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Tsiolkovskii and the Invention of ‘Russian Cosmism’: Science, Mysticism, and the Conquest of Nature at the Birth of Soviet Space Exploration

Asif Siddiqi

As cosmonauts rocketed into the cosmos in the 1960s, the Soviet Communist Party and its mouthpieces produced inspirational rhetoric that repeatedly reinforced the link between its achievements in space and the foundational requirement that made the space program possible, socialism. Most famously, in an oft-quoted aphorism, Nikita Khrushchev was said to have noted that ‘socialism—this is the steadfast launch pad from which the Soviet Union successfully sent into space its powerful modern space ships’.¹ This connection to socialism was frequently articulated as the outcome of historical forces dating back to the disjuncture of 1917, an acknowledgement of the Bolsheviks’ instrumental alignment of their state project with the power of science

¹Anonymous (1962a) ‘Startovaia ploshchadka—sotsializm’, *Sovetskii voen* 17, 1–4. The quotation was originally published as part of a lengthy joint statement of the Central Committee of the Communist Party of the Soviet Union, the Presidium of the USSR Supreme Soviet, and the Council of Ministers in the aftermath of the joint space mission of *Vostok-3* and *Vostok-4* in August 1962.

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and technology. The space program of the 1960s was seen as both an *outcome* of the long and close relationship between socialism and science and technology and an *expression* of that association. The triangulation among socialism, science, and space served as a scaffolding for a multiplicity of meanings and symbols to be ascribed to Soviet cosmic achievements and all were deployed in the service of Cold War rivalry with the USA.

The discourse of socialism, science, and space needed key figures to humanize the Soviet surge into the cosmos. They included a holy trinity of actors, Konstantin Tsiolkovskii, the early twentieth century theorist of space travel, Sergei Korolev, the designer who was the architect behind Sputnik, and Iurii Gagarin, the young and handsome fighter pilot who became the world's first space voyager in 1961. Each, especially as deceased martyrs for the cosmic cause, served as a discursive node around the massive upswell of enthusiasm for space exploration that gripped the Soviet populace in the 1950s and 1960s. For each, there were statues, conferences, memorials, and thousands of books and articles. And each, in their constructed biographies, seemed to embody the kind of rationalism and materialism that fit well with Bolshevik aspirations (rooted in Marxist rhetoric) for a unity between the scientific and the social under Soviet socialism.

While the biographies of Korolev and Gagarin provided relatively uncomplicated canvases for Soviet authorities to imprint their expectations, Tsiolkovskii presented more of a challenge. For one thing, Tsiolkovskii had produced most of his important works during the Tsarist era. In addition, he had never joined the Communist Party although had benefited from its largesse in the last years of his life. But these 'inconsistent' aspects of his career were accommodated or at least de-emphasized given his worthy scientific accomplishments, which the Soviet media claimed had gone unrewarded until the Bol'sheviks came to power in 1917. What appeared in the Soviet media was a linear story of genius: after a long period of self-education in the late nineteenth century, in 1903, Tsiolkovskii, the village school teacher, identified the basic mathematical equations required to make sense of the practical possibility of space travel. Most critically, he did this before contemporaries in Western Europe and the USA. By the 1960s, long after his death (in 1935), Tsiolkovskii's scientific contributions to the advancement of Soviet cosmonautics had been entrenched and then continuously asserted by a growing industry of public fealty orchestrated by official organs of the Soviet state. This campaign eventually became a

deluge as Tsiolkovskii became the center of cultlike devotion that structured his scientific claims around priority, prescience, and progress.²

Yet, if the Soviet space program was the apotheosis of a kind of post-Enlightenment project that merged instrumental views about science and technology with ideas about social engineering ('the Soviet man'), it has become clear in the past two decades that other sensibilities, some seemingly at odds with Bolshevik (and later, Stalinist) exhortations on the materialist context of modern science and technology were somehow responsible for the Russian interest in the cosmos. There is now quite a large body of literature in English—much of it popular—suggesting that the inspiration for Soviet space achievements had little to do with Bolshevik interests in modern science and technology but rather rooted in a uniquely Russian philosophical tradition dating from the late nineteenth and early twentieth centuries called 'Cosmism' or 'Russian Cosmism'. Many connect these ideas to the writings of the well-known Russian Orthodox Christian philosopher Nikolai Fedorovich Fedorov (1829–1903). We learn in many of these writings that Fedorov's 'cosmist' ideas about human destiny in outer space and of the quest to achieve 'victory over death' profoundly influenced Tsiolkovskii and other Russian and Soviet actors in the early twentieth century, thus producing a kind of space *mentalité* that provided the fire to Soviet popular enthusiasms for the cosmos.³ These works all suggest—some explicitly, others implicitly—that the roots of the Soviet space program of the 1960s lie *not* in the Bolshevik materialist and

²For useful biographies in Russian, see Sergei Samoïlovich (1969) *Grazhdanin vselenoi (cherty zhizni i deiatel'nosti Konstantina Eduardovicha Tsiolkovskogo)* (Kaluga: GMIK Named After K. E. Tsiolkovskii); Valerii Demin (2005) *Tsiolkovskii* (Moscow: Molodaia gvardiia). For a short treatment, focusing primarily on Tsiolkovskii's pedagogy and fiction, see James T. Andrews (2009) *Red Cosmos: K. E. Tsiolkovskii, Grandfather of Soviet Rocketry* (College Station, TX: Texas A&M University Press).

³Albert A. Harrison (2013) 'Russian and American Cosmism: Religion, National Psyche, and Spaceflight', *Astropolitics*, 11, 25–44; Vladimir Lytkin, Ben Finney, and Liudmilla Alepko (1995) 'Tsiolkovsky, Russian Cosmism and Extraterrestrial Intelligence', *Quarterly Journal of the Royal Astronomical Society*, 36, 369–76; R. Diordievic (1999) 'Russian Cosmism (with the Selective Bibliography) and Its Uprising Effect on the Development of Space Research', *Serbian Astronomical Journal*, 159, 105–09; Michael Holquist (1985–1986) 'The Philosophical Bases of Soviet Space Exploration', *The Key Reporter*, Winter, 2–4; Vladimir V. Lytkin (1998) 'Tsiolkovsky's Inspiration', *Ad Astra*, November/December, 34–39; Nader Elhefnawy (2007) 'Resurrecting Nikolai Fedorov', *The Space Review*, May 21, <http://www.thespacereview.com/article/873/1>. See also Chap. 9 ('The Scientific Cosmists') of George M. Young (2012) *The Russian Cosmists: The Esoteric Futurism of Nikolai Fedorov and His Followers* (Oxford: Oxford University Press), pp. 145–76.

teleological conception of science and progress but rather in rather more murky epistemologies rooted in mystical dreaming.

There is much to recommend such a line of thinking: it is indeed true that Fedorov's ideas, published in the first decade of the twentieth century, called for migration of humanity into outer space. Fedorov's calling, genealogically part of a long and rich Russian sensibility of mystical, philosophical, and sometimes occultish thought, was indirectly echoed by a number of early twentieth century Russian intelligentsia. Tsiolkovskii (who might have met Fedorov as a teenager) later sprinkled his work with Fedorovesque musings about the rationale for human migration into space. A large part of Tsiolkovskii's writings were undoubtedly mystical and religious in nature, and they are inextricably linked to his more mathematical musings. Yet, much of the recent fascination with 'Russian Cosmism' and its influence over the Soviet space program also misses the mark. Andrew Thomas, for example, ascribes Soviet space exploration largely to Fedorovian philosophy.⁴ A recent documentary by George Carey focusing on Fedorov and Tsiolkovskii helpfully synthesizes the argument: 'it was ... Nikolai Fedorov, who set Russians on course for Yuri [Gagarin's] moment of glory'.⁵ Busy with analyzing the content of Fedorov's and Tsiolkovskii's works—peculiar and esoteric to modern ears—these pronouncements weave a grip on the popular imagination at the cost of historical specificity.⁶

⁴Andrew Thomas (2010) 'Kul'tura Kosmosa: The Russian Popular Culture of Space Exploration', M.A. thesis, De Montfort University, Leicester, UK.

⁵George Carey (2011) 'Why Russia Won the Space Race', *The Telegraph*, April 8, <http://www.telegraph.co.uk/culture/tvandradio/8437995/George-Carey-Why-Russia-won-the-space-race.html>. The documentary in question is *Knocking on Heaven's Door* (2011), BBC Storyville documentary series. I should note that I was thanked in the credits of the documentary for assistance to Mr. Carey.

⁶The best writing in Europe or the USA on 'cosmism' and 'Russian Cosmism' is the work of Michael Hagemester. Hagemester (1997) 'Russian Cosmism in the 1920s and Today' in Bernice Glatzer Rosenthal (ed.) *The Occult in Russian and Soviet Culture* (Ithaca, NY: Cornell University Press); Hagemester (2011) 'The Conquest of Space and the Bliss of the Atoms: Konstantin Tsiolkovskii' in Eva Maurer, Julia Richers, Monica Rüthers, and Carmen Scheide (eds) *Soviet Space Culture: Cosmic Enthusiasm in Socialist Societies* (Basingstoke: Palgrave Macmillan); Hagemester (2012) 'Konstantin Tsiolkovskii and the Occult Roots of Soviet Space Travel' in Birgit Menzel, Michael Hagemester, and Bernice Glatzer Rosenthal (eds) *The New Age of Russia: Occult and Esoteric Dimensions* (Munich: Verlag Otto Sanger), pp. 135–49.

