



HAL
open science

The Question Concerning Technology in a Rocket Age in China and the West

Brad Tabas

► **To cite this version:**

Brad Tabas. The Question Concerning Technology in a Rocket Age in China and the West. Doctoral. Séminaire Cultures visuelles et matérielles, Lille, France. 2024. hal-04689781

HAL Id: hal-04689781

<https://hal.science/hal-04689781v1>

Submitted on 6 Sep 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

The Question Concerning Technology in a Rocket Age in China and the West

I remembered the farming proverbs that Grandpa used to tell us: “Plant the eggplant deep and plant the leek shallow”; “keep the leek away from rain and keep the chives away from the sun”; “leek lives through coldness and garlic lives through drought.” He always said that those simple words contained thousands of years of collective wisdom.

Yet those proverbs no longer worked in space. Even my college astrobiology textbooks seemed outdated considering all we had learned in the past few years. In space, where everything was unfamiliar, humans who relied so much on previous experience were back to taking baby steps.¹

“So, without the telling, the rocks and plants and animals go on all right. But the people don’t. People wander around. They don’t know a mountain from its reflection in a puddle. They don’t know a path from a cliff. They hurt themselves. They get angry and hurt each other and the other things. They hurt animals because they’re angry. They make quarrels and cheat each other. They want too much. They neglect things. Crops don’t get planted. Too many crops get planted. Rivers get dirty with shit. Earth gets dirty with poison. People eat poison food. Everything is confused. Everybody’s sick. Nobody looks after the sick people, the sick things. But that’s very bad, very bad, eh? Because looking after things, that’s our job, eh? Looking after things, looking after each other. Who else would do it? Trees? Rivers? Animals? They just do what they are. But we’re here, and we have to learn how to be here, how to do things, how to keep things going the way they need to go. The rest of the world knows its business. Knows the One and the Myriad, the Tree and the Leaves. But all we know is how to learn. How to study, how to listen, how to talk, how to tell. If we don’t tell the world, we don’t know the world. We’re lost in it, we die. But we have to tell it right, tell it truly. Eh? Take care and tell it truly. That’s what went wrong. Down there, down there in Dovza, when they started telling lies. Those false maz, those big munan, those boss maz. Telling people that nobody knew the truth but them, nobody could speak but them, everybody had to tell the same lies they told. Traitors, usurers! Leading people astray for money! Getting rich off their lies, bossing people! No wonder the world stopped going around! No wonder the police took over!”²

1. Two Spirits

This paper deals with the spirit of astrocolonialism in China and the West. It explores how a spiritual or moral visions of a future in outer space justify imperial ambitions associated with the exploitation of space in the present. By exploitation of space I have in mind that which follows space exploration. Space becomes exploitable when technologies begin to function in such a way as to exploit the planetarity of the planet, its location in space. Space exploitation makes a difference in society, if this difference need not necessarily be neo-colonial in the sense of maintaining or augmenting inequalities. Yet it can be so, and in the present moment it is so, thanks to the uneven development of extra-global space. I will show that the uneven development of space is currently fueled by astrocolonial ideologies which suggest that current inequalities will be redeemed and hence justified once humankind expands out into space. It is these ideologies that I have in mind when I write about the spirit of space exploitation.

¹ Qiufan Chen, "Space Leek," *Slate.com* (June 2019). <https://slate.com/technology/2019/06/space-leek-chen-qiufan-stanley-chen.html>.

² Ursula K. Le Guin, *The Telling* (New York: Harcourt, 2000), 134-5.

This essay is a work of comparative astroculture. I consider Western astrocolonialism as well as Chinese astroimperialism. I aim to demonstrate that despite fundamental philosophical differences with regard to what the Hong Kong philosopher Yuk Hui, in his essay *The Question Concerning Technology in China*, calls cosmotechnics, the differing ways in which each culture configures the fourfold relationship between “gods, technics, humans, and the cosmos,” both Chinese and Western moral arguments for expanding space exploitation remain exploitative.³ They possess a dimension whereby moral arguments with respect to future states of affairs are used as justifications for present abuses and exploitations. They remain caught within the same imperial power matrix which has long justified colonial expansion in the name of the moral betterment of the exploited and dominated. One might say that they exploit moralism as a means of achieving immoral ends. A secondary aim of this essay is to explore more precisely how and why this happens. I hypothesize that there is a common limit to received versions of Chinese and Western cosmotechnics as approaches to thinking about the moral dimension of the deployment of technologies when it comes to outer space. My guiding hypothesis is that both Chinese and Western thought remain implicitly global. They think of the sphere of human activity as restricted to the surface of the globe in such a way that there is a quasi-transcendental distinction between the spheres of terrestrial things—the Earth in Western thought, the Ten Thousand Things in Chinese thought—that does not apply in a planetary age; and age of space exploitation. This shift from globe to planet affects the interpretation of these two foundational terms within each culture’s cosmotechnics, meaning that the relationship between the spirit and the letter in both cases needs to be shifted away from what it would have been when space exploitation could not be taken literally. It is the exploitation of this gap between the spirit and letter that constitutes, so I argue, the spirit of space exploitation both in the United States and in China. Recognizing this tendency of inherited cosmological language to be exploitable by astrocolonialism is in no way a critique of space exploration or even of limited forms of space exploitation. It is a critique only of our inherited relationship to the fundamental terms in Eastern and Western cosmotechnics.

2. The Spirit of Space Exploitation in the West

Space expansionism is often accused of being colonial, even astrocolonial.⁴ This is obviously true: many space exploitation advocates explicitly advocate settling Mars, building space

³ Yuk Hui, *The Question Concerning Technology in China: An Essay in Cosmotechnics* (Cambridge, MA: MIT Press, 2016).

⁴ Alina Utrata, "Engineering Territory: Space and Colonies in Silicon Valley," *American Political Science Review* (2023), <https://doi.org/10.1017/S0003055423001156>, <https://www.cambridge.org/core/product/5D6EA4D306E8F3E0465F4A05C89454D6>; Alessandra Marino, "Astroenvironmentalism as SF: Bordering (and Ordering) Otherworldly Ecologies," *Environmental Humanities* 15, no. 1 (2023), <https://doi.org/10.1215/22011919-10216140>, <https://doi.org/10.1215/22011919-10216140>; William Lempert, "From Interstellar Imperialism to Celestial Wayfinding: Prime Directives and Colonial Time-Knots in SETI," *American Indian Culture and Research Journal* 45 (January 01, 2021 2021), <https://doi.org/10.17953/aicrj.45.1.lempert>, <https://ui.adsabs.harvard.edu/abs/2021AICRJ..45...45L>; Nathalie Trevino, "Coloniality and the Cosmos," in *The Routledge Handbook of Social Studies of Outer Space*, ed. Juan Francisco Salazar and Alice Gorman (New York: Taylor & Francis, 2023); A. Mitchell et al., "Dukarr lakarama: Listening to Guwak, talking back to space colonization," *Political Geography* 81 (2020/08/01/

colonies, and taming the ‘final frontier,’ all tropes unrepentantly drawn from the history of settler colonialism. Yet as Daniel Deudney put it, in only a slight overstatement, astrocolonialism understands itself as a “colonialism without imperialism and without guilt.”⁵ There are many reasons why astrocolonialism can seem innocent. As Stewart Brand put it all the way back in the 1970’s, off Earth, there are “no space natives” to be colonized.⁶ Yet in its most recent form, which is particularly associated with theories of existential risk and the philosophy of Effective Altruism, the moral case for space expansionism not only involves an absence of future harms, but even seems to promise a redemption of the past ills, including those ills created by the colonial past. In this way, at the essence of the new astrocolonialism is a moral argument for saving everything—including the idea of colonialism itself. This total redemption of the past ills via space expansionism follows when we accept a seemingly banal argument: we ought to morally act in such a way as to ensure that in the future there will be the greatest quantity and duration of life (possibly but not necessarily human) in the cosmos.

Accepting this principle yields what might be called white colonialism, white not so much for its obvious debts to the colonial rationality of Caucasian Europeans, but rather white because it constituted a whitened version of colonialism, one that integrates and overcomes a certain range of critiques of colonialism and coloniality, dialectically subsuming those critiques of global colonialism into an argument for interplanetary colonialism. In order to bring out this dimension in the spirit of astrocolonialism, it is thus helpful to briefly fill in the case against the older form of colonialism, which if we wish we might align with the spatial revolution brought about by the discovery of the exploitability of the seas.⁷ As a guiding thread let us take here Donna Haraway’s notion of the Plantationocene Donna Haraway. She employs this term as a kind of synonym for the Anthropocene, but one which puts particular emphasis on “the devastating transformation of diverse kinds of human-tended farms, pastures, and forests into extractive and enclosed plantations, relying on slave labor and other forms of exploited, alienated, and usually spatially transported labor” which derived from European colonialism.⁸ We might take the Plantationocene hypothesis as a particular way of structuring and articulating moral blame for the problems of the

2020), <https://doi.org/https://doi.org/10.1016/j.polgeo.2020.102218>, <https://www.sciencedirect.com/science/article/pii/S0962629818304086>; Mary-Jane Rubenstein, *Astrotopia: The Dangerous Religion of the Corporate Space Race* (Chicago: University of Chicago Press, 2022); Deondre Smiles, "The Settler Logics of (Outer) Space," *Society + Space* (26 October 2020). <https://www.societyandspace.org/articles/the-settler-logics-of-outer-space..>

⁵ *Dark skies : space expansionism, planetary geopolitics, and the ends of humanity* (New York, NY: Oxford University Press, 2020), 347.

⁶ Stewart Brand, "Comments on O'Neill's Space Colonies," in *Space Colonies*, ed. Stewart Brand (San Francisco: Whole Earth Catalog, 1977).

⁷ The term spatial revolution was first introduced into the literature by Carl Schmitt. It plays a critical role in his account of how the English domination of the seas changed the face of European politics over the course of the global colonial age, changing the very significance of spatial terms within the continent's political imaginary. See: Carl Schmitt, *Land und Meer: eine weltgeschichtliche Betrachtung* (Stuttgart: Klett-Cotta, 2008), 55-7.

