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BEYOND EARTH'S GLOBALIZATION: SOCIOLOGY OF OUTER SPACE?

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ABSTRACT. This paper raises the possibility of a sociology of outer space that examines the spatial turn and the turn to space in recent sociology. Rapid developments in space technology, travel and colonization now raise a set of questions about the extension of the spatial turn in sociology to outer space, to a space and territory no longer tied to earth's limits. A significant theme in the sociology of outer space is how space-time compression is conceptualized outside of the frame of planet Earth to describe the overcoming of the friction of distance with new forms of space travel, transportation and communication and the extent to which new technologies driving and associated with the globalization of postmodern capitalism are generating new extra-world spatialities as an extension of Earth-bound economic and political processes. In this context, the paper also briefly records and examines the shift from the "Space Race" to space commercialization.

Keywords: outer space; sociology; globalization; Earth; space commercialization

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The Spatial Turn and the Turn to Space

English-speaking sociology took the spatial or topological turn in the 1980s following the translation of Henri Lefebrve's work, especially *The Production of Space* (1991, orig. 1974), and its popularization and development by the critical geographer David Harvey. Harvey wrote the Afterword and was one of a number of geographers who in the tradition of Jane Jacobs had studied the spatiality and geopolitics of urban form embracing Lefebrve's "rights to

the city." At the same time, the production of space was aided by the translation of other French thinkers on aspects of the significance of space like Gaston Bachelard and Michel de Certeau. Michel Foucault's seminal essay "Of Other Spaces" (1991, orig. 1967) declared the twentieth century "the age of space." This movement gathered momentum with the publication of works that extended Marxist spatial theory by Manual Castells, Edward Soja and Doreen Massey who developed conceptions of lived space, place-relateness and relational theories of space with a focus on what Harvey (1991) called "time-space compressions" as a means of understanding "flexible accumulation" and the transition to a postmodernity governed by new phases of neoliberal globalization. It is not too much of a stretch to say that the spatial turn in sociology constitutes the new interdisciplinary paradigm in the opening decades of the twenty-first century.

The underlying notion of space developed in these studies was a geographical and architectural concept that was made up of a phenomenological experience of space with attention to spatial practices and representations of space. Its ontological status was defined geographical by the limits of the earth and to that extent still reflects a Euclidean geometry of place even if multiscalar surpassing national boundaries and limits. Information system analysis provides some more dynamic non-linear systems complexity but to all intents and purposes humanist studies seem oddly constrained by constructivist notions at the expense of physical concepts emphasizing "space-time."

The spatial turn in modern sociology is predicated upon the geographical limits of the planet Earth, the third planet from the Sun and the fifth largest, and the only one in our solar system capable of sustaining life. The emergence of the concept of the planet Earth is itself an evolving story. It was not until the time of Copernicus in the 16th century that the major shift from a geocentric to a heliocentric universe took place yet it was not until the twentieth century that a map of the entire was produced, of inestimable help in weather modeling and prediction.

Rapid developments in space technology, travel and colonization now raises a set of questions about the extension of the spatial turn in sociology to outer space, to a space and territory no longer tied to earth's limits. The sociology of outer space comprises but is not confined to:

- the prehistory of space exploration;
- representations of space in popular science and culture;
- the development of space technologies and the "space race";
- the development of the international legal infrastructure governing space;
- the emergence of space law;

- the establishment of space treaties and agreements, the militarization of space;
- "Spaceship Earth" and the ecological limits of development;
- the commercialization and privatization of space travel and space technology;
- the colonization of space, and the economic exploitation of space;
- the study of possible aliens life-forms and "first contact."

A significant theme in the sociology of outer space is how space-time compression is conceptualized outside of the frame of planet Earth to describe the above activities as a means of overcoming the friction of distance with new forms of space travel, transportation and communication and the extent to which new technologies driving and associated with the globalization of postmodern capitalism are generating new extra-world spatialities as an extension of Earth-bound economic and political processes. In one sense then the sociology of outer space represents an uneven extension and logic of development that projects on space as an almost empty canvass a continuation of nationalist and regional world power constellations and alliances together with a myriad of scientific collaborations and agreements. In this environment it is necessary to make the distinction between geospace (the region of space closest to the Earth), cislunar space (the region extending beyond Earth to the Moon), interplanetary space (the space around the Sun and planets of the solar system), interstellar space (the physical space within a galaxy), and intergalactic space (the physical space between galaxies).