The purpose of my essay is *historically* to contextualize the relative importance of the two dominant narratives of the roots of the Soviet space program—one derived from socialism's supposed social setting as a launching pad for modern science and technology and the other rooted in the metaphysical musings of 'Russian Cosmist' thought, but to do so with an eye to disentangling how history itself has colored our understanding of the relative importance and relationship between the two sensibilities. By doing so, I hope to position the philosophical foundations of Soviet space activities as part of a broader conversation about the meaning of *modernity* in the Russian context, through its instrumental invocation of the 'mastery over nature', and its unsavory eugenicist worldview. I argue that these impulses, the Bolshevik cult of science and technology and the mystic ideas of 'Russian Cosmism', each representing particular rationales for the conquest of space, were responses to fundamentally *modern* questions opened in the early twentieth century by the emergence of discrete scientific disciplines distinct from natural philosophy.

The essay is divided into two parts. In the first section, I highlight the emergence of a culture-wide fascination with desirable futures enabled by scientific and technology in Russia in the late nineteenth century and its alignment with Bolshevik ideology after 1917 and then briefly track its evolution and manifestation across the Soviet era through to the end of the twentieth century. My focus here will be on how popular enthusiasm for space exploration in the 1920s was eventually subordinated to positivist state discourses that understood modern science and technology as a measure of 'progress' under socialism. Such messages inspired many of the main actors in the Soviet space program while also preparing a generation of postwar Soviet citizens to the fact that space exploration by the Soviet state was not only inevitable but absolutely necessary. The key symbol at the center of this discourse was the memory of Konstantin Tsiolkovskii. In the second and longer part, drawing from the writings of Fedorov and Tsiolkovskii, I summarize the basic contours and substance of mystical and Cosmist thought about space exploration, especially as it was embedded in particular historical moments in Russia in the twentieth century. I then conclude with some thoughts on how these disparate strands might be understood as a part of larger Russian narrative about humanity's relationship with the natural world and one possible embodiment of an aspiration for modernity in twentieth century Russia.

THE CULT OF SCIENCE AND TECHNOLOGY

Popular Russian fascination with the instrumental role of science and technology emerged in the late nineteenth century as part of an intersection several phenomena: the appearance of discrete scientific disciplines in Russian universities, the acceleration of industrialization (and consequent popular interest in the aesthetics and mechanics of machines), the rise of private publishers interested in science popularization, and a growing bourgeois and educated demographic.⁷ The tenor of popular engagement with late nineteenth century science was also catalyzed by the predilection of established scientific luminaries—such as the chemist Dmitrii Mendeleev (1834–1907) and the botanist Kliment Timiriazev (1843–1920)—to join editorial boards of several major publishing houses specializing in popular science. Inspired by the example of prominent scientists, Russian intelligentsia increasingly embraced public science as a vocation, producing a spate of new textbooks for the coming generation of young Russians.⁸ The works of foreign writers such as Jules Verne, Camille Flammarion, and H. G. Wells flooded the Russian publishing market and encouraged native Russian writers to take up the cause of scientific fiction. By the first decades of the twentieth century, there were dozens of popular science journals flooding the market. One of the largest private publishers of popular science, Soikin, produced a fleet of magazines with such descriptive names as *Priroda i liudi* (Nature and People), *Mir prikliucheni* (World of Adventure), and *Vestnik znani* (Journal of Knowledge) and issued more than 80 million books that made a deep impression on the generation that came of age at the turn of the century.⁹ Now firmly separated from natural philosophy, modern science appeared as a discrete category of knowledge, marked and admired by many for its explicit stance against ‘superstition’ and ‘backwardness’.¹⁰

⁷Asif A. Siddiqi (2010) *The Red Rockets' Glare: Spaceflight and the Soviet Imagination, 1857–1957* (New York: Cambridge University Press), pp. 16–42.

⁸E. A. Lazarevich (1984) *S vekom naravne: populiariizatsiia nauki v Rossii: kniga, gazeta, zhurnal* (Moscow: Kniga). For more on the emergence of ‘public science’ as a distinct category, see also James T. Andrews (2003) *Science for the Masses: The Bolshevik State, Public Science, and the Popular Imagination in Soviet Russia, 1917–1934* (College Station, TX: Texas A&M University Press).

⁹A. Admiralskii and S. Belov (1970) *Rytsar knigi: ocherki zhizni i deiatelnosti P. P. Soikina* (Leningrad: Lenizdat).

¹⁰Loren R. Graham (1994) *Science in Russia and the Soviet Union: A Short History* (Cambridge, MA: Cambridge University Press); Alexander Vucinich (1963) *Science in*

If these early strands of technological fascination were inchoate and sporadic before the Revolution, they acquired a quasi-utopian tenor after: the Revolution propelled technological visions to move from the wisp of dreams to the arena of possibility. Helped by the hyperbolic claims of early Bolshevik ideologues, after 1917, fascination with science and technology acquired a millenarian tone. The richest expressions of this meeting between utopia, science, and possibility occurred during the years of the New Economic Policy (NEP) when the country moved through rapid economic recovery matched by what Sheila Fitzpatrick has called 'an upsurge of optimism among the Bolshevik leaders'.¹¹ With economic stability more in evidence to the average urban resident, people from all walks of life conjured up possible futures in new and surprising ways. We find a superb chronicle of these anticipations, some of them utopian in language and meaning, in the work of the late Richard Stites who invited readers into a world of mad excitement as actors from all walks of life invoked, debated over, wrote about, and confronted the future.¹² From ritual to religion, mannerisms to machines, and art to architecture, idealized visions of the future pervaded Soviet society at all levels. These were not all suffused with an optimistic glow; there was a deep ambivalence and anxiety to these anticipations, especially in relation to the social consequences of modern science and technology, but the reactions show a grappling with the fundamental shifts in the structure of knowledge evident at the turn of century as 'science' became both a category and a lever for social improvement.¹³

As I have shown elsewhere, ideas about cosmic travel constituted a highly visible aspect of the obsession with science and technology in the 1920s and early 1930s. Its manifestations were multitude: in the hundreds of

Russian Culture: A History to 1860 (Stanford, CA: Stanford University Press); Alexander Vucinich (1970) *Science in Russian Culture, 1861–1917* (Stanford, CA: Stanford University Press); Michael Gordin (2004) *A Well-ordered Thing: Dmitrii Mendeleev and the Shadow of the Periodic Table* (New York: Basic Books).

¹¹ Sheila Fitzpatrick (1994) *The Russian Revolution*, 2nd ed. (Oxford, UK: Oxford University Press), p. 113.

¹² Richard Stites (1989) *Revolutionary Dreams. Utopian Vision and Experimental Life in the Russian Revolution* (New York: Oxford University Press).

¹³ Anindita Banerjee explores the nature of ambivalence about science and technology in her recent book: Banerjee (2012) *We Modern People: Science Fiction and the Making of Russian Modernity* (Middleton: Wesleyan University Press). See also Julia Vaingurt (2013) *Wonderlands of the Avant-Garde: Technology and the Arts in Russia of the 1920s* (Chicago: Northwestern University Press).

articles and books in the Soviet media, driven by key popularizers such as Vladimir Riumin, Iakov Perel'man, and Nikolai Rynin; in the innovative cinema of *Aelita* (1924) and *Kosmicheskii reis* (Space Voyage, 1935), the latter of which featured two spaceships named after Iosif Stalin and Kliment Voroshilov; in the activities of burgeoning amateur enthusiast societies based on Moscow and Leningrad; in the heavily publicized and attended exhibitions on space travel in Kiev (in 1925) and Moscow (in 1927); in art, architecture, poetry, and literature; and in the networks of thousands of disparate activists throughout the country who wrote to each other and exchanged information about space topics.¹⁴ The one single sustained commonality in all of this activity was the figure of Konstantin Tsiolkovskii, who, although largely ignored by the Bolsheviks, was elevated to saintly status by faithful correspondents. One of the organizers of the Moscow cosmic exhibit wrote breathlessly to Tsiolkovskii that united in their zealous belief in the power of 'invention' and 'inventors', they saw Tsiolkovskii as a 'prophet' of the new era of science and technology, 'superior even to [Thomas] Edison', the most recognizable American icon of the age.¹⁵

By the late 1930s, the Bolshevik cult of science and technology had transformed itself from one extreme—idealized visions of the future—into another—a fetish for large-scale infrastructural projects designed to literally submit nature to Soviet power.¹⁶ The Moscow Metro, the industrial factory city of Magnitogorsk, the White Sea-Baltic Sea Canal—these were the living artifacts of Soviet civilization, built by the labor of the new Soviet man but given life by the markers of modern technology—electricity, steel furnaces, diesel tractors, and the assembly line. Beyond their functionality, these projects also represented powerful symbols of national identity; it was assumed and then reiterated in public rhetoric that Soviet power was synonymous with the ability to remake the social, physical, and cultural landscape of the Soviet Union. This link among large-scale technologies, the natural landscape, and national identity were not unique to the Soviet context, but what gave them a particular frisson was the way in which socialism seemed to uniquely energize and embody a populist relationship between nation and technology: socialism made possible the proper social

¹⁴Siddiqi, *Red Rockets' Glare*, pp. 74–113.

¹⁵Efofbi (Ol'ga Kholoptseva) to Tsiolkovskii (3 December 1928), Archive of the Russian Academy of Sciences (ARAN), f. 555, op. 3, d. 199, ll. 5–6.