⁸ Donna Haraway, *Staying with the Trouble : Making Kin in the Chthulucene* (Durham: Duke University Press, 2016), 206. Also relevant with respect to the links between colonization and environmental destructiveness is the work of Ferdinand. Malcolm Ferdinand, *Une écologie décoloniale: Penser l'écologie depuis le monde caribéen* (Paris: Seuil, 2019).

present. By spreading European modes of being around the globe, the coming of the Plantationocene sapped the vital forces of our planet, placing us in a situation of existential risk with regards to the future habitability of the planetary system. Plantations were a manifestation of productivist and growth-oriented techno-capitalism. They were also vectors of what Crosby called ecological imperialism, insofar as they uprooted local flora and fauna, frequently driving them into extinction, all in the service of planting unsustainable crops that were deemed either superior, more productive, or both.⁹ A similar process occurred at a cultural level. Local cosmotechnics-- one thinks of the efforts of the American education system's efforts to "kill the Indian and save the man"—stripped colonized people of ways of being that had co-evolved with their environments and replaced them with the Western modes of being that had, in their unsustainability, prompted colonization in the first place.¹⁰ Along with these ravages to cultural heritage, local institutions were also destroyed, Sylvia Federici, for example, has explored how sustainably managed common pool resources were first privatized and then ruthlessly exploited as part of colonization and its aftermaths.¹¹

One of the focuses of more recent theoretical work on the history of colonization has been to focus on what is called Mignolo and others have called coloniality, which is to say the continuing power of the nexus of often moral reasons which emerged to justify the colonization of the globe, and which still defend certain values—progress, development, and growth, for example—which demonstrably contributed to the spread of the Plantationocene and which have revealed themselves to be complicit in generating “poverty, misery, inequities, injustices, corruptions, commodification” around the globe.¹² Supplementing the above three concepts at the core of the spirit of astrocolonialism, it is worth mentioning a few other thought figures first employed in the service of global colonization. One of the most derided is the so-called *terra nullius* doctrine. This alleged that lands which were (in fact) inhabited were empty, available for appropriation by Western settlers. Similarly odious were racial doctrines. These suggested that some human beings were less human than others, and so were either rightly exploited, or, more ‘humanely,’ were rightfully submitted to various sorts of disciplinary procedures aimed rendering them better subjects of global capitalism. Yet perhaps the strongest, or at least the most currently vital line of argumentation emerging from the colonial experience is existential risk thinking.

The employment of the term existential risk here is anachronistic: the first theories of existential risk emerged in the immediate aftermath of the discovery of the atomic bombs

⁹ Alfred Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900-1900* (New York: Cambridge University Press, 2004).

¹⁰ Ned Blackhawk, *The Rediscovery of America: Native Peoples and the Unmaking of U.S. History* (New Haven: Yale University Press, 2023), 487.

¹¹ Silvia Federici, *Re-Enchanting the World : Feminism and the Politics of the Commons*, ed. Peter Linebaugh (Oakland, CA: PM, 2019).

¹² Walter Mignolo, *The Darker Side of Western Modernity: Global Futures, Decolonial Options* (London: Duke University Press, 2011), loc. 501.

with their potential for bringing about mutual annihilation scenarios.¹³ Yet it is easy to show that the analyses of Thomas Malthus, which later came to be employed by existential risk thinkers, particularly with respect to notions such as the limits to growth, were used in ways resembling their later employments by existential risk thinkers by those interested in making a moral case for colonialism. As is well known, Malthus had argued that “the power of population is indefinitely greater than the power in the earth to produce subsistence for man,” insisting that at a certain point, if population is not kept in check, the “food necessary to the life of man” would run out, and mass starvation would ensue.¹⁴ Cecil Rhodes, one of the key agents in expanding the English colonial empire across Africa, made this argument into a moral case for imperialism as follows:

“I was in the East End of London yesterday and attended a meeting of the unemployed. I listened to the wild speeches, which were just a cry for ‘bread,’ ‘bread!’... My cherished idea is a solution for the social problem, i.e., in order to save the 40,000,000 inhabitants of the United Kingdom from a bloody civil war, we colonial statesmen must acquire new lands to settle the surplus population, to provide new markets for the goods produced in the factories and mines. The Empire, as I have always said, is a bread and butter issue. If you want to avoid civil war, you must become imperialists.

For Rhodes, the way of addressing the Malthusian problem of having limited food for a growing and hungry English population was simple: colonialism. Taking resources from other countries to compensate for the ecological limits of the English landmass was thus a means of saving the rich from the poor and the poor from starvation. Colonialism saved lives. It was also—obviously—a means of maintaining an unsustainable form of what Mészáros has called the “social reproductive metabolism” of the home country.¹⁵ One can find a similar if slightly modified line of moral reasoning operating at the interstate level. For the German geopolitician Friedrich Ratzel, the Darwinian aspects of human nature as they manifested themselves in nation’s quests for growth implied that peoples were condemned to violent conflict. The only way of avoiding this conflict—again saving lives—was to find free *Lebensraum*, the famous *terra nullius*, in which to expand.¹⁶ Of course, the normal and persuasive critique of all of this points out that the territories into which these European nations expanded in order to save lives from existential catastrophe were precisely not empty, with the end result of these misguided efforts at saving lives through expansion being the dawn of the global Plantationocene, an era in which, to quote Kohei

¹³ As various histories of existential risk have pointed out, the concept of existential risk is relatively recent, being primarily developed in a post-Atomic context. Yet it is far from misleading to insinuate that the sources of existential risk discourse, and particularly the notion that it is morally imperative to avoid existential risks by taking into account the well-being of future people, owe a significant intellectual debt to these earlier justifications for expansionism. On the history of existential risk theory see: Thomas Moynihan, *X-risk : how humanity discovered its own extinction* (Falmouth, United Kingdom: Urbanomic, 2020); Émile Torres, *Human Extinction: A History of the Science and Ethics of Annihilation* (New York: Taylor & Francis, 2023).

¹⁴ *An Essay on the Principle of Population and Other Writings*, ed. Robert Mayhew (New York: Penguin Books, 2015), 16.

¹⁵ Istvan Mészáros, *Beyond Capital: Toward a Theory of Transition* (New York: Monthly Review Press, 2018), 94.

¹⁶ Friedrich Ratzel, *Erdenmacht und Völkerschicksal* (Stuttgart: Alfred Kroner, 1940), 47-9.

Saito, the “general conditions of production and reproduction” subject “human and non-human beings to serious existential threat.”¹⁷

The whitening power of astrocolonialism consists in its ability to employ the same colonial logics and ideologies to right all (or many) of these wrongs, in a large part through a reframing of the Malthusian and existential risk aspects of global colonial discourse coupled with an expansion of the pallet of concerning catastrophic scenarios largely developed with the help of scenario thinking techniques and a heavily reliant on Bayesian statistical analyses. The first inklings of this new line of thought were apparent as early as the late 1960’s. Thanks to the publication of the limits to growth, Americans were anxious about what Paul Ehrlich had dubbed the “population bomb,” which was essentially a planet-wide equivalent of the same social problem which concerned Rhodes.¹⁸ Gerard K. O’Neill’s *The High Frontier* and other contemporaries works such as Peter Vajk’s *Doomsday has Been Cancelled* argued that the problems associated with the limits to growth could be mitigated by expanding out into space.¹⁹ More recent arguments, for example those defended by the members of the Effective Altruist movement, tend to place emphasis on the fact that the moral reason from expanding into space is not merely escaping what Pommeranz called the “Malthusian constraints” of the planet, but rather lies in the vastly larger theoretical population that could come into existence by tapping the astronomical quantity of resources in the solar system.²⁰ More recent moral pleas for expansion, in particular those associated with the Effective Altruism movement, place stress on the idea that not only may space expansion save humanity from population growth-related collapse, but note that it may also enable the births of far greater numbers of future people.²¹ The philosopher Nick Bostrom, for example, has argued that every year that we delay colonizing space costs us an “astronomical” number of future lives. According to his calculations, advancing the colonization of the local supercluster by even one second would enable the coming into being of—by what he calls a “conservative lower bound”— 10^{13} future lives.²² While most theories of this type do not suggest that expanding out into space allows one to throw away the question of limits as such, all stress that moving from a global to an astronomical scale and focusing on the utilitarian value of the lives of those future people makes the moral argument for space expansionism strong indeed.²³

¹⁷ Kohei Saito, *Marx in the Anthropocene: Towards the Idea of Degrowth Communism* (New York: Cambridge University Press, 2023), 2.

¹⁸ Paul Ehrlich and Anne Ehrlich, *The Population Bomb* (New York: Ballantine, 1968).

¹⁹ Peter Vajk, *Doomsday Has Been Cancelled* (Culver City: Peace Press, 1978); Gerard K. O’Neill, *The High Frontier: Human Colonies in Space* (Garden City, N.Y.: Anchor Books, 1982).

²⁰ Kenneth Pomeranz, *The Great Divergence: China, Europe, and the Making of the Modern World Economy* (Princeton: Princeton University Press, 2021), 23.

²¹ William MacAskill, *What we owe the future* (New York, NY: Hachette 2022), 25.

²² Nick Bostrom, "Astronomical Waste: The Opportunity Cost of Delayed Technological Development: Nick Bostrom," *Utilitas* 15, no. 3 (2003): 309.

²³ On this question of the limits of accessible space beyond the limits of the planet, see: Toby Ord, "The Edges of Our Universe," (2021). On the limits of the available space resources see: Martin Elvis and Tony Milligan, "How much of the Solar System should we leave as Wilderness?," Article, *ACTA ASTRONAUTICA* 162 (9/1 2019), <https://doi.org/10.1016/j.actaastro.2019.03.014>.