Sociology of space might also make room for a serious study of alien life forms. Aliens once the preserve of the unhinged has becomes a topic of serious debate with the noted theoretical physicist Stephen Hawking remarking that humanity should be wary of actively seeking contact with alien civilizations. In a recent documentary he suggests that one day we might receive a signal from a planet "But we should be wary of answering back. Meeting an advanced civilization could be like Native Americans encountering Columbus. That didn't turn out so well."[1] Despite these reservations Hawking is part of a new search for intelligent life called Breakthrough Listen, a project that will survey a million stars in the Milky Way.[2] What is the sociology of intelligent life beyond Earth as a kind of first contact study? This is an important question that integrates colonization and postcolonial studies with an anthropology of outer space.

While the UN Committee on the Peaceful Uses of Outer Space (COPUOS) has worked to develop laws that in effect created outer space as a "global commons" free from existing political borders or sovereign claims Jason Berry (2016) demonstrates that "the status of outer space and orbits as beyond sovereign territories is a result of political contestation over the understanding

of physical properties of outer space and Earth."[3] As a common property resource outer space was once the preserve of government monopoly of the launch powers but now, with the advent of private companies, space manufacturing, exploration, travel, and satellite communications has become increasingly open to commercialization with huge implications for the world economy and the distribution of wealth.

From the "Space Race" to Space Commercialization

The "space race" of the late twentieth century was dominated by the competition between the world's two super powers that had its origins in the nuclear arms race spurring the development of satellite technology, space probes of neighborhood planets and human spaceflight. Much of the space race can trace its development to Germany in the 1930s and Werhner von Braun's ballistic missiles and V2 rocket program. The Soviet Union put the first Sputnik into orbit in 1957 and the first human in space in 1961. This phase all but ended with the US achieving the first moon landing in 1969 which was followed by a period of detente and the joint Apollo-Soyuz cooperation in the 1970s.

The first space treaties date from the signing of the 1959 UN Committee on the Peaceful Uses of Outer Space and The Outer Space Treaty of 1967 that forms the basis of international space law, significantly banning the orbit of weapons of mass destruction but not of convention weapons. The UN Office of Outer Space Affairs indicates that currently five treaties comprise the international legal infrastructure that

> deal with issues such as the non-appropriation of outer space by any one country, arms control, the freedom of exploration, liability for damage caused by space objects, the safety and rescue of spacecraft and astronauts, the prevention of harmful interference with space activities and the environment, the notification and registration of space activities, scientific investigation and the exploitation of natural resources in outer space and the settlement of disputes (http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties.html).

The National Aeronautics and Space Administration (NASA) was established on October 1, 1958 as a direct result of the pressures of national defense. During its first twenty years NASA conducted human space flight initiatives aimed at space survival, operations (rendezvous, docking) and Moon exploration, robotic missions to Venus, Mars and outer planets, aeronautics research to enhance air transport safety, reliability, efficiency, and speed, remote sensing for information gathering, and applications satellites for com-

munication and weather, establishment of the orbital workshop and reusable Shuttle spacecraft.

The full list of government space agencies categorizes some 80 space agencies in terms of manned lunar exploration (space station, manned flight, extraterrestrial probes), stations, satellites with some 14 agencies with launch capability and four only with human spaceflight capability and lunar soft-land capability.[4] There are expected and proposed space agencies including initiatives that are Pan-Arab, African, South American, Philippine and Sri Lanka.

There are today some 70 government space agencies while only 13 have space launch capability.