¹⁶Paul R. Josephson (1995) "Projects of the Century" in *Soviet History: Large-Scale Technologies from Lenin to Gorbachev*, *Technology and Culture* 36, no. 3, 519–59.

organization to foster world class science and technology, which improved the lives of the working class, thus serving as a measure of national prowess on the international stage. This was nowhere more evident than during the early years of the Cold War. In contrasting the 'basic economic law of socialism' with that of capitalism, Stalin himself described the socialist order in 1952 as 'the maximum satisfaction of the constantly rising material and cultural needs of society through the continuous expansion and improvement of socialist production on the basis of better technologies'.¹⁷

The Cold War added fuel to the Stalinist project to use science and technology to conquer nature. Few could ignore that science and technology had helped to fundamentally alter the nature of war, and now, with the arrival of the Cold War as a motivating framework for national imperatives, it promised to transform the nature of 'peace'. Under Stalin and then Khrushchev, the Soviet populace learned (and many undoubtedly believed), the future of science and technology was firmly tied to the future of the Soviet Union. In the 1950s, new popular science journals joined already existing publications such as *Tekhnika-molodezhi* (Technology for Youth), *Znanie-sila* (Knowledge is Power), and *Nauka i zhizn'* (Science and Life), while the market was flooded with biographies of great Russian scientists written for popular consumption. *Nauka i zhizn'* alone had monthly print runs into millions, comparable to lifestyle magazines such as *Ogonek* (Spark).¹⁸

Enthusiasm for space, much like the fascination with nuclear energy, was a significant component of this intersection of postwar scientific and technological optimism with Cold War exigencies.¹⁹ As with the mass interest in the 1920s, Tsiolkovskii was a central figure in this burst of writing on cosmic topics. Soon after the end of the war, a few influential space enthusiasts actively canvassed to elevate Tsiolkovskii's name as a native-born talent within the pantheon of Soviet science. The Soviet Academy of Sciences, for the first time, recognized the value of a self-educated genius to advance the standing of 'Soviet' (as opposed to 'Russian') science

¹⁷I. Stalin (1952) 'Ekonomicheskie problemy sotsializma v SSSR', *Pravda*, October 4.

¹⁸Siddiqi, *Red Rockets' Glare*, pp. 301–13; Mark Kuchment (1990) 'Bridging Two Cultures: The Emergence of Scientific Prose', in Loren R. Graham (ed.) *Science and the Soviet Social Order* (Cambridge, MA: Harvard University Press), pp. 325–40.

¹⁹Paul R. Josephson (1996) 'Atomic-Powered Communism: Nuclear Culture in the Postwar USSR', *Slavic Review* 55, no. 2, 297–324; Paul R. Josephson (1990) 'Rockets, Reactors, and Soviet Culture' in *Science and the Soviet Social Order*, pp. 168–91; Matthias Schwartz (2011) 'A Dream Come True: Close Encounters with Outer Space in Soviet Popular Scientific Journals of the 1950s and 1960s' in *Soviet Space Culture*, pp. 232–50.

and fostered what would become an industry of activity around the late Tsiolkovskii. Numerous celebrations of the late theoretician's birthday after World War II helped to reanimate the possibility of space exploration among the broader public. Commentators in the postwar era took pains to emphasize repeatedly that Tsiolkovskii had conceived his formulae on rocket and space motion before others in the USA and Germany. Arcane and rather lukewarm quotes from Tsiolkovskii on his generally ambivalent feelings toward the Bolsheviks were embellished and traded in publication. Writers repeatedly linked Tsiolkovskii to the Bolshevik cause, both in spirit and practice. Both sought their answers in the materialist conception of the world, it was said, and both had achieved success.²⁰

By their own admission, the positivist science and technology-identified cosmic discourse influenced a generation of space activists and enthusiasts and future managers, engineers, and cosmonauts. For example, in the 1920s and 1930s, the founding designer of the Soviet space program and the architect behind Sputnik, Sergei Korolev, read the works of science popularizer Iakov Perelman (and in fact corresponded with him in the 1930s).²¹ Valentin Glushko, the man who designed the engines that powered Gagarin into orbit, recalled in the 1980s that Perelman's book, *Interplanetary Travels*, sent him 'in the correct direction in his hobby of spaceflight'.²² Future cosmonauts Georgii Grechko, Konstantin Feoktistov, and Boris Egorov, all admitted their future careers were driven to a large degree by their encounter with the works of Perelman and Rynin. Other cosmonaut heroes who gained fame at the height of the Cold War recall reading of the grand future of space travel as young boys and girls, seeing in the technophilic colorful images of *Ogonek* and *Krokodil*, possibilities for both the Soviet Union and themselves.²³

The launch of Sputnik in 1957 cemented the link among socialism, science, and space. In the very first communiqué issued after the satellite's launch, *Pravda* noted that 'artificial earth satellites will pave the

²⁰For Tsiolkovskii's re-appropriation by the Soviet state in the postwar era, see Siddiqi, *Red Rockets' Glare*, pp. 294–301.

²¹Some of this correspondence has been published. See for example, M. V. Keldysh (ed.) (1990) *Tvorcheskoe nasledie akademika Sergeia Pavlovicha Koroleva: izbrannye trudy i dokumenty* (Moscow: Nauka), pp. 52–53, 79–80.

²²Valentin Glushko, introduction to Grigorii Mishkevich (1986) *Doktor zanimatelnykh nauk* (Moscow: Znanie).

²³Many of these reminiscences are interspersed through cosmonaut biographies and autobiographies. See for example, L. Lebedev, B. Lukianov, and A. Romanov (1971) *Syny goluboi planety* (Moscow: Politizdat).

way to interplanetary travel, and ... our contemporaries will witness how the freed and conscientious labour of the people of the new socialist society makes the most daring dreams of mankind a reality'.²⁴ An unprecedented run of space achievements in the 1960s, year after year, helped to reinforce the international image of the Soviet Union as a nation, not of dreary collective farms and obsolete technology but one at the vanguard of a new modern and dynamic future. The congruent nature of Khrushchev's Thaw and the first early burst of cosmic enthusiasm was not coincidental, as the former gave the (discursive) space for the latter to flourish. Both were characterized by optimism for a future aligned with the original (and still unrealized) past dreams of the Bolshevik Revolution.²⁵

By the late 1960s, the Soviet space program had its own trinity of dead heroes—Tsiolkovskii, Korolev, and Gagarin—who loomed over the cosmic discourse. Now the Soviet future in the cosmos had a stable and fixed past from which to access its dreams for the future. Anticipations of the future were frequently articulated in terms of what the trinity did not live to see, thus seamlessly mapping the past into the future in a grand narrative of Soviet space history. In a rare public lecture in 1970 given by one of the architects of the Soviet space program, Mikhail Tikhonravov, the future was still framed in terms of the power of science to remake society. His talk, tellingly titled 'K. E. Tsiolkovskii and the Future' was ostensibly about Tsiolkovskii's visions for what Soviet socialism might do in space. Yet, the speech, even as it described Tsiolkovskii's humanistic vision of human expansion and settlement in outer space, was punctuated with esoteric technical terms and mathematical equations, as if to emphasize the materialist and scientific contours of space travel. Here, according to Tikhonravov, only the cold hard language of modern science (enabled by socialism) could draw a single progressive line from the Soviet past to the Soviet future.²⁶

²⁴ Anonymous (1957) 'Soobshchenie TASS', *Pravda*, 5 October.

²⁵ Much has been written about this period of popular fascination with space. For two recent edited volumes, see James T. Andrews and Asif A. Siddiqi (eds) (2011) *Into the Cosmos: Space Exploration and Soviet Culture* (Pittsburgh, PA: University of Pittsburgh Press); Maurer, Richers, Rütters, and Scheide (eds) (2011) *Soviet Space Culture*.

²⁶ M. K. Tikhonravov (1970) 'K. E. Tsiolkovskii i budushchee' in A. D. Ursal et al. (eds) (1974) *Idei Tsiolkovskogo i problemy kosmonavтики* (Moscow: Mashinostroenie). I elaborate in more detail on the connection between the past and the future in Soviet popular visions of space exploration in: Siddiqi (2012) 'From Cosmic Enthusiasm to Nostalgia for the Future' in *Soviet Space Culture*, pp. 283–306.

INTO THE MYSTIC

The question remained: why *did* Tsiolkovskii advocate for human expansion into outer space? In Tikhonravov's talk in 1970, there is only an enigmatic footnote: 'Justification of the need for occupation of cosmic space is given in some unpublished manuscripts of K. E. Tsiolkovskii'.²⁷ This is partly true. Tsiolkovskii did provide a justification for human migration into space but it was not unpublished. In fact, he published quite a bit of his rationales and thoughts on the issue in the 1910s and 1920s. These copious philosophical musings about the place of humanity in the cosmos represented an odd juxtaposition to his more mathematical works and drew on sensibilities rooted in Orthodox Christianity, mysticism, and the occult. By the time of the Soviet collapse and into the 1990s, this set of articulations about the true destiny of humanity in the cosmos—by then integrated into a larger Russian philosophical worldview named 'Russian Cosmism' linked with the nineteenth century philosopher Nikolai Fedorov—all but eclipsed other possible rationales as the historical root for Russian fascination with the cosmos. So strong was its appeal that one author even imagined that the entire Bolshevik project was Fedorovian in nature.²⁸ Such connections, made largely on the basis of literary echoes of Fedorov in the pronouncements of Bolsheviks unfortunately reveal a kind of ahistoricism, unmoored from specificity, as if Fedorov's ideas were at once everywhere and with everyone to access. Recovering Fedorov and Tsiolkovskii as historical actors, exploring their original philosophical contributions in their particular moments, and reconstructing their influences leads to a more complex and chaotic story.