These arguments become even more compelling when one considers that expanding out into space does not only enable population growth while mitigating the risk of a population bomb, but also allows for the mitigation of risk factors associated with living on a single highly connected globe. Futurists have developed many scenarios illustrating how humankind and even all our biotic kin could go extinct. These include not only the obvious but speculative catastrophes such as total nuclear war, pandemics, and non-aligned A.I., as well as seemingly far-fetched ones like back-contamination from alien microbes, but also well documented risks drawn from the study of past extinctions. One example of this kind is non-Anthropogenic climate change, while another is the risk of Earth being struck by a planet-killer asteroid (one thinks of Larry Niven's famous quip, inspired by the work of Alvarez on the Cretaceous–Paleogene extinction event: "the dinosaurs became extinct because they didn't have a space program.")²⁴ While space expansion advocates do not claim that becoming a multi-planetary or inter-planetary species will reduce all of these existential risks to zero, since many of these threats are of such a sort that they would affect all outposts even in a multi-planetary civilization, they do note that some of these risks are sufficiently decorrelated that space expansion would most likely reduce the overall likelihood of humankind and our biotic kin going extinct. As Toby Ord puts it, it is simply true that a civilization is better off not "placing all of its eggs in one basket."²⁵ Now no one would deny that space expansionism generates new risks, so the statistical argument here is not open and shut. Daniel Deudney, for one, has held that leaving the bounding power of the Earth behind will actually incentivize new and more destructive forms of conflict, thus increasing the risk of mutual annihilation.²⁶ Meanwhile, Jonathan Wiener has suggested that space expansionism might expose terrestrial life to unforeseen risks which are calculable as uncalculable, or in any case do not figure within our scenarios and our past experiences.²⁷ Yet even with these concerns taken into account, seen from the purely quantitative point of view of a Longtermist utilitarian morality which places a premium on the absolute number and duration of future lives, what the Effective Altruist Will MacAskill calls our civilization's collective "life expectancy," the moral argument for space expansionism still prevails, simply on the basis of the fact that there could be so many more potential people in space than one earth under any possible successful colonization scenario.²⁸

²⁴ Quoted by Arthur Clarke in Andrew Chaikin, "Meeting of the Minds: Buzz Aldrin Visits Arthur C. Clarke," *Space Illustrated*, February, 2001.

²⁵ Toby Ord, *The precipice : existential risk and the future of humanity* (New York: Hachette Books, 2020), 194.

²⁶ Deudney, *Dark skies : space expansionism, planetary geopolitics, and the ends of humanity*.

²⁷ Jonathan B. Wiener, "The Tragedy of the Uncommons: On the Politics of Apocalypse," *Global Policy* 7, no. S1 (2016), <https://doi.org/https://doi.org/10.1111/1758-5899.12319>.

²⁸ MacAskill, *What we owe the future*, 25. So staggering is the difference between the hypothetical upper bounds that space colonization points to a paradox within utilitarian morality, a moment in which it seems to become actively immoral or non-sensical. The statistically overwhelming numbers generated by astronomical abundance mean that one could argue for space expansionism even if the lives lived by future people were as miserable as could possibly be imagined. Derek Parfit was perhaps the first person to identify this bug within Utilitarian moral philosophy, calling it the "Repugnant conclusion." Part of what renders the repugnant conclusion so repugnant is the fact that it suggests that ethics teaches us not to act in such a way as to make future people's lives better, but only in

Here we have merely seen the expansion of a line of thought which propelled colonialism, but we have not yet seen how it saves colonialism, other than the obvious fact that expanding out into space would save humankind from the obvious existential catastrophe which appears to be the natural trajectory of the Plantationocene. Yet as an ideological weapon for justifying coloniality space expansionism actually does much more. For example, if we agree that the primary problem with the older moral arguments for colonialization was that they saved English lives at the expense of non-English lives, colonization now promises to save all the lives on the planet, human and non-human. Moreover, if global colonization was morally flawed in pretending that the lands which were appropriated were uninhabited, it is much harder to argue we have not seriously looked for inhabitants on Mars. Which is to say that even if we might concoct various oppositions to the argument that other planets are not *terra nullius*, as Jacob Haqq-Misra has pointed out, it remains almost impossible to claim that there are “intelligent indigenous populations” living in our solar system.²⁹ While the Plantationocene has shown global colonialism to be largely an ecocidal affair, the situation looks rather different when we consider the ecological effects of colonizing an otherwise lifeless planet such as Mars. Judging Mars colonization from the viewpoint of a vitalist ethics which places higher value on life than on non-life, one might argue that rather than destroying the Martian ecosystem, colonization would bring it to life, hence improve it. In this way what colonialism purported to do and failed to do, would unquestionably be achieved by astrocolonial efforts just so long as they succeeded (and just so long as the colonized place really had been lifeless). Furthermore, while some ecologists imagine that this new form of space expansionism would merely entail destroying the Earth and moving on, the existential risk-based thinking presented here, which aims above all at mitigating risk by multiplying planets, would logically aim at improving the environment of the earth by reducing strain upon its ecosystem. The rocket billionaire Jeff Bezos, for example, has argued that one of the first steps in colonizing space ought to be the exportation of all heavy industry away from our home planet.³⁰ Furthermore, as we have seen, global colonialism produced and justified racism and speciesism. While there is little doubt that the first waves of space exploration were—in a mirror of the societies that generated them—a performatively racist affair (one might say that what Wolfe called the “Right Stuff” embodied in the first astronauts was in effect a mid-century idealization of the “White Stuff”)—it is also true that going to space in

such a way as to indifferently maximize the quantity of life and maybe even make every future person’s life worse. The significance of this worry can only be clarified, of course, if we have a sense of what kinds of lives future people might live in a multi-planetary civilization. We obviously cannot know this in detail, but we can get some informed ideas based on our already extensive experience with creating habitats and environmental systems capable of functioning in orbital space. I will return to this point and its bearing on our discussion somewhat later. Derek Parfit, *Reasons and persons* (Oxford Clarendon Press, 1984), 381-91.

²⁹ Jacob Haqq-Misra, *Sovereign Mars: Transforming Our Values through Space Settlement* (Topeka: University Press of Kansas, 2022), 34.

³⁰ This argument is central to Bezos’ notion that we need to develop space in order to preserve the Earth. See: Jeff Bezos, *Invent and Wander* (New York: Harvard Business Review, 2020), 249.

order to maximize the total population, and in the name of the total population of the globe suggests that all types of people may be welcomed into space.³¹ Moreover, if colonization has been an unmitigated catastrophe for many non-human species, given our biotic dependence on other species, many argue that expanding beyond the planet cannot be anything but a biocentric “expansion of life as a whole.”³² Meanwhile if capitalism has largely been a disaster for both the planet and for human societies at a planetary scale, many space advocates argue that the new wave of astrocapitalism is not only saving the planet by accelerating our expansion out into space, but also preparing humankind to enter into a realm in which new values may be formed, including what Aaron Bastani has called “fully automated luxury communism.”³³

These arguments constitute the spirit of Western space exploitation, the vision of how the colonial power matrix, when pushed beyond the limits of our orb, appears capable of saving everything. All of this is, as one would imagine, too good to be true, but perhaps not for the reason one might initially imagine: the claim that there is “no Planet B,” that we will never live on Mars or elsewhere.³⁴ I take that claim to be approximately as speculative as claims that we will successfully establish habitats beyond the Earth. After all, we have already sent human beings and other animals into outer space. At this point, plants have grown aboard the ISS. Animals have reproduced there. Lichens and tardigrades have survived exposure to outer space environments. On Earth astrobiologists have discovered various forms of weird life, creatures that live in places like deep sea vents and the deep hot biosphere, and so seem in all probability compatible with the kinds of habitats available even on the planets and moons in our solar system, without even mentioning the astronomical number of exoplanets. All of this suggests the plausibility, if not the necessary truth, of the panspermia thesis: the notion that life, far from being unique to the Earth, arrived on our home planet from elsewhere. Simply put, I don’t think that it is easy to dismiss space expansionism outright as a technical impossibility. But that does not mean that we cannot make other arguments against it, in this particular case, to show how the particular change in the cosmotechnical relations between technology, spirituality, humankind, and the cosmos effectuated by thinking beyond the globe and hence admitting astronomical numbers into our moral calculus can transform morality into immorality. In simplest terms, what that means is that the spirit of space exploitation in the west involves maintaining and even deepening colonial logics of power in the present on the promise that this will yield a transcendental reconciliation of all past wrongs in the future.

³¹ The inclusiveness dimension within even first-wave astrofuturism is registered by Kilgore Dewitt, who despite his acknowledgement that science fiction has often, as pointed out by Rieder, himself draws attention to the ways in which astrofuturist fantasies could also support inspiring visions of future diversity. De Witt Douglas Kilgore, *Astrofuturism : science, race, and visions of utopia in space* (Philadelphia: University of Pennsylvania Press, 2003); John Rieder, *Colonialism and the Emergence of Science Fiction* (New York: Wesleyan University Press, 2013).

³² Freeman Dyson, "Noah’s Ark Eggs and Viviparous Plants," ed. Gregory Benford and James Benford, *Starship Century* (Los Angeles: Lucky Bat, 2013). 259.

³³ Aaron Bastani, *Fully Automated Luxury Communism : A Manifesto* (London ; New York: Verso, 2019).

³⁴ Sylvia Ekstrom, Javier Nombela, and Michel Mayor, *Nous ne vivrons pas sur Mars, ni ailleurs* (Lausanne: Libella, 2021).

Yet before getting to the details of how that works, I want to first turn our attention to the spirit of space exploitation in China.

3. The Spirit of Space Exploitation in China

Why China? First, aside from the United States, China is the leading actor in the contemporary space age, with many specialists evoking the specter of a new US-China space race.³⁵ China has recently created its own alternative to the ISS, the Tiangong. It is the second leading nation in the world in terms of satellite and rocket launches, having recently launched Beidou, its own alternative to GPS, as well as new constellations of satellites aimed at providing data direct to cellular phones. It has rival plans, and a rival conglomerate, aimed at building a moon base. Moreover, it is second only to the US with respect to privately funded “New Space” endeavors.³⁶ Yet it is not only in space, or even in geopolitics that a US-China rivalry is emerging. This is a conflict that is as much ideological as it is military. For many, even inside the West, Chinese thinking is rising as a creditable and ecological alternative to Western thinking about political and social order in the Plantationocene. Western Marxist thinker John Bellamy Foster has argued that “the Chinese notion of ecological civilization, due to its overall theoretical coherence and coupled with China’s rise in general, is likely to play an increasingly prominent role in the development of ecological Marxism worldwide.”³⁷ Hui, for example, explains that he introduced his notion of cosmotechnics as an alternative to combat the idea that there was “one universal and homogenous technology,” going on to suggest that different cosmotechnics might provide a different, and presumably more legitimate, account of how to unify “moral order and cosmic order through technical activities” in the Anthropocene.³⁸ In the same vein, the neo-Confucian political philosopher Jiang Qing has argued that while Western liberal democracies can only “tinker” with environmental issues, a Confucian monarchy, deriving its “sacred legitimacy” from “the Way of heaven” can properly act to resolve ecological problems since these are manifestations of “The way of heaven,” and illustrations of the fact that this way can sometimes clash with the “popular will” that makes the laws within Western regimes.³⁹ I agree with Hui that Chinese thought derives from a cosmotechnics that is significantly different from the colonial power matrix which gave birth to the

³⁵ Greg Autry and Peter Navarro, *Red Moon Rising: How America Will Beat China on the Final Frontier* (Washington D.C.: Post Hill Press, 2024); Eric Seedhouse, *The New Space Race: China vs. USA* (Cham: Praxis, 2010).