> Six government space agencies – the Indian Space Research Organisation (ISRO), the European Space Agency (ESA), the China National Space Administration (CNSA), the Japan Aerospace Exploration Agency (JAXA), the National Aeronautics and Space Administration (NASA) and the Russian Federal Space Agency (RFSA or Roscosmos) have full launch capabilities; these include the ability to launch and recover multiple satellites, deploy cryogenic rocket engines and operate extraterrestrial probes. Only three currently operating government space agencies in the world - NASA, the RFSA, and the CNSA – are capable of human space-flight as of 2016. https://en.wikipedia.org/wiki/List_of_government_space_agencies

The commercial use of space dates from the Telstar satellites launched by AT&T and Bell Labs in 1962 that transmitted live television and other data. During the 1960s weather and communications satellites were launched. Commercial spaceports and over 200 launches occurred in the late 1990s (to 2002) together with rapid growth of satellite manufacture and maintenance of satellite subscription services, imagery, navigation and tourism. More recently start-up companies have been established for the recovery of asteroid minerals and the mining of raw materials in outer space prompting fears of a lunar landgrab. A report by the Tauri Group found that startups have attracted over $13.3 billion of multiple types of investment since 2000, including seed ($1.3 billion), venture capital ($2.9 billion), public offering ($23 million), and debt financing ($5.1 billion).[5]

Commercialization of space is a topic of increasing sociological interest. One background paper for a conference at King's College "Commercial-isation of space: *Opportunities and Challenges*" in 2013 explains:

> Space commercialisation covers a breadth of space related tech-nologies, capabilities and services, both space-based as well as ground-based, that are generally exploited to generate revenue by governments and aerospace companies. Much of the space capabil-

> ities developed so far are beginning to be exploited not only commercially as multi-national companies have expanded their business activities but also for humanitarian applications such as alleviation of poverty and diseases and management of refugees resulting from droughts and conflicts for which space capabilities could be used by appropriate United Nations agencies (p. 1).

It includes a set of questions for discussion that include:

- An overview of space commercialization;
- Communications satellites/location based services;
- Commercial Insight and Geospatial Intelligence – developments and opportunities;
- Cyber security of critical space-derived data;
- Manufacturing space industry: *Launchers, satellites, ground facilities*;
- Space transportation: *World launchers, launch sites and launch market, and cost (launchers and launch service)*;
- Space tourism: *Prospect of suborbital flights and the nature of longer orbital travels*;
- Legal issues: *Use of satellite imagery in civil court, export controls (MTCR, ITAR), interference with and jamming of satellite signals, space debris, shortage of radio frequencies and orbital positions, militarization and weaponization of space, etc.;*
- Ethics of space commercialization;
- Future: Cooperation or competition?

Elon Musk is the CEO and founder of SpaceX established in 2002 with the goal of developing low-cost space travel to enable the colonization of Mars through the facility of reusable Falcon launch vehicles. SpaceX was the first privately funded company to successfully launch a spacecraft into orbit in 2010 and to achieve a successful vertical landing in 2015. In 2016 Musk announced the Interplanetary Transport System that is designed for inter-planetary colonization using reusable launch and spacecraft vehicles planned for the early 2020s. The Mars Colony concept would begin with ten people and eventually grow to support a population of a million people in a self-sustaining community.

Virgin Galactic advertises itself in the following terms “Our purpose is to become the spaceline for Earth; democratizing access to space for the benefit of life on Earth.”[6] The company website claims that “Exploring Space Makes Life Better on Earth”:

> Modern life would be unrecognizable without satellites. Meteorologists make life-saving weather predictions. Humanitarian organizations track the movements of genocidal military forces and coordinate relief efforts after national disasters. Farmers improve

> crop yields, and governments monitor and prevent illegal fishing and logging. Scientists and policy makers learn the answers to key questions about our planet's climate.
>
> But satellites are not sufficient: we as a species also dare to push new boundaries. Perhaps it is in our culture, perhaps it is in our DNA, or perhaps it is a bit of each of those, but we humans seem hardwired to explore. Not all of us feel it, but so many people today and in the past have felt an irresistible urge to see for themselves what lies just beyond the horizon.[7]