Fedorov never used the term 'cosmist' or 'Russian cosmist' in his writings, but the text that he left—difficult to follow, often contradictory, and drawing from Eastern and Western philosophical traditions, theosophy, pan-Slavism, and Russian Orthodox thinking—was in the service of one goal: human migration off the planet Earth.²⁹ What one Western writer has called 'one of the most profound, comprehensive, and original ideas in the history of Russian speculation' was, at its core, a striking oeuvre of philosophical thought about the evolution of humanity and the universe,

²⁷Tikhonravov (1970) 'K. E. Tsiolkovskii i budushchee'.

²⁸Dmitry Shlapentokh (1996) 'Bolshevism as Fedorovian Regime', *Cahiers du monde russe: Russie, Empire russe, Union soviétique, États indépendants* 37, no. 4, 429–65.

²⁹Michael Hagemester (1989) *Nikolaj Fedorov: Studien zu Leben, Werk und Wirkung* (Munich: Sagner); George M. Young, Jr. (1979) *Nikolai F. Fedorov: An Introduction* (Belmont, MA: Nordland); Young, Jr. (2012) *The Russian Cosmists*.

and the inviolable relationship between the two.³⁰ Fedorov first formulated this philosophy while a librarian at the Rumiantsev Library (later, the Lenin Library) in Moscow, and although he never published anything during his lifetime, he was said to have communicated his ideas to many. He began preparation of a comprehensive set of his thoughts soon after the turn of the century but died suddenly in 1903. Three years later, they were prepared and issued in a small run of 480 copies by two of his disciples. A second volume was issued in 1913. Neither was for sale but simply distributed to interested intellectuals in a very small community of like-minded thinkers. In this work, grandly entitled *Filosofia obshchego dela* (The Philosophy of the Common Task), Fedorov outlined his basic doctrine: that the 'common task' of all of humanity is to resurrect the dead. This mission stemmed from a distinctly theocratic view of the universe in which he saw Christianity as primarily a religion of resurrection; he believed that humanity's moral task was to emulate Christ and make bodily resurrection possible. Mass resurrection, he argued, would finally eliminate the artificial boundaries among the 'brotherhood' of humanity, that is, between previous and current generations. In other words, none of the ills of society could be solved without devising a solution to the inevitability of death. Using all of the resources at its disposal, including science and technology, humanity, Fedorov believed, should engage in a quest to reassemble the corporeal particles lost in the 'disintegration' of human death, leading to an ideal utopian setting ('as it ought to be'), where there would be no birth and no death, only the progressive reanimation of the deceased millions from history.

Two aspects of Fedorov's 'philosophy of the common task' concerned voyages into the cosmos. First, to achieve his ultimate goal of 'liberation from death', Fedorov called for subordinating humanity's natural environment, which for him included not only the Earth but also the entire universe, to its will. As if to emphasize his point, Fedorov began one key section of his book ('Regulation of Nature') with the words: 'Nature—This is our enemy'.³¹ Indeed, his entire corpus of writings is punctuated with calls for humanity to come together in unison so as to fight, conquer, and submit nature to its own domination, an ideology that found common resonance among many technocratic visionaries of the late nineteenth and early twentieth centuries. In the Soviet context, this stance

³⁰Young (1979) *Nikolai F. Fedorov*, p. 7.

³¹N. F. Fedorov (1995) 'Regulation of Nature' in A. G. Gacheva and S. G. Semenova (eds) *N. F. Fedorov: Sobranie sochinenii v chetyrekh tomakh*, t. 2 (Moscow: Progress), p. 239.

took on a particularly state-identified sheen, as buoyed by Bolshevik claims of remaking the social universe, many Soviet intelligentsia consequently committed to remaking the natural one. The famous Russian geochemist Vladimir Vernadskii, for example, shared similar views (although he probably never heard of Fedorov), and headed the government's Commission for the Study of the Natural Productive Forces (KEPS), a body whose goals encompassed such transformative projects as harnessing solar and electromagnetic forces for the good of Russian society.³²

Beyond subordinating nature to human exploitation, Fedorov believed that humans from Earth would have to travel into the cosmos—to the Moon, the planets, and stars—to recover the disintegrated particles of deceased human beings that are spread throughout the universe. Once the bodies of the deceased were reconstituted (in forms that might not resemble humans), the resurrected would then settle throughout the universe. In his *Philosophy of the Common Task*, Fedorov saw this as a duty, one that was imposed upon *each and every single* human being, living and dead. Citing the most advanced aeronautical technology of the day, he explained that:

The balloon, hovering over the ground, would foster courage and ingenuity ... it would serve, so to speak, as an invitation for all minds [to create] an open path to heavenly space. The duty of resurrection requires such an opening, as without possession of heavenly space the co-existence of all generations is impossible, while on the other hand, without resurrection it is impossible to achieve full possession of heavenly space.³³

There was an explicit Malthusian rationale at work in his ideas:

The need for transfer [from one world to another] is beyond doubt for those who have contemplated all the problems associated with the birth of an ideal society in which social vices and evils would be abolished ... To refuse [to go to] heavenly space would be to refuse to solve the economic problems predicted by Malthus, [and] in general, to reject the moral existence of humanity.³⁴

³²Kendall E. Bailes (1990) *Science and Russian Culture in an Age of Revolutions: V. I. Vernadsky and His Scientific School, 1863-1945* (Bloomington, Ind.: Indiana University Press); G. P. Aksenov (1993) 'O nauchnom odinochestve Vernadskogo', *Voprosy filosofii* no. 6, 74–87.

³³N. F. Fedorov (1995) 'Part IV: What is our Goal?' in A. G. Gacheva and S. G. Semenova (eds) *Sobranie sochinenii v chetyrekh tomakh*, t. 1 (Moscow: Progress), p. 255.

³⁴Fedorov, 'What is our Goal?', p. 256.

As a prelude to migration off the Earth, Fedorov also proposed two other technical projects: the 'regulation of atmospheric phenomena' and 'control over the movement of the Earth' as a kind of giant spaceship. All these, he predicted would be possible with the use modern science and technology.

During his lifetime, Fedorov's unusual ideas—at least his more religious Christian-identified ones—were known and admired by some very famous exemplars of late nineteenth-century Russian intelligentsia, for example, Tolstoy and Dostoyevsky, but by and large his legacy was rather limited. The few who took up the case, the so-called *Fedorovtsy*, were small in number and gained some visibility only in the 1920s. By then, most were captivated not by an engagement of the spiritual and Christian dimensions of Fedorov's plan—although they were committed to those—but more by how science and technology could make Fedorov's ideas come true. The most active of these *Fedorovtsy* was Aleksandr Gorskii (1886–1943), a rather obscure Moscow-based poet and musicologist who became obsessed with the idea of conquering death. Gorskii published a small print run book about Fedorov in the late 1920s—probably the only book about Fedorov published in that decade—but mostly he served as the center of a small network of like-minded thinkers, many of whom had a shared interest in theosophy and the occult—and indeed had connections with well-known occultists and mystics both in Russia and abroad.³⁵ They were not terribly successful in disseminating and sharing information about Fedorov, and although there were others in the NEP cultural era who also shared similar goals of immortality, none ever explicitly cited Fedorov as a direct influence.³⁶ Besides the small group of *Fedorovtsy*, the 'Anarchist-Biocosmists' were the most active group whose claims echoed those by Fedorov. Organized around 1920, the group's explicit goal was to make immortality a reality in the Soviet era. Upon Lenin's death, the group, essentially an artists' collective, announced that they would initiate

³⁵They included Vasilii Chekrygin (1897–1922), Nikolai Setnitskii (1888–1937), Aleksei Brusilov (1853–1926), Olga Forsh (1873–1961), and Iuliia Danzas (1879–1942). Hagemester provides a detailed survey of the *Fedorovtsy* in his Hagemester (1989) *Nikolaj Fedorov*, pp. 343–62. Besides Gorskii, the most well-known Fedorov devotee in the 1920s was probably Valerii Muravev (1885–1930) about whom little is known. See V. G. Makarov (2002) 'Murav'ev V. N.: Ochelovechennoe vremia', *Voprosy filosofii* no. 4, 100–28; V. G. Makarov (2003) "'Otnosias sochuvstvenno k sushchestvuiushchemu stroiu ...': sledsvennoe delo 1929 g. filosafo-kosmista V. N. Muraeva', *Otechestvennyye arkhivy*, no. 1.