³⁶ As Curcio et al. report, there are far more commercial launch companies with over USD 50 millions of funding in China than in any other country. That said, in the case of New Space, both in China but equally in the United States, the lines between private and public funding are sometimes blurred, such that many allege that the financial security of even market leaders such as Space X depends in a large part, if not wholly, on the largess of the American government. On new space in china, see: Blaine Curcio, Jean Deville, and Chen Lan, *New Space in Asia*, European Space Policy Institute (2021), 5. For a critical view on the autonomy of the American private space industry, see: Irénée Régnauld and Arnaud Saint-Martin, *Une histoire de la conquête spatiale: Des fusées nazies aux astrocapitalistes du New Space* (Paris: La Fabrique Editions, 2024).

³⁷ John Bellamy Foster, *The Dialectics of Ecology: Socialism and Nature* (New York: Monthly Review Press, 2024), 184.

³⁸ Yuk Hui, *Art and Cosmotechnics* (New York: University of Minnesota Press, 2020), 40.

³⁹ Jiang Qing, *A Confucian Constitutional Order: How China's Ancient Past Can Shape Its Political Future*, trans. Edmund Ryden, ed. D.A. Bell and R. Fan (Princeton: Princeton University Press, 2012), 35.

Plantationocene, yet in this context the question of space exploitation raises questions. It is unquestionable that China is factually deeply committed to this effort, and as I will try to make clear in the following discussion of the science fiction author and futurist Cixin Liu's moral arguments for space expansionism, that these arguments derive from Chinese cosmotechnics. While one interpretation of this might be to suggest that this derives from a contamination of Chinese thinking with Western thinking, I think that the issue ultimately lies deeper in ways that are particularly linked with the implications of thinking about how space technologies impact cosmotechnics emergent within a global historical context. Yet before getting to that point, a brief detour into Chinese moral and political philosophy is necessary.

Hui's approach to cosmotechnics is largely promissory: his work is largely devoted to raising questions regarding an alternative China-inspired cosmotechnics, he speaks of his work as preparing "for its arrival by providing a 'ground.'"⁴⁰ One way of thinking about that 'ground' is to see him as proposing key terms which he sees as useful for engaging in a productive dialogue about cosmotechnics. Among the terms he finds orienting are "heaven (tian, 天)" above, the "earth (di, 地)" and the "ten thousand beings."⁴¹ Hui also draws attention to the role of "Qi" (tools) and "Dao" (the way) with respect to moral visions how one thinks about action.⁴² Yet in the aim of being somewhat more explicit, let me introduce the moral vision of Chinese cosmopolitan order that Zhao Tingyang has popularized in his writings on *tianxia*. This choice is in part predicated on the force of his vision, and in part on his rising influence on Western thinkers seeking a holistic alternative to the current global order, for example the Berggruen Institute's Blake and Gilman, who see his vision of "world sovereignty," as a leading candidate for thinking the "planetary interdependence among all vital systems."⁴³ What they call here world sovereignty is in Zhao own language a clearly cosmotechnical notion, namely *tianxia*, which can be roughly translated as "all under heaven." Zhao describes *tianxia* as "a dynamic and vital process" a vision of the "the world-ing of the world" in which power is exercised in a morally legitimate way so as to augment the vitality of all.⁴⁴ He defines *tianxia* as a wholistic vision in which legitimate order emerges as a product a moral commitment to acting in such a way as to foster all-inclusive and harmonious co-existence among the "ten thousand things," a phrase borrowed from traditional Chinese cosmology to express the whole that is under heaven and united by it. For Tingyang, what is characteristic of moral practices that foster flourishing is that they practice relational reasoning of such a sort as to take into account the cosmic totality, or in his words, the "globalization" which has "entered into every aspect of all things."⁴⁵ Good government, on his account, rests on the cultivation of what he calls, borrowing from Confucious, "'relational virtuosity' (ren 仁)" understood as a model of exercising "caring/empathy/benevolence" towards all under heaven and in accordance with the way

⁴⁰ Hui, *Art and Cosmotechnics*, 240.

⁴¹ Hui, *Art and Cosmotechnics*, 156-7.

⁴² Hui, *The Question Concerning Technology in China: An Essay in Cosmotechnics*, 29.

⁴³ Jonathan Blake and Nils Gilman, *Children of a Modest Star: Planetary Thinking for an Age of Crises* (Palos Altos: Stanford University Press, 2024), 206.

⁴⁴ Zhao Tingyang, *All Under Heaven: The Tianxia System for a Possible World Order*, trans. J.E. Harroff, ed. O.A. Westad (Berkeley: University of California Press, 2021), 1.

⁴⁵ Tingyang, *All Under Heaven: The Tianxia System for a Possible World Order*, 1.

of heaven.⁴⁶ Though Zhao has relatively little to say about technology, we might suppose, supplementing his thought with that of Hui, that the proper or skillful way of using tools, the one that would be in resonance with the way, in accordance with heaven, and with the proper objective of achieving *tianxia*, would one that would facilitate the manifestation of “ch’i” which Hui translates as “energy,” (he notes that this word literally means “gas” and one is tempted to here insert the term spirit), in such a way as to bring about vital resonances within the “cosmic order” which foster the vital aims of the “moral order.”⁴⁷ That said, and always keeping in mind the fact that cosmotechnics is ultimately a broader and less explicit sphere than this particular theory of *tianxia*, it is worth noting that multiple different moral theories can exist within a single cosmotechnical paradigm. Thus, Jiang claims that traditional Chinese moral and political philosophy has three key normative objectives: balancing humaneness, a “moral norm that is agent/recipient relative” modeled on “our natural inclination to be partial toward those who are close to us, especially our family/kin members;” justice, a “moral norm that is agent/recipient neutral,” for example “our exercise of impartial judgment on the merits of persons and states of affairs;” and personal freedom.⁴⁸ For Jiang, each of the different schools of Chinese thought, the Confucians, the Taoists, the Mohists, the Legalists and so on, emerge out of different understandings of the means of balancing these normative values, if all, now speaking in the language of Hui, operate within the same cosmos, and ultimately accept that achieving something like *tianxia* might be the proper final end of all moral and technical activities.

At this point I want to begin considering the Chinese case for space exploitation as it is made by Liu Cixin in an essay entitled “One and One Hundred Thousand Earths.” This piece is clearly influenced by and shows some familiarity with western existential risk-based arguments for space expansionism, quite possibly via the writings of Stephen Hawking. The physicist, who makes an appearance in one of Liu’s stories as being “as renowned as Einstein,” where he is fêted for having accomplished “astonishingly” much despite his paralysis, famously argued that “our only chance of long-term survival is not to remain lurking on planet Earth, but to spread out into space.”⁴⁹ Yet that said, it is important to emphasize that Liu’s stance relative to the arguments for space colonization is significantly different from those of western space advocates. Liu does not argue for the expansion into and exploitation of space, but rather argues that space expansion and exploitation will occur. Nevertheless, the arguments that he gives are moral arguments. His point is not that we morally ought to colonize space, but rather that morality dictates that we will colonize space. This altered stance is in many ways reflective of a longstanding perspectival element within Chinese moral and political thought. As Benjamin Schwartz has pointed out, the theory of heaven within Chinese thought has long been linked to political theology, with the idea that the sovereign, the ultimate moral actor, had a mandate from heaven, and even “a

⁴⁶ Tingyang, *All Under Heaven: The Tianxia System for a Possible World Order*, 29.

⁴⁷ Hui, *The Question Concerning Technology in China: An Essay in Cosmotechnics*, 61-2.

⁴⁸ Tao Jiang, *Origins of Moral-Political Philosophy in Early China: Contestation of Humaneness, Justice, and Personal Freedom* (New York: Oxford University Press, 2021), 35.

⁴⁹ Cixin Liu, *The Wandering Earth* (New York: Bloomsbury, 2016), 187; Stephen Hawking, “Our Only Chance,” ed. Gregory Benford and James Benford, *Starship Century* (Los Angeles: Lucky Bat, 2013).

monopoly of access to Tian (heaven).⁵⁰ Thus, obedience to the moral example set by the sovereign who served as an exemplar of the way of heaven can be understood as a means of understanding the way of heaven and hence bringing about the harmony of all under heaven. This means that Liu text is not so much a moral argument for colonizing space, but an informed speculation which reflects Chinese cosmotechnics and which explains why someone who understood the relations between humanity, technology, the cosmos, and the gods or spirit as informing the decisions of sovereign agents might explain why it speculatively appears reasonable that legitimate sovereigns, acting in the name of the moral well-being of all under heaven, will employ technology to pursue expansion into the cosmos.

Liu thus begins by wondering whether “human civilization [will] be forever unable to step out of its cradle” (a question that in its formulation betrays the influence of Tsiolkovsky and Russian Cosmism).⁵¹ He then goes on to review the history of human space exploration, its successes but also its eventual loss of inertia, arguing that it perhaps failed because humanity never really wished to leave the cradle, “never actually thought of space as its future home.”⁵² Then he isolates two rather more minor causes: technology and economics. Space, as they say, is hard, and the technology demanded was advanced and costly. If we were to translate this into the logic of technics exposed by Hui, we might say that there was not enough energy behind the effort. Then he notes that if space did not become a new home, space exploitation continued, but in such a way that “space ventures were brought in line with economics, with it necessary for product to exceed invention, the noble spirit of exploration replaced with the spirit of business.”⁵³ Of this spiritual death, Liu’s explanation is that “development in space is a huge risk, economically and technologically. Making space our new home and betting the human future on this huge of a risk is not something governments can accept.”⁵⁴ Yet having come to this provisional conclusion, which basically amounts to the conclusion that space exploitation cannot be made moral, practiced in such a way as to achieve a balance between humanity, justice, and personal liberty, and so in consequence has even become a tool of immorality, whereby rocket billionaires abuse their liberty to foster injustice on the falsely humane pretext of improving their nation’s economy, he shifts course.