The NZ Space Agency is the latest to join those nations with space launch capability. The NZ government has introduced a new regulatory regime for space including the Technology Safeguards Agreement (TSA) bilateral treaty with the US, UN Convention on Registration of Object Launched into Outer Space, and signing a contract authorizing Rocket Lab's space activities from New Zealand's Mahia Peninsula which will include the first commercial space launches from New Zealand in late 2016.[8] The global space economy is seen as offering NZ substantial benefits:

> A New Zealand-based space industry not only builds our capacity and expertise in space activities, but also provides opportunities to apply the associated advanced technologies to a range of down-stream applications as diverse as more reliable telecommunications, more advanced climate data modelling and environmental research.[9]

The Sapere report (Morre et al., 2016) entitled "Economic Impact Analysis of the Development of a Rocket Industry in New Zealand" provides an analysis of Rocket Lab's launch venture and its low cost launch services for small satellites with the prospect of enhanced scale-up capacity, employment in the supply-chain industries, cluster effects in satellite technology, knowledge and technology spillovers, human capital development and prestige. As the report suggests citing the OECD (2014) there is a strong trend toward the globalization of the space sector representing an estimated economy of in excess of some $256 billion with growing Earth observation, environment, weather, communications, GPS and surveillance applications.

Rocket Lab's aim as a company is:

> to remove the barriers to commerce in space. It was founded on the belief that in order to make space a place where commerce can thrive, two fundamental aspects must be addressed: a dedicated service for small satellites at an affordable cost, and a launch frequency that enables regular access to space. Since its foundation in 2007, Rocket Lab has delivered a range of complete rocket systems and technologies for fast and low-cost payload deployment.[10]

The Electron launch vehicle is 16m long with a lift-off mass of 10.5 tonnes and the Rutherford engine uses new electric propulsion cycle manufactured through 3D printing for all major parts.

Already the US House of Representatives has passed the "Space Resource Exploration and Utilization Act of 2015" (H.R. 1508) to establish a legal framework to govern property rights of resources obtained from asteroids enabling this new industry and providing clarity for future entrepreneurs. This legislation is enabled to "facilitate the commercial exploration and utilization of space resources to meet national needs," to "discourage government barriers to the development of economically viable, safe, and stable industries for the exploration and utilization of space resources in manners consistent with the existing international obligations of the United States," and "to promote the right of United States commercial entities to explore outer space and utilize space resources, in accordance with the existing international obligations of the United States, free from harmful interference, and to transfer or sell such resources."

Conclusion

The Spatial Turn and the Turn to Space: Sociology needs to address the changes to concepts of space outside the "space-time" compression that is currently the dominate reading of neoliberal capitalism and globalization to examine more closely the extension of global politics and space capitalism in outer space where national boundaries are less related to concepts of national and global territory and more constituted in legal definitions, treaties and agreements. The Earth-bound notion of space represented in sociology recently also requires reexamination in terms of its applicability to outer space.

From the "Space Race" to Space Commercialization: A significant shift in terms of resources, funding, research and politics has taken place with the commercialization and privatization of space. New research needs to map the emerging constellations of private-public consortia, the resource scramble, space colonization and space manufacturing. There is considerable room for a newly conceptualized concept of sociology of outer space.

NOTES

1. See http://www.space.com/8288-aliens-exist-stephen-hawking.html

2. See http://www.space.com/29990-stephen-hawking-intelligent-alien-life-initiative.html and see also http://www.space.com/9788-search-intelligent-life-4-key-questions.html

3. *Space Policy* is an international and interdisciplinary journal that provides "analysis of space activities in their political, economic, industrial, legal, cultural and social contexts," see http://www.journals.elsevier.com/space-policy/

4. See https://en.wikipedia.org/wiki/List_of_government_space_agencies; see also http://pillownaut.com/spacemap/spacemap.html

5. See http://www.space.taurigroup.com/news/start-up-space.html

6. See http://www.virgingalactic.com/human-spaceflight/

7. See http://www.virgingalactic.com/why-we-go/

8. See https://www.rocketlabusa.com

9. See http://www.mbie.govt.nz/info-services/sectors-industries/space

10. See http://www.rocketlabusa.com/rocket-lab-usa-poised-to-change-the-space-industry

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