³⁶Nikolai Kremetsov (2014) *Revolutionary Experiments: The Quest for Immortality in Bolshevik Science and Fiction* (New York: Oxford University Press).

a program to resurrect Lenin.³⁷ For a short while, they published two journals, *Biokosmist* and *Bessmertie* (Immortality) with contributions mostly in the form of poems—paens to fighting death. The group, also known as the Biocosmist-Immortalists, didn't last very long and left a light imprint on cosmic discourse in the 1920s, recovered only by historians recently.³⁸

One major Soviet intellectual figure who did speak of Fedorov on occasion in the 1920s was Maksim Gorkii who saw in the emergence of Soviet power a new ability of society to master and 'regulate nature' in the service of social 'progress'. His animus toward death no doubt also made Fedorov's ideas more attractive, although Gorkii distanced himself from the possibility that immortality was actually possible. In his memoirs, we learn that Gorkii considered Fedorov 'remarkable' and an 'original thinker' and what Gorkii remembered about Fedorov was at least once noticed by a highly placed Bolshevik. In a short piece to note the 100th birthday of Fedorov, *Izvestiia* reported that M. I. Kalinin, the nominal head of the Soviet state, was told of a Fedorov aphorism by Gorkii himself, that 'Freedom without command over nature—this is the same as the liberation of peasants without land'.³⁹ This rare invocation of Fedorov's ideas in the public eye notwithstanding, the 'philosophy of the common task' did not widely circulate among Soviet intelligentsia in the 1920s and 1930s. Fedorov's original works were few in number, and although there are some sporadic references to Fedorov in the Soviet press in the 1920s, no major work ever seriously considered his ideas during the NEP era at a time when many mystical, occultish, and metaphysical ideas were routinely tolerated in public discourse. Undoubtedly there were a number of prominent Soviet intelligentsia—for example, the geochemist Vladimir Vernadskii—who had similar ideas about the relationship between humanity and nature, or whose ideas one might consider metaphysical or mystical nature, but it is difficult if not impossible to attribute any of this to the *Philosophy of the Common Task*. Certainly, there is no evidence to suggest that *any* of the active cosmic travel activists of the 1920s, such as Fridrikh Tsander, Mikhail Lapirov-Skoblo, Moris Leiteizen, Iakov Perelman,

³⁷ A. Sviatogor, N. Lebedev, and V. Zikeev (1924) 'Golos anarkhistov', *Izvestiia*, January 27; A. Sviatogor, P. Ivanitskii, V. Zikeev, and E. Grozin (1924) 'Deklaratsiia kreatoriia rossiiskikh i moskovskikh anarkhistov-biokosmistov', *Izvestiia*, January 4.

³⁸ For the Biocosmist manifesto, see A. Sviator (2000) 'Biokosmizm: biokosmicheskaia poetika' in S. B. Dzhimbinov (ed.) *Literaturnye manifesty ot simvolizma do nashikh dnei* (Moscow: XXI vek-soglasie), pp. 305–14.

³⁹ A. Gornostaev (1928) 'N. F. Fedorov', *Izvestiia*, December 28.

Nikolai Rynin, Grigorii Kramarov, and Vladimir Vetchinkin ever took Fedorov's ideas as sources of inspiration.⁴⁰

Fedorov was not forgotten in the 1940s and 1950s—his name and contributions could be found in encyclopedias, for example—but by and large, there were none who critically re-evaluated his contributions and legacy. The study of Fedorov was infused with life only in the late 1970s, when a few working philosopher-academics, led by a graduate of the Gorkii Literary Institute, Svetlana Semenova, began publishing articles in the Soviet media advocating a singular place for Fedorov in the longer tradition of modern Russian philosophy. For their project, they appropriated the neologism 'Russian Cosmism', which had been circulating since about 1970 to describe Fedorovian ideas about ensuring the future of humanity through controlling nature, resurrection, and migration into the cosmos.⁴¹ Inspired by the work of Semenova (who prepared a rather hastily edited selection of Fedorov's writings in Moscow in 1982), others joined to comment on the 'Russian Cosmist' tradition.⁴² Seeing in it resonances of the work of many other prominent Russian intellectuals of the *fin-de-siècle* era, including Vladimir Vernadskii, Vladimir Solovev, Aleksandr Chizhevskii, and, most strikingly, Konstantin Tsiolkovskii, the founding theorist of Soviet space travel, the literature on 'Russian Cosmism' ballooned in the 1990s into a full-fledged intellectual movement that has now intertwined with both ultra-nationalist Russocentric strands in post-socialist Russia *and* growing transhumanist movements that seek to imagine human life beyond its current human form. These modern day Russian Cosmists see the older turn-of-the-century thinkers as part of a lineage of likeminded individuals who were confronting a suite of humanistic problems. As part of this constructed history, what was rather disparate and atomized in individual writing has been structured into a more cohesive

⁴⁰For the space activists, see Asif A. Siddiqi (2008) 'Imagining the Cosmos: Utopians, Mystics, and the Popular Culture of Spaceflight in Revolutionary Russia' in Michael Gordin, Karl Hall, and Alexei B. Kojevnikov (eds) *Osiris*, 2nd Series, Vol. 23 (*Intelligentsia Science: The Russian Century, 1860–1960*) (Chicago: University of Chicago Press), pp. 260–88.

⁴¹Probably the first use of the term 'Russian cosmism' in a publication can be found in R. A. Gal'tsev (1970) 'V. I. Vernadskii' in F. V. Konstantinov (ed.) *Filosofskaia entsiklopediia*, t. 5 (Moscow: Sovetskaia entsiklopediia), p. 624. See V. P. Rimskii and L. P. Filonenko, 'Sudba termina "Russkii kosmizm"', paper presented at 2012 Tsiolkovskii Readings, <http://readings.gmik.ru/lecture/2012-SUDBA-TERMINA-RUSSKIY-KOSMIZM>.

⁴²A. V. Gulyga and S. G. Semenova (eds) (1982) *N. F. Fedorov: Sochineniia* (Moscow: Mysl).

philosophical tradition. Resonance and echoes of each other writings are deployed as evidence of an active ideological movement in the early twentieth century.⁴³

Besides Fedorov, the central actor in this constructed genealogical tradition is Konstantin Tsiolkovskii whose mystical pronouncements provide rich evidence of the so-called spiritual and mystical roots of Soviet space exploration. Fedorov's ideas of restructuring humanity and the cosmos, and especially the central role of science and technology in this transformation, anticipated Tsiolkovskii's writings, which are also suffused with the Promethean urge to remake everything that surrounds us. There is also a key piece of evidence that connects Fedorov with Tsiolkovskii: the two may have met. While in Moscow as a teenager, from 1873 to 1876, Tsiolkovskii had seen Fedorov, who worked as a librarian at the Chertkovskii Public Library. In an autobiography published after his death (in 1939)—and repeated many times over the decades—Tsiolkovskii noted that 'in the Chertkovskii Library I *met* one of its employees ... [who] turned out to be the well-known ascetic Fedorov ... [he] donated his salary to the poor. I now realize that he wanted to give me his pension [too]. But in this he did not succeed: I was too shy'.⁴⁴ Over the years, many have embellished these brief observations, and without any evidence, created an entire narrative of the supposed friendship between these two men; it was noted that during their many meetings, Fedorov inculcated the young Tsiolkovskii with the idea of space travel.⁴⁵ Others have suggested that Fedorov influenced the young

⁴³There is a vast body of literature on the imagined history and current concerns of Russian Cosmism. For general overviews from the early 1990s, see L. V. Fesenkova (ed.) (1990) *Russkii kosmizm i sovremennost* (Moscow: IFAN); Svetlana Semenova (1992) 'Russkii kosmizm', *Svobodnaia mysl'* no. 17, 81–97; S. G. Semenova and A. G. Gacheva (eds.) (1993) *Russkii kosmizm: antologiiia filosofskoi mysli* (Moscow: Pedagogika-Press); O. D. Kurakina (1993) *Russkii kosmizm kak sotsiokulturnyi fenomenon* (Moscow: Moskovskii fiziko-tekhn. in-t); V. N. Demin and V. P. Seleznev (1993) *K zvezdam bystree sveta: russkii kosmizm vchera, segodnia, zavtra* (Moscow: Akademiia kosmonavtiki im. K. E. Tsiolkovskogo).

⁴⁴K. E. Tsiolkovskii (1939) 'Cherty iz moei zhizni' in N. A. Islentev (ed.) *K. E. Tsiolkovskii* (Moscow: Aeroflot), pp. 15–25 (see page 27 for the quote).

⁴⁵The legend that Fedorov pointed Tsiolkovskii in the direction of space travel probably originated from scientist Viktor Shklovskii in Shklovskii (1971) "K" in "Kosmonavtika ot A do Ia", *Literaturnaiia gazeta*, April 7. See also V. E. Lvov (1977) *Zagadochnyi starik: povesti* (Leningrad: Sov. pisatel).

man to take up a kind of 'cosmist' philosophy.⁴⁶ The evidence in fact suggests no such thing. An inspection of Tsiolkovskii's original handwritten biography shows clearly that publications added details that were absent in Tsiolkovskii's own writings; in the original, Tsiolkovskii merely noted that he had only *seen* Fedorov, possibly once, and implied strongly that they never spoke a word.⁴⁷ In all his copious writings, both published and private, Tsiolkovskii mentioned Fedorov only that one instance, and it remains unclear how or when Tsiolkovskii was exposed to the works of Fedorov.⁴⁸ Rumor and legend have grown around this meeting, but the circumstantial evidence suggests nothing of substance was exchanged.

After his brief stay in Moscow, Tsiolkovskii moved around several times, from provincial town to town, ending up in Borovsk (in 1880) and then finally Kaluga (in 1892). It was then that he began to publish modest articles in popular science journals about a variety of topics, all loosely grouped around aeronautics. His passion was to design a passenger airship. As he became more prolific, and influenced by Jules Verne, he published science fiction dealing with space travel. Then, finally in 1903, he issued his most important mathematical work, substantiating the possibility of space travel using liquid propellant rockets. Followed by supplements in 1911–1912 and finally, in 1914, this set of writings on the mechanics of launching objects into space and the physics of human spaceflight constitute the first fully coherent mathematical intervention anywhere in the world into what until that moment had been entirely a discourse of speculation and myth. In the second part of his series, he noted very clearly his most important influence: 'the first seeds of the idea [of using rockets for space exploration] were cast by the famous fantasy writer Jules Verne [who] awakened in my mind [thoughts] in this direction'.⁴⁹

⁴⁶ Konstantin Altaiskii (1966) 'Moskovskaia iunost Tsiolkovskogo', *Moskva*, no. 9, 176–92. See also all the sources cited in Refs. 3, 4, and 5.