Hawking had argued that it was “almost inevitable that either a nuclear confrontation or environmental catastrophe will cripple the Earth at some point in the next 1,000 years which, as geological time goes, is the mere blink of an eye.”⁵⁵ Liu has nothing to say about nuclear, what attracts him is the Plantationocene. He fully endorses the view that environmental catastrophe seems inevitable, and he indeed offers moral reasons for its inevitability. He notes that “human society has entered a period of sustainable

⁵⁰ Benjamin Schwartz, *The World of Thought in Ancient China* (Cambridge: Harvard University Press, 2009), 72.

⁵¹ Cixin Liu, *A View from the Stars: Stories and Essays* (New York: Tor, 2024), 71; Konstantin Tsiolkovsky, “The Future of Earth and Mankind,” in *Russian Cosmism*, ed. Boris Groys (Cambridge: MIT, 2018).

⁵² Liu, *View*, 72.

⁵³ Liu, *View*, 72.

⁵⁴ Liu, *View*, 73.

⁵⁵ Stephen Hawking, *Brief Answers to the Big Questions* (London: John Murray, 2018), 132-33.

development” explaining that today “it seems to be a goal within grasp” such that within “another half century, most underdeveloped zones, including countries like China and Brazil, will be able to catch up to the West in economic terms.” But then he adds that completing this development is impossible. “If the whole world lived the kind of lives those in the US and in Europe do, the resources necessary would be equal to four and a half Earths.”⁵⁶ He then notes that the “only hope is to stop development.” But then he concludes that “development cannot be suppressed” since no one would morally accept that “some countries and regions to laze about, fully enjoying the comforts of modern civilization” while other parts of the world to “stagnate in the poverty of an agricultural society goes against the most basic value of humanity.” With respect to this judgement his argument is explicitly political: he claims that what is now fashionably described as degrowth is “a nonstarter” politically, as monarch would dare claim that reducing the level of energy within the system coincides with a skillful utilization of their mandate from heaven.⁵⁷

This brings Liu to a critical point in his argument, one that illustrates fully how cosmotechnical diversity affects moral reasoning about technology. As Hui has suggested, while Western cosmotechnics associates technology with a “revolt against the gods,” in China there “is no Promethean figure” but rather Fuxi, a “half-dragon, half-human figure,” and Shennong, which “literally means ‘divine farmer’” a mythical figure who “invented

⁵⁶ Liu, *View*, 74.

⁵⁷ Liu, *View*, 75. This point is clearly a judgment call. Historically speaking, my sense is that he is surely right. In her account of revolutions and transfers of power within the Chinese state, Anne Cheng points out that the transfer of legitimacy has generally depended on the new ruler demonstrating that they have a heavenly mandate by bringing about flourishing at the level of the ten thousand things:

Des « ordres du Souverain d'en haut », on passe au « mandat du Ciel » (tianming 天命). Cette fameuse idée du mandat céleste, qui devait rester à la base de toute la théorie politique chinoise, les Zhou furent les premiers à s'en réclamer pour justifier leur renversement de la dynastie précédente : c'est parce que les derniers souverains de la dynastie Shang n'étaient plus dignes de gouverner que le Ciel aurait mandaté les Zhou pour les châtier et les remplacer. Ainsi, l'exercice du pouvoir n'était plus l'apanage d'un seul et même lignage, par simple transfert héréditaire, comme cela avait été le cas depuis la fondation des Xia par Yu le Grand. Le mandat du Ciel était susceptible d'être modifié, de passer d'un lignage à un autre, censé plus digne de gouverner. L'expression « changement de mandat » (geming 革命) en est venue à traduire, dans l'esprit des penseurs progressistes du XIXe siècle, la notion de « révolution ». Il est significatif qu'une des toutes premières élaborations de la pensée sur le Ciel ait eu un enjeu politique : en Chine, l'aménagement de l'univers est aussi et avant tout un aménagement de l'espace humain : ordre social et ordre cosmique se rejoignent et se confondent.

Nevertheless, some contemporary thinkers, for example Qing, have argued that precisely one of the benefits of the Confucian system is that it allowed even restrictions of material well being to be accepted by the citizens given that they derive from a divine mandate. As he explains:

Since democracy makes the will of the people the sole source of legitimacy, it is unable to tackle environmental problems at the root. This is because environmental issues have to do with sacred legitimacy or, in Confucian terms, with the legitimacy of the Way of heaven. The Way of heaven can, at times, clash with the popular will. This is because the popular will is formed by human desire, and the only way to resolve conflicts between heaven and the people is to curb desire.

Left out of Qing's analysis is the third way which precisely stands at the center of Liu's line of thinking, namely the idea that extending technology out into heaven offers an alternative solution which seems to better reconcile personal liberty (people's desires), justice, and humanity. Anne Cheng, *Histoire de la pensée chinoise* (Paris: Editions du Seuil, 2015), 70-71; Qing, *A Confucian Constitutional Order: How China's Ancient Past Can Shape Its Political Future*, 335.

agriculture, medicine, and other technics.” Thus Chinese cosmotechnics does not attribute the origins of technics to a theft, but rather finds in its commemorates a gift received thanks to the “benevolence of the ancient sages.”⁵⁸ In practice, this implies something like the following. Western thinkers have typically been inclined to view geo-engineering as in-principle immoral, seeing it as a repetition an original sin. Based on this, they make arguments such as this one by Clive Hamilton:

Climate engineering is intuitively appealing to a powerful strand of Western technological thinking and conservative politicking that sees no ethical or other obstacle to total domination of the planet. It is a Promethean urge named after the Greek titan who gave to humans the tools of technological mastery. Promethean plans have always met resistance from those who share a deep mistrust of human technological overreach, those who heed the warning that Nemesis waits in the shadows to punish Hubris.⁵⁹

Meanwhile, Chinese thinkers have, if anything, the opposite viewpoint. If technology has come from heaven, then it would be against heaven, literally immoral, to not employ it to augment the level of ch’i available among the ten thousand things. Which means that Liu takes it as self-evident that governments will undertake what he describes as a “hyperengineering” projects aimed at “changing the Earth’s environment in an artificial and comprehensive way.”⁶⁰

But the problems with this are not moral, indeed, they are—at the limit—spiritual. Liu points out that successfully re-engineering the planet in such a way as to bring about flourishing for all under heaven will demand “unprecedented, even God-like” technological advances, the kinds of magical technologies that only seem to exist “in science fiction.” In his opinion, geo-engineering the Earth in a moral way is a more difficult task than developing the technologies necessary for “space travel within the solar system.”⁶¹ He then argues that governments are likely to pursue the space route, based on the idea, that the proper usage of technology is likely to be the one that liberates the greatest amount of energy. As he points out: “the solar system has enormous amounts of resources. Among the eight planets, in the asteroid belt, all the resources necessary for the development of human existence are present in ample amounts, from water to metals to fissile materials for nuclear fusion, such that if we go by the calculation that Earth could at most support a population of 100 billion humans, then the solar system resources could support one hundred thousand Earths.”⁶² His argument here is as much about morals as it is about science. While it is not sure that establishing space colonies to house 100 billion humans is an easier technological proposition than rendering the Earth sustainable, and some, for instance the American science fiction writer Kim Stanley Robinson, have argued that learning to live sustainably here on Earth is a precondition for the successful colonization of

⁵⁸ Hui, *The Question Concerning Technology in China: An Essay in Cosmotechnics*, 15-16, 28.

⁵⁹ Clive Hamilton, *Earthmasters: The Dawn of the Age of Climate Engineering* (New Haven: Yale University Press, 2013), 18.

⁶⁰ Liu, *View*, 75. The western reliance on the opposition between nature and technology in the context of a moral analysis of geo-engineering is amply illustrated in

In contrast to this narrative, whereby

⁶¹ Liu, *View*, 76.

⁶² Liu, *View*, 76.

other planets, it is certain that the moral acceptability of pursuing cosmic expansion in light of inherited visions of how to properly employ tools in the service of demonstrating an administration's heavenly mandate would be very strong.⁶³ On Earth, the best-case scenario is in any case worse. There will be fewer people with fewer resources, and this will make it harder to achieve a balance that maintains the impression that the ruler is acting in such a way as to bring about harmony for all under heaven and more likely to result in situations which curb personal liberties and prompt decisions to be made which place into tension the delicate balance between showing humanity and dispensing justice. Meanwhile, if space exploitation succeeds, this will be, to quote Liu, "a very smart, if risky, investment."⁶⁴ I take him to mean not only an investment in economic but also in moral or even spiritual capital. If a government will be able to harvest the abundant resources of space, then that government will demonstrate its heavenly mandate, it will do this by obtaining access to resources that allow for a far greater amplitude of flourishing within the whole than would likely have been possible by staying on Earth.

Even if the specifics of the arguments are different, both the Chinese and the Western moral arguments for space expansionism have this in common: they aim at saving everything, including, and perhaps above all, the foundations of the moral order as such.

4. The Dark Side of the Spirit

Above I have suggested that space expansionism may be possible, but that save everything argument that constituted the spirit of Western space exploitation was too good to be true, in effect suggesting that it served to justify short term moral compromises in the name of a future which in any case could not justify the means employed to that end. I believe that the same thing is true of Liu's argument, namely that it ultimately can be seen as playing an ideological function which employs moral reasoning to the ends of saving moral reasoning but in the process ultimately perverts morality by employing it in the name of an end which can sensibly be qualified as immoral. The key to exposing this darker side of the spirit of space exploitation, or at least of the spirits of space exploitation that seem to animate both China and the West, is to focus on thinking historically about how actually putting human beings in heaven using technology has changed our understanding of the implications of space exploitation. It is this that I want to briefly pursue in this section. Yet let me state my provisional conclusion first: the reason why the spirit of space colonization cannot save everything is because it will not be humans who colonize space. Which implies that the moral arguments presented above are ultimately arguments for becoming transhuman, arguments that are at the limit anti-humanist. Why?

