference on Global Space Governance* that occurred May 29-31, 2014. We are pleased that contributors have heeded our call to contribute articles in this area. They include Chris Brown (space law), Xavier L.W. Liao (global space governance), Sayuri Tanaka Dijkwel (space law and telecommunications governance), and Madhu Thangavelu (engineering and architecture).. Such scholarship is necessary to address not only forms of cooperation among nations, but also patterns of inequality between space-capable nations and those dependent upon them. This is an important area simply because space is playing an increasingly important part in both the affairs of nations and the everyday lives of individuals. Jeffrey S. Lee and Simone Caroti also offer interesting contributions covering other astrosociological areas.

Astrosociology in the Classroom

Now that our newsletter enjoys a larger readership than existed when the first issues came out, I feel it is important to reissue an excerpt from this newsletter's first issue. Education and related research efforts exist at the very heart of ARI's mission to develop astrosociology as an academic field. With this in mind, it is important to understand the purpose, intended implementation, and scope of ARI's *Astrosociology in the Classroom* program. Our organization still pursues many of the objectives described below. Furthermore, much progress has occurred behind the scenes, which will soon become apparent.

> *On many levels, the development of astrosociology has progressed markedly since it was first introduced in 200[4]. From 200[4] to mid-2008, the efforts aimed at developing and popularizing this academic field have focused on conference presentations and publications, mostly within the space community. The incorporation of ARI in 2008 began a transition to a new mission.*
>
> *There are three prongs to the Astrosociology in the Classroom program: (1) get astrosociological materials into classrooms, even if they are social science and humanities courses at first, (2) create workshops and classes devoted to*

Notes from the CEO (cont.)

astrosociology, and (3) expand to astrosociology programs, and eventually departments. For now, we will concentrate on the first two objectives.

Thus, this program is intended for the physical and natural sciences in addition to the social and behavioral sciences, and the humanities. Placement of materials is intended for a variety of different subject matters: sociology or social psychology classes, history classes, and astronomy or aerospace engineering classes. Demonstrating the relevancy of astrosociology to various subjects serves as a major theme of the program.

We want you to assist us. If you are a teacher or professor, add materials to your syllabus. We encourage you to develop your own materials and share them with us. You can use the resources in the Virtual Library. If you are a student, encourage your teachers/professors to add astrosociological materials. Attempt to gain approval from your teachers/professors for reports, theses, and dissertations.

We have made great strides since 2008 during a climate of economic downturn and slow recovery. As a nonprofit organization, ARI can only move as quickly to achieve these objectives as our supporters and contributors participate in our programs. Thus, the *Astrosociology in the Classroom* program can benefit greatly from your donations of astrosociology-related teaching materials. Students are very important to us, of course, but so are teachers at various levels.

The Journal of Astrosociology (JOA)

Another big step in ARI's growth is coming soon. Publication of the first issue of our new academic journal will occur in the fourth quarter of 2014. *The Journal of Astrosociology* represents an important additional forum for the discussion of important astrosociological issues. Remember, astrosociology is a multidisciplinary field. I encourage those of you interested in space and in the social and behavioral sciences, humanities, and the arts to support our efforts. Additionally, we invite those in the physical and natural sciences to pursue interdisciplinary efforts in support of astrosociology that incorporate concepts from this "other" branch of science. One major way to do this is to submit articles for The JOA and this newsletter when our Calls go out.

ARI Welcomes Three New Additions

The people associated with our organization are vital to its success. It is gratifying that our efforts continue to attract quality individuals to various aspects of our organization. In this vein, we are happy to report that three new people have joined ARI. We are pleased to announce that Elizabeth Lockard and Ken Duffy have joined the Board of Advisors and that Geoffrey Notkin is the most recently confirmed member of our Board of Directors. All these individuals are top

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Notes from the CEO (cont.)

quality people and we look forward to their great contributions in the years ahead.

Contact Me if You Can Help

If you wish to assist our organization move forward in our plans more quickly and decisively in other way, please visit our website at http://www.astrosociology.org and/or send me a message at *jpass@astrosociology.org.* All of us at ARI would greatly appreciate any assistance you can provide to assist in the furtherance of our mission to bring the human dimension more prominently into the discourse and practice within the space community. ARI focuses on astrosociology education and research, and we hope you become involved with our efforts.

" As a nonprofit organization, ARI can only move as quickly to achieve these objectives as our supporters and contributors participate in our programs. ."