⁴⁷ In his original pencil-written notes, Tsiolkovskii notes that in the library he '*noticed* one of [the library] employees' rather than he '*met* one of the [library] employees'. See K. E. Tsiolkovskii, 'Cherty iz moei zhizni' (1934–1935), ARAN, f. 555, op. 2, d. 14, ll. 1–29ob (See especially. ll. 12ob–13).

⁴⁸ One of Tsiolkovskii's earliest biographers (who also knew him well), B. N. Vorobev, wrote in 1940 that according to the testimony of scientist's family, Tsiolkovskii learned of the philosophical works and personal life of Fedorov from magazine articles in his adulthood and that there is no evidence to suggest that the two ever spoke to each other. See B. N. Vorobev (1940) *Tsiolkovskii* (Moscow: Molodaia gvardiia), pp. 29–30.

⁴⁹ K. Tsiolkovskii (1911) 'Issledovanie mirovykh prostranstv reaktivnymi priborami', *Vestnik vozdukhoplavaniia* no. 19, 16–21. Quote on p. 16.

Through this period Tsiolkovskii read voraciously, not only the standard and latest contributions of European modern science but also, for the first time, more esoteric works, what even in those days might be considered mystical in content, such as the theosophist writings of Madame Helena Blavatsky, which, as Maria Carlson has shown, were not difficult to obtain in Russia.⁵⁰ By the mid-1910s, after publishing his mathematical writings, he began to articulate a semi-coherent philosophy about the justification for space travel, one that reflected his reading interests, a hodgepodge of Christian eschatology, theosophy, and various Western and Russian mystics. As with his more mathematical considerations which were also self-published in Kaluga, he began to publish his ‘philosophical’ ideas in small booklets, the first being *Nirvana* (1914), followed by *Grief and Genius* (1916), a meditation on how to cultivate ‘geniuses’ in society, a clear clue that Tsiolkovskii was flirting with then-fashionable eugenicist ideas among certain Western European and American intellectuals and spiritual leaders.⁵¹ Undoubtedly these ‘philosophical’ brochures that he self-published must have puzzled Tsiolkovskii’s more materialistic-minded followers who expectantly followed his mathematics on airplanes, airships, and rockets. But these two strands of his writing—the one seemingly more mathematical and the other more meditative—began to merge into a holistic body of work by the time that the Bolsheviks came to power and intertwined and influenced each other throughout the remainder of his life. And although his ‘philosophical’ writings were less well-known and certainly less discussed, they form a body of work that *far* exceeds in size his works on aeronautics, rocketry, and space travel.⁵² Just as popular Soviet enthusiasm for the science of cosmic travel peaked in the 1920s—helped by Tsiolkovskii’s mathematical articles—he simultaneously self-published works with such enigmatic titles as *The Wealth of the Universe* (1920),

⁵⁰ Maria Carlson (1993) *No Religion Higher Than Truth: A History of the Theosophical Movement in Russia, 1875–1922* (Princeton, NJ: Princeton University Press).

⁵¹ Christine Rosen (2004) *Preaching Eugenics: Religious Leaders and the American Eugenics Movement* (New York: Oxford University Press); Marouf A. Hasian, Jr. (1996) *The Rhetoric of Eugenics in Anglo-American Thought* (Athens, GA: University of Georgia Press).

⁵² During his lifetime Tsiolkovskii published 68 philosophical works. A much larger number was never published. See T. N. Zhelnina and V. M. Mapelman (1996) ‘K izucheniiu praktiki izdaniia filosofskikh sochinenii K. E. Tsiolkovskogo’, *Trudy XXVIII chtenii, posviashchennykh razrabotke nauchnogo naslediiia i razvitiuu idei K. E. Tsiolkovskogo (Kaluga, 14–17 Sentiabria 1993 g.): Sektsiia ‘Issledovanie nauchnogo tvorchestve K. E. Tsiolkovskogo i istoriia aviatsii i kosmonavtiki’* (Moscow: IET AN SSSR), 65–87.

The Origins of Life on Earth (1922), *Monism of the Universe* (1925), *Reason for Space* (1925), *The Future of Earth and Humanity* (1928), *The Will of the Universe: Unknown Intelligent Forces* (1928), *Love for One Self or the Source of Egoism* (1928), *Intellect and Passion* (1928), *The Social Organization of Humanity* (1928), and *The Goal of Stellar Voyages* (1929).⁵³

Nearly 20 years after having laid out the various mathematical problems of space program, Tsiolkovskii articulated his rationale for this endeavor, bringing a messianic and transformative vision to the *cause* of space exploration, one that echoed Fedorov's ideas about immortality and cosmic unity. And like Fedorov, he elevated above all what he considered the absolute certainty of 'modern science' while at the same time seeking a kind of unity between the human and physical worlds.⁵⁴ Tsiolkovskii drew from a whole panoply of influences, only some of which he explicitly acknowledged. For example, his writings show a clear influence of the Bavarian philosopher-mystic Carl Du Prel (1833–1899), famous for drawing a link between cosmic and biological evolution, especially the notion that Darwinian natural selection acted on planetary bodies just as they acted on living organisms. Tsiolkovskii undoubtedly took from Russian theosophists, some of whom already had mentioned 'cosmic' ideas long before he did, and some of whose Russian adherents later lived in Tsiolkovskii's hometown of Kaluga.⁵⁵ There were some direct but unacknowledged allusions to the writings of Madame Blavatsky. And as Michael Hagemeister has noted, many of Tsiolkovskii's ideas on matter and universal consciousness were not original; he liberally appropriated concepts from such late nineteenth-century European thinkers as Gustav Fechner (1801–1887) and Ernst Haeckel (1834–1919), whose works were in Tsiolkovskii's library.⁵⁶

⁵³ All of these works—and many others which were unpublished during his lifetime—have been compiled together into one volume: V. S. Avduevskii (ed.) (2001) *K. E. Tsiolkovskii: kosmicheskaia filosofiia* (Moscow: URSS).

⁵⁴ For a comparative overview of the philosophies of Fedorov and Tsiolkovskii, see V. V. Kaziutinskii (1997) 'Kosmizm i kosmicheskaia filosofiia', in B. V. Raushenbakh (ed.) *Osvoenie aerokosmicheskogo prostranstva: proshloe, nastoiashchee, budushchee* (Moscow: IIET RAN), pp. 139–44.

⁵⁵ For 'cosmic' theosophist ideas in English from the late nineteenth century, see John Fiske's *Outlines of Cosmic Philosophy* (1874) and Richard M. Bucke's *Cosmic Consciousness: A Study in the Evolution of the Mind* (1901).

⁵⁶ Hagemeister (2012) 'Konstantin Tsiolkovskii and the Occult Roots of Soviet Space Travel'.

In Tsiolkovskii's worldview, the occult, theories of evolution, and Christianity existed without contradiction, and he expended much energy explaining biblical events with the aid of modern-day science. But his vision principally encompassed two evolutionary projects: first, to enable the migration of humanity off the Earth due to what he saw as irreversible problems on Earth (overpopulation and various geological and cosmic threats including extinction of the Sun); and, second, having left the Earth, to 'perfect' humankind, which would evolve into a kind of universal and immortal energy or radiation representing the best examples of people, lower and defective organisms having been left behind or destroyed. The 'scientific' basis for these two projects depended on an acceptance of two related ideas, *monism* and *panpsychism*, described in detail in *Monizm vselennoi* (Monism of the Universe), a brochure Tsiolkovskii self-published in 1925 that was the most complete published statement of his 'cosmic philosophy'.⁵⁷ Taking from Haeckel and Fechner among others, Tsiolkovskii articulated a striking worldview of 'human progress' embedded in universal time and space. According to Tsiolkovskii's monism, all matter in the universe, including organic matter, is made of a single substance, has the same structure, and obeys the same set of laws. Similarly, panpsychism was to him the belief that all matter is made up of 'atoms of ether', smaller than 'regular' atoms, which are in and of themselves *living organisms* or 'happy atoms'. Different living beings with differing abilities for expression result when these atoms combine in different ways. Because these 'ether atoms' are indestructible, there is no such thing as true death since the atoms can be reconstituted in different combinations from the one that gave life to a specific human being. Mortality is thus simply a mirage. In one of his brochures, *Volia vselennoi* (Will of the Universe), published in 1928 in Kaluga, he wrote:

Death is one of the illusions of a weak human mind. There is no death, for the existence of an atom in inorganic matter is not marked by memory and time—it is as if the latter does not exist at all. The multitude of existences of the atom in the organic form merges into one subjectively uninterrupted and happy life ... The Universe is made in such a way, that it is not only immortal, but that its parts are also immortal in the form of blissfully happy living beings. There is no beginning and no end to the Universe, there is also no beginning and no end to life and its bliss.⁵⁸

⁵⁷ K. E. Tsiolkovskii (1925) *Monizm vselennoi* (Kaluga: K. E. Tsiolkovskii). Tsiolkovskii republished the brochure with some minor additions and changes in 1931.

⁵⁸ K. Tsiolkovskii (1928) *Volia vselennoi: neizvestnye razumnye sily* (Kaluga: K. Tsiolkovskii), p. 7.

This philosophy explained to a large degree Tsiolkovskii's surprising lack of sorrow when several of his children died young, two of them from suicide.