Let us look back on our experience of the Space Age. The mythical figures of the astronauts were very much racial ideals of the sort which emerged thanks to the eugenic theories which accompanied global colonialism. Then and now, American, Russian, even Chinese

⁶³ "Earth First. Then Mars. An Interview with Kim Stanley Robinson," updated April 25, 2019, 2019, accessed May 24, 2024, <https://www.publicbooks.org/earth-first-then-mars-an-interview-with-kim-stanley-robinson-reprint/>.

⁶⁴ Liu, *View*, 77.

astronauts are manifestations of what Wolfe called the “right stuff.”⁶⁵ They were not only idealized versions of American manhood, but they were also, from a more biological perspective, the result of a NASA quest to recruit “supermen.”⁶⁶ They had undergone one of the most rigorous selection processes ever, having been forced (among other things) to run on treadmills, pedal stationary bikes, pass IQ exams, even have their intestines measured.⁶⁷ In the meanwhile, professional astronaut selection has gotten more diverse, but not less exigent. Professional astronauts are overachievers: physical specimens and highly accomplished minds. Yet no matter how exceptional they are, the verdict of nearly decades of studying the effects of space on the human body, even on the most exceptional human bodies, are sobering. Based on what we know from the ISS, many doctors expect voyagers to Mars would arrive weakened by muscle atrophy, most probably suffering from things like kidney stones, dermatological infections, and back pain, and almost certainly at risk for developing cancers as a function of their prolonged exposure to solar radiation.⁶⁸ Christopher Mason, a NASA scientist who studied the Kelly twins, one of whom (Scott) broke a record by spending a year in space, concluded, based on these findings, that “sending any Earth-evolved organism to any other planet would result in almost certain death.” But he then observed that this is not really a tragedy: we now “know enough to be able to modify, tweak, and engineer life to improve the odds of survival or to create entirely new adaptive features and mechanisms.”⁶⁹

This argument resonates strongly with the existential risk-based arguments which we have seen above. As we have seen, the major reason why humans ought to go to space is to increase future population sizes. Yet that would be made more difficult if we maintain the criterion of only exporting regular humans as opposed to modified humans. Already in the 1960’s, Manfred Clynes and Nathan Kline, the coiners of the term cyborg, had begun arguing that it would be far more cost effective to engineer the “bodily functions to meet the requirements of extraterrestrial environments” rather than the other way around.⁷⁰ Needless to say, the earliest reception of this idea was largely critical, even horrified. For example, the first novel to explore the figure of the cyborg, Frederick Pohl’s 1976 *Man Plus*, depicted part of the process of becoming cyborg as submitting to literal castration, dramatizing this sacrifice by showing the scientist who performed the procedure sleeping with the wife of the new Martian even as he traipsed joyfully over the surface of his new environment.⁷¹ In other words, from within the paradigm of globalized coloniality in which the vision of the intact white man as potential savior still held sway, space expansion simply

⁶⁵ Tom Wolfe, *The Right Stuff* (New York: Farrar, Straus, Giroux, 1983).

⁶⁶ cited after Neil M. Maher, *Apollo in the Age of Aquarius* (Cambridge, Massachusetts: Harvard University Press, 2017), 144..

⁶⁷ A good account of this selection process is available in: Andrew Chaikin, *A Man on the Moon: The Voyages of the Apollo Astronauts* (New York: Penguin 2007), 4.

⁶⁸ N. Kraft, G.T. Hooft, and J.R. Kass, *Mars One: Humanity's Next Great Adventure: Inside the First Human Settlement on Mars*, Mars One: Humanity's Next Great Adventure: Inside the First Human Settlement on Mars, (New York: BenBella, 2016); Claude Piantadosi, *Mankind Beyond Earth: The History, Science, and Future of Human Space Exploration* (New York: Columbia University Press, 2013).

⁶⁹ Christopher E. Mason, *The next 500 years : engineering life to reach new worlds* (Cambridge, Massachusetts: The MIT Press, 2021), xii..

⁷⁰ Manfred Clynes and Nathan Kline, "Cyborgs and Space," *Astronautics* (September 1960): 26.

⁷¹ Frederic Pohl, *Man Plus* (New York: Tor 2013).

was not worth the cost. But within the contemporary paradigm, promoting symbolic castration can now be read as precisely opening the door to collective salvation. It can allow space futurism to align with gender equity, with sexual diversity, presumably even allowing it to become post-racial in the traditional sense of the term. Moreover, assuming we are talking about not only engineering our bodies but also our minds, embracing transhuman becoming will not only allow for expansion beyond the Earth, it will also mitigate the existential risk associated with non-aligned artificial intelligence, to the extent that it will enable future humanoids to pursue what Robin Hanson has called the “Em” strategy, a term which literally derives from “brain emulation,” i.e. transhuman beings whose brains have been “recorded, copied, and used to make artificial “robot” minds,” humans literally become spiritual machines, but which ought to be understood more colloquially as the ‘if you can’t beat ‘em, join ‘em’ strategy.”⁷² Now one reaction to all of this would seem to fall back on traditional western cosmotechnics: the horror, these beings will be unnatural, non-human. Yet I don’t want to make that argument, but rather a slightly different one. Namely that all of this moral argumentation, which claims to be aimed at saving human lives, first of all embraces a sacrifice of a significant portion of what would in ordinary terms be called our humanity, and second of all does so in the name of pursuing a future which will not necessarily be more desirable for any living human than a far more modest future either on Earth or in Space, except for the fact that these new post-humanoids will have been maximally washed clean of the sins of colonialism, having acted in such a way as to maximize the total number of (potentially miserable) lives in the universe, and what is more, will have enabled justified even more short term exploitation and inequality—because that is what uneven extraterrestrial development generates-- on their way to doing so.

So, if that is the spirit of space exploitation in the West, is the situation better in China? Here the case is slightly different. I take it as unambiguous that the part of the human body that would be modified to conform with extraterrestrial conditions would conform to the socio-technical imaginary of the Chinese state. One might say that while in a classical version of tianxia, “the ‘Son of Heaven’ (tianzi 天子)” who leads “all-under-heaven and the ten-thousand countries’ (tianxia wanguo 天下万国) as a political cooperative,” literally stands under heaven along with the ten thousand things, in this new articulation, those things which literally are up in heaven are, paradoxically, ever more submitted to the son of heaven.⁷³ Needless to say, from the point of view of Chinese cosmotechnics it is only ambiguous whether or not this is a catastrophe, that would very much depend upon the success of the endeavor, the particular flourishing enabled or disabled. Seen from the point of view of personal liberty, I would tend to think that it constitutes an unmitigated loss, but perhaps that is western bias. Lee and Chen, for example, have recently argued that it will likely be possible to code “complex objective functions” such as built-in nudges to encourage users towards “fairness” and “happiness” into future generations of A.I., and perhaps it is possible to code in a socially acceptable experience of freedom into future

⁷² Robin Hanson, *The Age of Em: Work, Love, and Life when Robots Rule the Earth* (New York: Oxford University Press, 2016), 2.

⁷³ Tingyang, *All Under Heaven: The Tianxia System for a Possible World Order*, 29, 40, 64.

versions of *homo stellaris*.⁷⁴ With respect to the issue of justice, and assuming that the creators of the new technologies will be Chinese with Chinese value biases, once again the case looks bad for the belief that space exploitation will not only save us from limits but also save and even demonstrate the spiritual virtues of Chinese morality. But here once again, a lot depends on the specificities of those biases: where Zhao's argumentation is convincing relates to the idea, based on his studies of the historical example of early Chinese history, that even people of different cultures who were submitted to the son of heaven saw this arrangement, even if it was not strictly speaking just, as beneficial for their well-being. Finally, the question of humanity is raised. Is transforming those you live into transhumans compatible with humanity? Literally it seems inhuman, though most advocates for post-humanism seem to think that it won't be worse. If our judgment remains purely objective, and we assume that the creation of the maximum number of lives such as is imagined by the Effective Altruists is the objective of space exploitation, then it seems difficult to argue that individual lives are likely to be really better—humans may then be nothing more than ghosts in machines floating in the interstellar void. But given that this decision is formally up to the son of heaven within Chinese thought, it seems fair to say that here once again we cannot decide.

Yet what does seem decidable, and this based on contemporary reality, is that the very possibility of space exploitation has transformed *tianxia* into a formidable ideological tool for Chinese thinking, so formidable that it reflects rather darkly on the spiritual legitimacy of the Chinese state, and Chinese morality, as offering up a legitimate alternative to Western thought. This is because we already live in a world in which all is not under heaven. As we have already noted, the Chinese state has already invested heavily in satellite technology, aimed at weaning citizens around the planet off a critical dependence on GPS, and aimed as siphoning off users from new western mega-constellations of data satellites. The fact of the matter is that not everyone is equal under heaven, because some of the ten thousand things are already in heaven, and those are controlled by the interests of the United States, space billionaires, the Chinese state, and a few other actors around the globe. Appealing to the idea that China may show justice to all under heaven may show humanity towards Chinese people, but not towards others, and likewise damages the personal liberty of all by denying critical listeners the right to an accurate—read honest—description of the whole or the cosmos in which we live. Whatever benefits this might accrue for the soft power politics of the Chinese state, it seems to exact a severe toll on the moral legitimacy of Chinese moral thinking as such, just as the Effective Altruist's arguments for space expansionism exert a similarly severe toll on the legitimacy of western moral thinking. In both cases, what occurs is another aspect of the spirit of space exploitation today, namely the exploitation of a bug within inherited cosmotechnics when it comes to thinking about morality in an age of space technologies. This bug comes from the fact that words like heaven have certain associations and functions within inherited cosmotechnics, and those functions malfunction when employed at a super-global scale, perverting moral reasoning in such ways that seemingly moral arguments for space exploitation end up, when viewed historically and critically, undermining or delegitimizing appeals to morality itself.

⁷⁴ Kai Fu Lee and Chen Qiufan, *AI 2041: Ten Visions for Our Future* (New York: Crown, 2021), 30.

5. Beyond Heaven and Earth

This problem seems to me to be hardly addressed in Hui's writings on cosmotechnics. I think that it nevertheless raises significant challenges his thinking, given that he recommends drawing on classical Chinese thinking on "heaven and earth" as a means of cultivating aesthetic education and so healing our relationship to the world.⁷⁵ Yet it is precisely the mis-construal of the significance of these two terms by rocket technology that renders effective the dark spirit of space exploitation, this dark spirit that precisely ends up perverting even a relatively convincing vision of the common future such as Tinyang's *tianxia* into an otherwise questionably moral means of disguising Chinese sovereign interests. Hui develops most of his theory with reference to Heidegger's critique of technology, and he seems to believe that the strong point of Chinese cosmotechnics is that it avoids the tragedy which afflicts western metaphysics. Yet Hui is arguably not a very good reader of Heidegger. He bases his reading of Heidegger's thinking on technology around his early essay, *Die Frage nach der Technik* and on a few later writings, all focused on the existential significance of cybernetics. Yet he completely ignores Heidegger's horror when it came to the question of space technology, what Heidegger called the "rocket age." In a 1961 speech in Messkirch, Heidegger announced:

It is no coincidence that we talk about the technological age. In its history, this itself is subject to the enigmatic frenzy [*rätselhaften Raserei*] that constantly pushes all modern technology beyond itself. Not long ago, the modern age was called the "Atomic Age." The name is already outdated and replaced by that of the "Rocket Age"⁷⁶.

What he is proclaiming here is nothing less than a paradigm shift: what he had written before, with the impact of atomic power in mind, no longer fully applied. What needed now to be thought was the significance of rockets and space technology. Heidegger had again pointed to the extreme importance of space for his thinking on technology in the infamous *Der Spiegel* interview. There he had claimed that the mere fact of seeing the Earth from space was even more existentially consequential than exploding an atomic bomb: "I don't know if you were horrified, I was certainly horrified when I saw the images from the moon to the earth. We don't need an atomic bomb; the uprooting of humankind is already there [*die Entwurzelung des Menschen ist schon da*]."⁷⁷ Why this horror, especially with regards to the kind of image that is supposed to be responsible for making us believe that we live on one globe, one common planet, and hence are necessarily susceptible to opening ourselves to a new cosmic ordering, a renewed organic order beyond the alienations of modern thought imaginable as *tianxia* or, to take a similar figure from contemporary philosophy, Gaia? The answer is clear enough in this fragmentary comment out of Heidegger's late notebooks, penned immediately after he read about the launch of the Russian satellite Luna, the first human object to leave cislunar space, thus becoming an artificial planet:

There is [*es Gibt*] neither "earth" nor "heaven" in the sense of man's poetic dwelling on this earth. What the rocket's orbit achieves is the technical realization of what since three centuries has always more exclusively and decisively been framed

⁷⁵ Hui, *Art and Cosmotechnics*, 169.

⁷⁶ Martin Heidegger, *Reden und andere Zeugnisse eines Lebensweges, 1910-1976* (Frankfurt am Main: V. Klostermann, 2000), 577.

⁷⁷ *Reden*, 670.

[*gestellt*] as Nature and which now stands [*bestellt*] as a universal, interstellar, standing reserve [*Bestand*]. The rocket's orbit [*Raketenbahn*] pushes "earth and heaven" into oblivion [*Vergessenheit*]. The milieu [*Wozwischen*] in which it moves is neither the one nor the other."⁷⁸

Heidegger elaborated the consequentiality of this loss in his essay *Hölderlins Himmel und Erde*, a text in which he exposes a version of the *Geviert*, or the fourfold, which also forms the basis for Hui's thinking on cosmotechnics. Yet without getting into that work, that cold-eyed reckoning of the costs of progress and the horror of existential uprooting, the simple sense and source of Heidegger's horror is this: that any aesthetic construction which had previously invested the terms heaven and earth with moral meaning had suddenly lost its meaning, lost its ability to give the same moral guidance that it had been able to give before Luna. The relationship between the spirit and the letter of talk about heaven, and talk about earth, changed. Just so long as there are technologies in space, there can be no return to a cosmotechnics, a vision of the cosmos, rooted in the old distinctions, as the poetic language itself has become exploitable, ideological. The attraction of other planets on the part of some space futurists as well as many opponents of space expansionism is no in part aligned with a desire to land again, to be able to return to a world in which the heaven and earth have their old sense. This is a desire that has also underwritten the globalization of the imagination, the paradoxical fact that despite living in an age in which almost every aspect of our daily lives has been altered by technologies in heaven, most thinkers have—at least from the late 1990's up until the present—insisted that we live on a closed globe with no meaningful outside. But that was false, that was imperial ideology at work, encouraging us to think about the planet from the viewpoint of remote sensors without simultaneously thinking about those remote sensors, the uneven extraterrestrial development that they implied, and the implications of that unevenness for relations of equality and inequality around what Americans were then fond of calling "the free world."

What is necessary now is perhaps cosmotechnics, but it is not a cosmotechnics which can find, to quote Hui quoting and extrapolating from Heidegger, "another beginning" by embracing an ancient Chinese cosmotechnics as opposed to a Western cosmotechnics.⁷⁹ Even if Hui were right that the absence of tragedy within classical Chinese thinking made it a viable alternative to western metaphysics, I would argue that the rearticulation of the sense of heaven and earth issued in by the dawn of the space age is just as much a tragedy for Chinese cosmotechnics as it is for Western cosmotechnics. The options left to us seem two. We can literally return to Earth as Bruno Latour has advised. Yet the cost of this is exorbitant if we in fact remain committed to protecting human lives. We indeed rely on space technologies for monitoring the planet. Satellites allow us to study our oceans, they allow us to monitor our emissions, to calculate our weather, to understand what our efforts to bring about human flourishing might accidentally be doing to our collective habitat. To come down to Earth, even ignoring the question of settling space which may still have some legitimacy for saving human lives if pursued in the right spirit, is almost without question to condemn many to unjustified and unnecessary deaths. Which leads us to the other

⁷⁸ Martin Heidegger, *Winke I und II*, vol. 101, ed. Peter Trawny, Gesamtausgabe, (Frankfurt a.M.: Vittorio Klostermann, 2020), 157.

⁷⁹ Hui, *Art and Cosmotechnics*, 86.

option, an option which I admit horrified Heidegger but which Derrida, not necessarily enthusiastically, endorsed. That is the ex-orbitant thinking of deconstruction, deconstruction understood as learning to think beyond the orb, beyond the globe, out beyond the inherited disposition of the logos which took as its fundamental opposition, in both the West and in China, the heaven and the earth. Such thinking is hard, disorienting, not necessarily offering us up the quick fix of moral rectitude delivered by the belief that we know how to save everything. But it at the very least has these virtues: It is a positive project, for we can think outer space now that we are in outer space, which if it provides no ground, at least has enough existential weight to allow for differences to be made, allowing for the process of planetization to supplant that of globalization. In thinking planetization, we discover a sphere of agency that has not been under-thought, and which precisely demands the work of poets and artists who can now help us to think not the globe of globalization, but the planet and its extraterrestrial technosphere on which we live. But perhaps most of all, the positive thing about the line of argumentation sketched below is this: if we can return to neither the past of Chinese thought nor the past of Western thought, then we find ourselves not in a battle of civilizations but rather in a situation in which the creativity and resources of each may be of value.

The exorbitant difficulty of thinking contemporary cosmotechnics is illustrated precisely by the focus of this text, and most science fiction, on imagining a future in which human beings will live in space. But that is not the condition that is our prevailing reality. The spacing of outer space, the inclusion of it into our world if not necessarily into our experience of our everyday lives, demands a hybrid thinking, a dimension of space in the terrestrial, a dimension of terrestrial in the extraterrestrial, with the human occupying a place within this system, but not in an evenly distributed way. This means as much as we might want to keep the human in the center, what I hope to have shown is that it is precisely a care for humanity, a concern over how power is exercised by humans over humans, or even a care for life, a concern for how power is exercised by some living beings over other living beings, which draws us out into thinking space, even if what is there is lifeless, and may always be lifeless.

Agama, Ferdinand Onwe. "Effects of the Bogota Declaration on the Legal Status of Geostationary Orbit in International Space Law." *Nnamdi Azikiwe University Journal of International Law and Jurisprudence* 8 (2017): 24-34.

Autry, Greg, and Peter Navarro. *Red Moon Rising: How America Will Beat China on the Final Frontier*. Washington D.C.: Post Hill Press, 2024.

Bastani, Aaron. *Fully Automated Luxury Communism : A Manifesto*. London ; New York: Verso, 2019.

Bezos, Jeff. *Invent and Wander*. New York: Harvard Business Review, 2020.

Blackhawk, Ned. *The Rediscovery of America: Native Peoples and the Unmaking of U.S. History*. New Haven: Yale University Press, 2023.

Blake, Jonathan, and Nils Gilman. *Children of a Modest Star: Planetary Thinking for an Age of Crises*. Palos Altos: Stanford University Press, 2024.