He amplified these ideas in an eight-page meditation titled simply, 'Kosmicheskaia filosofiiia' (Cosmic Philosophy) that he wrote months before his death in 1935.⁵⁹ Making use of a crude concoction of ideas from post-Enlightenment science, Russian Orthodox Christianity, and Buddhism (such as reincarnation), he ruminated on the goal of 'perfecting' humanity. He believed that once humans—led by 'presidents' who would introduce new ways of living—had gained absolute control over nature and had moved out into space, they would develop ideal relationships with each other. Tsiolkovskii's view on the proper relationship between humanity and nature reflected a belief that 'man' was the most supreme being in the universe. Although humans and the matter around them were essentially made from the same constituents, humans were capable of finer forms of reason that elevated them beyond a rock or a planet. As such, it was man's duty to master nature to introduce order and eliminate chaos. Humans should also harness the power of the universe, such as solar energy, for the improvement of people.⁶⁰ His technical works are sprinkled with allusions to space travel representing a 'victory over gravity'. He equated this liberation over nature with liberation over ignorance and imperfection in the human social landscape. Living in open space would allow humans to evolve biologically into a new species, an immortal 'Homo Cosmicus', capable of living naturally in open space, using ambient solar energy.

Tsiolkovskii makes no mention of Fedorov in any of his works although he was more than likely aware of *Philosophy of the Common Task*.⁶¹ While there

⁵⁹The essay was first published (in edited form) in 1981. See K. E. Tsiolkovskii (1981) 'Kosmicheskaia filosofiiia', *Tekhnika-molodezhi* no. 4, 22–26. The original is in ARAN, f. 555, op. 1, d. 534, ll. 20–27ob.

⁶⁰Tsiolkovskii believed that the short-term goal of humans in space was to use the energy resources of the solar system to improve the lot of the human race. In *Kosmicheskie raketnye poezda* (Cosmic Rocket Trains), he noted that '[c]onquering the solar system will yield not only energy and life that will be two billion times more plentiful than Earth's energy and life, but spaciousness which will be even more abundant'. He also pointed to other sources of energy besides the Sun., particularly, mineral resources on the asteroids (or minor planets) that circle the Sun. beyond the orbit of Mars. He meditated on the technical, managerial, and economical challenges of setting up industry in outer space for extraction and use of various minerals. For the quote, see K. E. Tsiolkovskii (1929) *Kosmicheskie raketnye poezda* (Kaluga: Kollektiv sektsii nauchnykh rabotnikov), p. 8.

⁶¹The few hints that Tsiolkovskii was aware of Fedorov's 'philosophy of the common task' come from second-hand sources, particularly the journalist Konstantin Altaiskii-Korolev (1902–78) who, in the 1960s, wrote about his private conversations with Tsiolkovskii. Altaiskii (1967) *Tsiolkovskii rasskazyvaet ...* (Moscow: Detskaia literatura). Altaiskii claimed

are obvious similarities—the use of science and technology for the migration of humans off the Earth—there are also key differences. Fedorov, for example, did not seek perfection of humanity in space, nor did he envision human transformation into energy. Both, however, had deeply troubling aspects. Nikolai Fedorov's 'common task', for example, can be interpreted as distinctly totalitarian given its explicit rejection of choice: human freedom was circumscribed by the expectations and limits of cosmic evolution. In other words, each and every last human being would *have* to participate in his project and submit to the 'will of the universe' for the 'common task' to have any meaning. More ominously, Tsiolkovskii's view of the search for human perfection clearly incorporated contemporary racist and eugenicist ideas. In his 'theory of rational egoism', Tsiolkovskii advocated the extermination of imperfect plants and animal life and called for, as he noted in a 1928 booklet, the 'battle against the procreation of defective people and animals'.⁶² This view was most strikingly articulated in a piece finished in 1918:

I do not desire to live the life of the lowest races [such as] the life of a negro or an Indian. Therefore, the benefit of any atom, even the atom of a Papuan, requires the extinction also of the lowest races of humanity, and in an extreme measure the most imperfect individuals in the races.⁶³

Was anyone paying attention to these musings of Tsiolkovskii in the 1920s and 1930s when the first enthusiasts of space travel were simultaneously articulating their visions of the future? A few people certainly read them, some of them loosely connected to the *Fedorovtsy*. For example, we know of Aleksandr Chizhevskii, the young intellectual who, influenced by occult writings, wrote extensively on the relationship between cosmic factors (such as sunspots) and social activity on Earth. Chizhevskii wrote a German-language introduction for one of Tsiolkovskii's mathematically inclined monographs on rocketry, but he also had links to Leonid Vasiley,

that Tsiolkovskii told him that he heard about Fedorov's ideas about ten years after 'publication' of the *Philosophy of the Common Task*, but it is not clear if he meant publication of the first volume (1905) or the second (1913).

⁶² Tsiolkovskii quoted in Hagemeister (1997) 'Russian Cosmism in the 1920s and Today', p. 202.

⁶³ K. Tsiolkovskii (2001) 'Etika ili estestvennye osnovy npravstvennosti' in *K. E. Tsiolkovskii: kosmicheskaia filosofia*, p. 82. For one of the few Russian commentators to investigate Tsiolkovskii's racist and eugenicist ideas, see N. Gavriushin (1992) 'Kosmicheskii put k vechnomu blazhenstvu' (K. E. Tsiolkovskii i mifologiiia tekhnokratii)', *Voprosy filosofii* no. 6. 125–31.

the telepathy researcher who was a member of the short-lived Biocosmists in Moscow.⁶⁴ Tsiolkovskii also corresponded with Maksim Gorkii, the erstwhile fan of Fedorov. The writer had apparently heard of Tsiolkovskii during his exile via the latter's 1925 work *Prichina kosmosa* (Reason for Space), a meditation on humanity's spiritual calling to go to space. Although Gorkii intended to visit Tsiolkovskii in Kaluga upon his return to the Soviet Union in 1928, the two never met. Tsiolkovskii, however, sent Gorkii many of his philosophical brochures; unfortunately, there is no evidence to indicate what he thought of them. Their last contact was in 1932 when Gorkii sent a well-publicized congratulatory letter to the 'interplanetary old man' (as he liked to call Tsiolkovskii) on his 75th birthday.⁶⁵ Another possible reader of Tsiolkovskii's philosophy was the famous Russian poet Nikolai Zabolotskii although, like Gorkii, he has left very little of note to suggest what exactly he might have gleaned from Tsiolkovskii.⁶⁶

There is no record of published commentary in the 1920s and 1930s on any of Tsiolkovskii's more philosophically minded works in the Soviet media. At a time when ideas beyond the prevailing epistemologies of modern science—such as telepathy, blood transfusionology, the search for immortality, and the noosphere—still remained as entirely appropriate subjects for public discussion, Tsiolkovskii's 'cosmist' ideas (a term he never used) had little or no public resonance, especially among likeminded space enthusiasts. In fact, in the prolific writings of the famous science popularizers Iakov Perelman and Nikolai Rynin, or the brilliant interplanetary theorist Iurii Kondratiuk, or the pioneering rocket engineers Mikhail Tikhonravov, Fridrikh Tsander, Sergei Korolev, and Valentin Glushko,

⁶⁴For Chizhevskii's famous introduction, see Alexander Tshijewsky (1924) 'Anstatt eines Vorworts', in K. E. Tsiolkovskii, *Raketa v kosmicheskoe prostranstvo* (Kaluga: K. E. Tsiolkovskii), unnumbered preface page. Chizhevskii's most famous work on 'helio-biology' was published the same year: Chizhevskii (1924) *Fizicheskie faktory istoricheskogo protsessa* (Kaluga: A. L. Chizhevskii). Tsiolkovskii, in turn, published a review of Chizhevskii's book the following year in a local Kaluga newspaper. See *Kommuna*, April 4, 1924. For a recent reading, see V. V. Kaziutinskii (1998) 'Kosmizm A. L. Chizhevskogo', *Iz istorii raketno-kosmicheskoi nauki i tekhniki* no. 2, 98–122.

⁶⁵Gor'kii to Tsiolkovskii (1932) ARAN, fond 555, op. 4, d. 183, l. 1.

⁶⁶For Zabolotskii and Tsiolkovskii, see Sarah Pratt (2000) *Nikolai Zabolotsky: Enigma and Cultural Paradigm* (Evanston, IL: Northwestern University Press), pp. 183–86; Darra Goldstein (1993) *Nikolai Zabolotsky. Play for Mortal Stakes* (Cambridge, UK: Cambridge University Press), pp. 143–48; A. Pavlov (1964) 'Iz perepiski N. A. Zabolotskogo s K. E. Tsiolkovskim', *Russkaia literatura* no. 3, 219–26, which discusses the two letters Zabolotskii wrote to Tsiolkovskii in January 1932.

we see no evidence that they read or were even aware of Tsiolkovskii's millenarian philosophy about space conquest. All of them cite Tsiolkovskii as a genius, a prescient thinker of great truths. All of them quote him in their published works. Perelman and Rynin both even published biographies of the old man in the early 1930s. But none refer to Tsiolkovskii's odd meditations about 'blissful happy atoms'.

When Tsiolkovskii's legacy was fully resurrected in the post-World War II era, commentators skirted around his metaphysical motivations, preferring to publish in copious volumes his more mathematical articles. Museums, statues, conferences dedicated to Tsiolkovskii spoke of him only as a good communist (which by his own admission, he was not), a prophet in the service of modern science and technology, and the patriarch of Soviet space exploration. Statues were adorned with appropriate quotes about the power of modern science. Yet, comprehensive encyclopedias on Russian philosophy published in the 1950s did not mention him.⁶⁷ Barring a few sporadic and obscure academic works by graduate students, until the early 1970s, no major figure explored Tsiolkovskii's philosophical works. Then a young graduate of the philology faculty at the Moscow State University, Nikolai Gavriushin, began presenting papers on Tsiolkovskii's philosophy at the annual Tsiolkovskii Readings conferences held in Kaluga every year.⁶⁸ This annual conference, held every September, began to draw scores and then hundreds of devotees through the 1970s and 1980s, with Tsiolkovskii as their only cynosure. As a cult grew around Tsiolkovskii, many of the presenters, who included not only historians and archivists but also self-styled mystics and 'non-conformists', began to publish prolifically on Tsiolkovskii's philosophies. This small impulse coalesced and then expanded in the post-socialist era into a massive network of thinkers, writers, and activists who now actively act as the custodians of Tsiolkovskii's legacy. Like the invention of a Russian Cosmist historical tradition around Fedorov, by the 1990s, one could

⁶⁷The two most prominent volumes from the 1950s do not mention Tsiolkovskii. See V. V. Zen'kovskii (1948) *Istoriia russkoi filosofii* (Paris; YMCA Press) and N. O. Losskii (1951) *Istoriia russkoi filosofii* (Moscow).

⁶⁸Gavriushin's 1973 dissertation was entitled 'Artistic Creativity and the Development of Science (The Establishment of the Idea of Conquering Space)'. His very first paper on Tsiolkovskii's philosophical work was published in 1972 under the title 'From the History of Russian Cosmism'. He had orally presented the paper 2 years previously at the Tsiolkovskii Readings in Kaluga. For the publication, see *Trudy V i VI chtenii posviashchennykh razrabotke nauchnogo nasledia i razvitiu tvorchestva K. E. Tsiolkovskogo* (Moscow: 1972), pp. 104–06.

find a similar historical genealogy around Tsiolkovskii's so-called 'Cosmic Philosophy', which, while loosely grouped under Russian Cosmism, has its own particularities and features relevant to the Soviet and later Russian space program. No less an authority than the Russian Academy of Sciences has since published several volumes of Tsiolkovskii's mystical musings with copious annotation, while many Russian intellectuals continue to debate them as an important constituent part of a 'national idea of Russia'. In the post-socialist times, Tsiolkovskii's philosophy was positioned in relation to the writings of Fedorov in an upsurge of jingoistic Russocentric 'cosmist' thinking. One well-known modern day Cosmist wrote in 1998, at a time of great national crisis that:

the Russian philosophical and cultural tradition, in which a hugely important place is occupied by the creative heritage of K. E. Tsiolkovskii, can become the basis for the rebirth of Russian spiritual identity and its national revival. In Russian ... cosmism, [we see] prevailing the feeling of each [Russian] person's own self involvement as part of a living cosmos.⁶⁹

This seemingly oxymoronic connection between '*Russian* spiritual identity' and *humanity's* place in the cosmos continues to vivify a new post-socialist generation of Russian intellectuals.⁷⁰

CONCLUSION

When the first young hero cosmonauts flew into space in the early 1960s, Soviet commentators repeatedly depicted them as emblematic of a modern and technologically sophisticated Russia, overtaking the West. And unlike American astronauts who thanked God for their successes, Soviet cosmonauts were avowedly atheistic; one of the first cosmonauts, the young German Titov, famously declared on a visit to the USA that during his 17 orbits of the Earth, he had seen 'no God or angels', adding that 'no

⁶⁹ L. V. Leskov (1998) 'K. E. Tsiolkovskii i rossiiskaia natsional'naia ideia', *Zemlia i vselennaia* no. 4, 62–7.

⁷⁰ For a lengthy meditation on the role of Russian Cosmism in post-socialist Russia, see V. V. Kaziutinskii (1994) 'Kosmicheskaia filosofia K. E. Tsiolkovskogo na rubezhe XXI veka' in *Trudy XXVII chteniia, posviashchennykh razrabotke nauchnogo nasledia i razvitiu idei K. E. Tsiolkovskogo (Kaluga, 15–18 sentiabria 1992 g.): sektsiia 'K. E. Tsiolkovskii i filosofskie problemy osvoeniia kosmosa'* (Moscow: IIET RAN, 1994), pp. 4–40.

God helped build our rocket'.⁷¹ As Victoria Smolkin-Rothrock has shown, such exclamations reinforced an alignment between space exploration and campaigns to inculcate atheism among the Soviet population.⁷² They also whitewashed 'inconvenient' phenomena dating back to the 1920s when the founding theorist of Soviet space exploration, Tsiolkovskii, was actively writing about space travel in ways that could not conform to orthodoxies about the role of science and technology in post-World War II Soviet society. An article entitled 'Cosmonautics versus Religion' in 1959, for example, could confidently argue that atheism provided the spark for cosmic conquest and that Tsiolkovskii was at the vanguard of this movement.⁷³ Yet, despite these efforts, through the height of Soviet space exploits during the Cold War, Tsiolkovskii's mystical ideas loomed as an echo of an earlier time.

It is undoubtedly true that when the first space theorists, enthusiasts, and practitioners were articulating a vision for the future of cosmic travel, they were drawing from the modernist and quasi-utopian ideas emerging from particular scientific and technical disciplines rooted in post-Enlightenment rationalism. Expressions of this cult of modern science and technology took the form of fiction (Jules Verne) or popular science (Iakov Perelman) or engineering marvels (e.g. the airplane). All of the principal actors who translated Soviet populist cosmic enthusiasm into the machines that put the first Soviet satellites and cosmonauts into orbit, have paid explicit debt to this tradition. Lest we suspect that they were 'hiding' their true motivations, among the literally hundreds of memoirs about the Soviet space program churned out in the 1990s—many of them highly critical of the Soviet state, Stalin, and Marxism in general—remarkably, not a single one hints that the inspiration to aspire for the cosmos was anything but an outcome of a national and cultural commitment to be the best in science and technology.

⁷¹ Anonymous (1962b) 'Titov, Denying God, Puts His Faith in People', *New York Times*, May 7. A variation of this quote is often falsely attributed to first cosmonaut Iurii Gagarin, but there is no evidence to suggest that he said anything about God or his faith in any of his public pronouncements.

⁷² Victoria Smolkin-Rothrock (2011) 'Cosmic Enlightenment: Scientific Atheism and the Soviet Conquest of Space' in *Into the Cosmos*, pp. 159–94.

⁷³ M. V. Mostepanenko (1959) 'Kosmonavtika protiv religii', *Nauka i zhizn'* no. 1, 74–5. See also the invocation of Tsiolkovskii in a book arguing for the inextricable link between technological progress and atheism, G. S. Gudozhnik (1961) *Tekhnika i religiiia* (Moscow: Voenizdat), pp. 22–3.

Yet, while the cult of modern science in the twentieth century inspired these actors, it is also undeniable that the central figure at the very root of grand narrative of the Soviet space program, Tsiolkovskii, was deeply influenced by mystical and occult epistemologies. In fact, at the very moment, the 1920s, when the first mass cosmic enthusiasm emerged in Soviet culture, there was a concomitant if less widespread interest in various mystical and metaphysical notions about the cosmic setting of humanity. The existence of this particular historical strand in the early twentieth century is further complicated by a more recent post-socialist discourse that claims 'Russian Cosmism' as a founding imperative of the Soviet space program. But as I show here, this invented tradition, true enough in accounting for the richness of cosmic thought in Russia in the early twentieth century, vastly overreaches in suggesting that it had any influence on the *actual actors* in the Soviet space program. What we are left with instead is a complex story about the ways in which 'scientific' and 'mystical' worldviews in the Soviet context were often difficult to parse out in twentieth century Russia.

The evidence tells us that Fedorov and Tsiolkovskii were enigmatic thinkers who considered with great care the possibility of human migration off the planet Earth and the rationales behind it. They were driven partly by religious imperatives, partly by what they considered 'rational' considerations, and partly by mystical, occult, and Russophilic ideas about the place of humanity in our universe. Their ideas were not heard by many at the time but were implicitly mimicked in a form of cultural echo in the ideas and works of other Russian intellectuals, especially in their evangelical calling to fully conquer and submit nature to the will of humanity. And although they probably influenced no major actor in the Soviet space program of the Cold War, the fact that these ideas existed at all, especially within the worldview of Tsiolkovskii, suggests that while the Soviet march into the cosmos was not inspired by mystical or occultish ideas, it was definitely accompanied by them. And that accompaniment also included deeply unsavory and unsettling ideas about eugenics and racial purity that require a deeper reckoning, especially as 'Russian Cosmism' has taken a more jingoistic turn in the past decade.

Was the Russian cause for the cosmos, as articulated in the twentieth century, an outcome of a modernist imperative? As I have shown here, once articulated in the context of the cult of science and technology, the Russian intellectual framework for cosmic enthusiasm took on an unlikely path, like a Mobius strip of ideas that veered back into a completely separate history to recover its ostensibly religious and mystical

roots. The recovery of an imagined movement for the conquest of space became an important project and also a convincing one, given that both the 'scientific' and the 'mystical' existed without contradiction in the life and work of the founding theorist of Soviet space exploration. In one sense then, the intellectual foundations of the space program can be understood as a typical manifestation of the urge of many early twentieth century intellectual movements to respond to the encroachment of modern science into the social order through an active recovery of what they considered 'ancient truths'. As modern science began to explain the world around us, thinkers such as Fedorov and Tsiolkovskii sought to adjust their beliefs into new epistemologies that incorporated what they self-consciously understood as 'ancient' (Christianity) and 'modern' (nineteenth-century scientific disciplines). Both, however, articulated a teleology of social improvement with a central place for the project of 'mastery over nature'. Like a persistent line on each side of the Mobius strip, these aspirations to control of nature—often in troubling ways—remained the one constant in Russian cosmic enthusiasm in the twentieth and now into the twenty-first centuries.