- Bostrom, Nick. "Astronomical Waste: The Opportunity Cost of Delayed Technological Development: Nick Bostrom." *Utilitas* 15, no. 3 (2003): 308-14.
- Brand, Stewart. "Comments on O'Neill's Space Colonies." In *Space Colonies*, edited by Stewart Brand. San Francisco: Whole Earth Catalog, 1977.
- Chaikin, Andrew. *A Man on the Moon: The Voyages of the Apollo Astronauts*. New York: Penguin 2007.
- . "Meeting of the Minds: Buzz Aldrin Visits Arthur C. Clarke." *Space Illustrated*, February, 2001.
- Chen, Quifan. "Space Leek." *Slate.com*. (June 2019).
<https://slate.com/technology/2019/06/space-leek-chen-qiufan-stanley-chen.html>.
- Cheng, Anne. *Histoire De La Pensée Chinoise*. Paris: Editions du Seuil, 2015.
- Clynes, Manfred, and Nathan Kline. "Cyborgs and Space." *Astronautics* (September 1960): 26-7, 74-76.
- Crosby, Alfred. *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*. New York: Cambridge University Press, 2004.
- Curcio, Blaine, Jean Deville, and Chen Lan. *New Space in Asia*. European Space Policy Institute (2021).
- Deudney, Daniel. *Dark Skies : Space Expansionism, Planetary Geopolitics, and the Ends of Humanity*. New York, NY: Oxford University Press, 2020.
- Dyson, Freeman. "Noah's Ark Eggs and Viviparous Plants." In *Starship Century*, edited by Gregory Benford and James Benford Los Angeles: Lucky Bat, 2013.
- Ehrlich, Paul, and Anne Ehrlich. *The Population Bomb*. New York: Ballantine, 1968.
- Ekstrom, Sylvia, Javier Nombela, and Michel Mayor. *Nous Ne Vivrons Pas Sur Mars, Ni Ailleurs*. Lausanne: Libella, 2021.
- Elvis, Martin, and Tony Milligan. "How Much of the Solar System Should We Leave as Wilderness?". Article. *ACTA ASTRONAUTICA* 162 (9/1 2019): 574-80.
<https://doi.org/10.1016/j.actaastro.2019.03.014>.
- Federici, Silvia. *Re-Enchanting the World : Feminism and the Politics of the Commons*. Edited by Peter Linebaugh. Oakland, CA: PM, 2019.
- Ferdinand, Malcolm. *Une Écologie Décoloniale: Penser L'écologie Depuis Le Monde Caribéen*. Paris: Seuil, 2019.
- Foster, John Bellamy. *The Dialectics of Ecology: Socialism and Nature*. New York: Monthly Review Press, 2024.
- Hamilton, Clive. *Earthmasters: The Dawn of the Age of Climate Engineering*. New Haven: Yale University Press, 2013.
- Hanson, Robin. *The Age of Em: Work, Love, and Life When Robots Rule the Earth*. New York: Oxford University Press, 2016.
- Haqq-Misra, Jacob. *Sovereign Mars: Transforming Our Values through Space Settlement*. Topeka: University Press of Kansas, 2022.
- Haraway, Donna. *Staying with the Trouble : Making Kin in the Chthulucene*. Durham: Duke University Press, 2016.
- Hawking, Stephen. *Brief Answers to the Big Questions*. London: John Murray, 2018.
- . "Our Only Chance." In *Starship Century*, edited by Gregory Benford and James Benford Los Angeles: Lucky Bat, 2013.
- Heidegger, Martin. *Reden Und Andere Zeugnisse Eines Lebensweges, 1910-1976*. Frankfurt am Main: V. Klostermann, 2000.

- . *Winke I Und li*. Gesamtausgabe. Edited by Peter Trawny. Vol. 101, Frankfurt a.M.: Vittorio Klostermann, 2020.
- Hui, Yuk. *Art and Cosmotechnics*. New York: University of Minnesota Press, 2020.
- . *The Question Concerning Technology in China: An Essay in Cosmotechnics*. Cambridge, MA: MIT Press, 2016.
- Jiang, Tao. *Origins of Moral-Political Philosophy in Early China: Contestation of Humaneness, Justice, and Personal Freedom*. New York: Oxford University Press, 2021.
- Kilgore, De Witt Douglas. *Astrofuturism : Science, Race, and Visions of Utopia in Space*. Philadelphia: University of Pennsylvania Press, 2003.
- Kraft, N., G.T. Hooft, and J.R. Kass. *Mars One: Humanity's Next Great Adventure: Inside the First Human Settlement on Mars*. Mars One: Humanity's Next Great Adventure: Inside the First Human Settlement on Mars. New York: BenBella, 2016.
- Le Guin, Ursula K. *The Telling*. New York: Harcourt, 2000.
- Lee, Kai Fu, and Chen Qiufan. *Ai 2041: Ten Visions for Our Future*. New York: Crown, 2021.
- Lempert, William. "From Interstellar Imperialism to Celestial Wayfinding: Prime Directives and Colonial Time-Knots in Seti." *American Indian Culture and Research Journal* 45 (January 01, 2021 2021): 45-70.
<https://doi.org/10.17953/aicrj.45.1.lempert>.
<https://ui.adsabs.harvard.edu/abs/2021AICRJ..45..45L>.
- Liu, Cixin. *A View from the Stars: Stories and Essays*. New York: Tor, 2024.
- . *The Wandering Earth*. New York: Bloomsbury, 2016.
- MacAskill, William. *What We Owe the Future*. New York, NY: Hachette 2022.
- Maher, Neil M. *Apollo in the Age of Aquarius*. Cambridge, Massachusetts: Harvard University Press, 2017.
- Malthus, Thomas. *An Essay on the Principle of Population and Other Writings*. Edited by Robert Mayhew. New York: Penguin Books, 2015.
- Marino, Alessandra. "Astroenvironmentalism as Sf: Bordering (and Ordering) Otherworldly Ecologies." *Environmental Humanities* 15, no. 1 (2023): 25-43.
<https://doi.org/10.1215/22011919-10216140>. <https://doi.org/10.1215/22011919-10216140>.
- Mason, Christopher E. *The Next 500 Years : Engineering Life to Reach New Worlds*. Cambridge, Massachusetts: The MIT Press, 2021.
- Mészáros, Istvan. *Beyond Capital: Toward a Theory of Transition*. New York: Monthly Review Press, 2018.
- Mignolo, Walter. *The Darker Side of Western Modernity: Global Futures, Decolonial Options*. London: Duke University Press, 2011.
- Mitchell, A., S. Wright, S. Suchet-Pearson, K. Lloyd, L. Burarrwanga, R. Ganambarr, M. Ganambarr-Stubbs, et al. "Dukarr Lakarama: Listening to Guwak, Talking Back to Space Colonization." *Political Geography* 81 (2020/08/01/ 2020): 102218.
<https://doi.org/https://doi.org/10.1016/j.polgeo.2020.102218>.
<https://www.sciencedirect.com/science/article/pii/S0962629818304086>.
- Moynihan, Thomas. *X-Risk : How Humanity Discovered Its Own Extinction*. Falmouth, United Kingdom: Urbanomic, 2020.

- O'Neill, Gerard K. *The High Frontier : Human Colonies in Space*. Garden City, N.Y.: Anchor Books, 1982.
- Ord, Toby. "The Edges of Our Universe." (2021).
———. *The Precipice : Existential Risk and the Future of Humanity*. New York: Existential risk and the future of humanity: Hachette Books, 2020.
- Parfit, Derek. *Reasons and Persons*. Oxford Clarendon Press, 1984.
- Piantadosi, Claude. *Mankind Beyond Earth: The History, Science, and Future of Human Space Exploration*. New York: Columbia University Press, 2013.
- Pohl, Frederic. *Man Plus*. New York: Tor 2013.
- Pomeranz, Kenneth. *The Great Divergence: China, Europe, and the Making of the Modern World Economy*. Princeton: Princeton University Press, 2021.
- Qing, Jiang. *A Confucian Constitutional Order: How China's Ancient Past Can Shape Its Political Future*. Translated by Edmund Ryden. Edited by D.A. Bell and R. Fan. Princeton: Princeton University Press, 2012.
- Ratzel, Friedrich. *Erdenmacht Und Völkerschicksal* Stuttgart: Alfred Kroner, 1940.
- Régnault, Irénée, and Arnaud Saint-Martin. *Une Histoire De La Conquête Spatiale: Des Fusées Nazies Aux Astrocapitalistes Du New Space*. Paris: La Fabrique Editions, 2024.
- Rieder, John. *Colonialism and the Emergence of Science Fiction*. New York: Wesleyan University Press, 2013.
- "Earth First. Then Mars. An Interview with Kim Stanley Robinson." Updated April 25, 2019, 2019, accessed May 24, 2024, <https://www.publicbooks.org/earth-first-then-mars-an-interview-with-kim-stanley-robinson-reprint/>.
- Rubenstein, Mary-Jane. *Astrotopia: The Dangerous Religion of the Corporate Space Race*. Chicago: University of Chicago Press, 2022.
- Saito, Kohei. *Marx in the Anthropocene: Towards the Idea of Degrowth Communism*. New York: Cambridge University Press, 2023.
- Schmitt, Carl. *Land Und Meer: Eine Weltgeschichtliche Betrachtung*. Stuttgart: Klett-Cotta, 2008.
- Schwartz, Benjamin. *The World of Thought in Ancient China*. Cambridge: Harvard University Press, 2009.
- Seedhouse, Eric. *The New Space Race: China Vs. USA*. Cham: Praxis, 2010.
- Smiles, Deondre. "The Settler Logics of (Outer) Space." *Society + Space*. (26 October 2020). <https://www.societyandspace.org/articles/the-settler-logics-of-outer-space>.
- Tingyang, Zhao *All under Heaven: The Tianxia System for a Possible World Order*. Translated by J.E. Harroff. Edited by O.A. Westad. Berkley: University of California Press, 2021.
- Torres, Émile. *Human Extinction: A History of the Science and Ethics of Annihilation*. New York: Taylor & Francis, 2023.
- Trevino, Nathalie. "Coloniality and the Cosmos." In *The Routledge Handbook of Social Studies of Outer Space*, edited by Juan Francisco Salazar and Alice Gorman. New York: Taylor & Francis, 2023.
- Tsiolkovsky, Konstantin. "The Future of Earth and Mankind." In *Russian Cosmism*, edited by Boris Groys. Cambridge: MIT, 2018.
- Utrata, Alina. "Engineering Territory: Space and Colonies in Silicon Valley." *American Political Science Review* (2023): 1-13.

<https://doi.org/10.1017/S0003055423001156>.

<https://www.cambridge.org/core/product/5D6EA4D306E8F3E0465F4A05C89454D6>.

Vajk, Peter. *Doomsday Has Been Cancelled*. Culver City: Peace Press, 1978.

Wiener, Jonathan B. "The Tragedy of the Uncommons: On the Politics of Apocalypse." *Global Policy* 7, no. S1 (2016): 67-80. <https://doi.org/https://doi.org/10.1111/1758-5899.12319>.

Wolfe, Tom. *The Right Stuff*. New York: Farrar, Straus, Giroux, 1983.

Young, Robert. *Postcolonialism: An Historical Introduction*. London: Wiley, 2016.