

RESEARCH ARTICLE

Leapfrogging India: Vikram Sarabhai and the developmental promise of geocentric space flight

Haitian Ma

Department of Media Studies, Universiteit van Amsterdam, The Netherlands
Corresponding author: Haitian Ma, Email: h.ma@uva.nl

Abstract

Historical accounts of the Indian space programme inevitably invoke the figure of Vikram Sarabhai (1919–71), credited as the father of its early development in the 1960s. A physicist by training, Sarabhai was best known for his ‘leapfrogging’ vision, into which social applications of space technology would catapult developing countries out of poverty. By interrogating official and unofficial records, speeches, cinematic productions and obituaries, this article examines how Indian leadership utilized Sarabhai’s persona to substantiate the role of space flight in the nation’s domestic modernization and geopolitical leverage. Especially after his death in 1971, the making of Sarabhai into the pioneer of Indian space flight allowed India to fashion a geocentric appeal specific to its space programme, which construed the benefits of low-earth-orbit satellite communication to tackle unequal development. In the 1990s, Sarabhai’s image was further appropriated by international powers and actors to propagate the commercialization of satellite systems. Despite its elitist outlook and subscription to received notions of nationhood and modernity, a closer look into the public resonance of Sarabhai’s persona reveals how the geocentric promise of space flight in the Indian context contributed to the formation of post-1960s astroculture globally.

On 16 October 1966, as part of the ‘National Programme of Talks’ section of the *All India Radio* programme, the newly appointed chairman of the Department of Atomic Energy (DAE) in India, Vikram Sarabhai (1919–71), gave a lecture titled ‘Sources of man’s knowledge’. In the speech, the eye-catching term ‘leapfrogging’ first reached the Indian public as the distinctive feature: space research ‘should materially assist developing countries, such as India to leap-frog from their present status’.¹ The claim distinguished the nation – at least on a rhetorical level – from its fellow players in the race for space: at this point, the Apollo mission had just entered the stage of testing uncrewed flights, while the first robotic probe on the Moon was just completed in the USSR. With its first detonation of an atomic bomb in 1964, China had risen to become the fifth nation in the world that possessed the capacity to produce nuclear weapons. Rather than aspiring to enter deep space or going full-speed towards nuclear weapons (nuclearization), ‘leapfrogging’ appeared to have a more developmental focus: research on outer space and space flight could yield socio-economic benefits. India would not opt to race with other nations, but instead use space technology for the welfare of its people.

The word ‘leapfrogging’ continues to be one of Sarabhai’s best-known remarks as the founding father of India’s space programme. Like the rhetoric itself, Sarabhai’s public image

¹ Vikram Sarabhai, ‘Sources of man’s knowledge’, *Resonance* (2001) 6, pp. 89–92, 92.

was that of a ‘true patriot’ who used space technology for the welfare of his people. His family was a prominent industrial force of the Ahmedabad region, owning businesses in textiles, mining and chemicals. On the recommendation of Rabindranath Tagore, Sarabhai went to the University of Cambridge to pursue his interest in science.² In 1947, he went back to the UK, completing his doctoral degree in Cambridge before returning to India to inherit the family business. During his leadership at the DAE and the Atomic Energy Commission (AEC) under it, Sarabhai set up a series of collaborative rocketry and satellite projects in India for applications in agriculture, education and communication, which came to fruition after his death in 1971. His profile was emblematic of the trope of enlightened intellectuals in previously colonized nations – growing up in an aristocratic family of liberal thought, travelling to the West for higher education and bringing ‘advanced technologies’ back to the falling-behind motherland for its national development.

As a solitary hero in the arena of outer space, Sarabhai’s name constitutes the key reference for telling the genesis story of the national space programme. A hagiographical tone often lies under such historical narratives, attributing the idea of using space technology for developmental ends as Sarabhai’s unique pioneering ‘vision’.³ One important event to substantiate this account was the 1963 Thumba rocket launch, designated by many as the beginning of India’s space programme.⁴ The project was initiated in response to the pronouncement from the United Nations regarding international cooperation in the peaceful use of outer space in 1960. The overarching UN umbrella allowed India to gather technical, infrastructural and personnel support from different nations to set up the Thumba launch site. In this process, Sarabhai’s proposition of developing space technology amongst Third World nations, together with his international connections, have been spotlighted as key to ensuring the fruition of the project.⁵ Historical accounts written from within the Indian Space Research Organization (ISRO) also attempted to show the lasting legacy of the scientist through accounts of his colleagues and students.⁶ However, from a postcolonial and epistemological perspective, recent critique of Sarabhai’s policy making underlines his technocratic and elitist outlooks. Heavily influenced by Western models of technological modernity, Sarabhai’s thinking on development is highly monolithic, which, as historian Asif Siddiqi points out, more served as ‘a genuine expression of his identification as a powerful Indian agent in newly independent India’ than they cultivated actual benefits for the highly heterogeneous rural population.⁷

Contributing to Sarabhai’s fame are the various biographies that have emerged since the early 1990s, which have detailed more intimate and psychological aspects of the scientist

² Amrita Shah, *Vikram Sarabhai: A Life*, New Delhi: Penguin Books, 2007, p. 37.

³ In *Reach for the Stars*, Gopal Raj spends the first forty-five pages elaborating on ‘Sarabhai’s vision’ in the early stages of Indian rocketry. Brian Harvey’s *Emerging Space Powers* also contains a separate section on ‘The vision of Vikram Sarabhai’. Gopal Raj, *Reach for the Stars: The Evolution of India’s Rocket Programme*, New Delhi: Viking, 2000, pp. 1–44; Brian Harvey, ‘India: the vision of Vikram Sarabhai’, in Harvey, *Emerging Space Powers: The New Space Programs of Asia, the Middle East, and South America*, Chichester: Praxis Publishing, 2010, pp. 141–71.

⁴ Asif A. Siddiqi, ‘Science, geography, and nation: the global creation of Thumba’, *History and Technology* (2015) 31(4), pp. 420–51; Ashok Maharaj, ‘An overview of NASA–India relations’, in John Krige, Angelina Long Callahan and Ashok Maharaj (eds.), *NASA in the World: Fifty Years of International Collaboration in Space*, New York: Palgrave Macmillan, 2013, pp. 211–34.

⁵ See B.N. Suresh and V.P. Balagangadharan, *From Fishing Hamlet to Red Planet: India’s Space Journey*, New Delhi: HarperCollins, 2015; U.R. Rao, *India’s Rise as a Space Power*, New Delhi: Cambridge University Press, 2013.

⁶ See Ramabhadran Aravamudan and Gita Aravamudan, *ISRO: A Personal History*, New Delhi: HarperCollins, 2017; Ved Prakash Sandlas, *The Leapfroggers: An Insider’s Account of ISRO*, Noida: HarperCollins, 2018; Gurbir Singh, *The Indian Space Programme: India’s Incredible Journey from the Third World towards the First*, ebook, Astrotalkuk, 2017.

⁷ Asif Siddiqi, ‘Whose India? SITE and the origins of satellite television in India’, *History and Technology* (2020) 36(3–4), pp. 452–74, 466.

at different stages of his life. They highlight Sarabhai's dedication to India's developmental tasks outside space technology, care for his family and personal characteristics. One of the first biographical accounts of the scientist was Padmanabh K. Joshi's 1992 book *Vikram Sarabhai: The Man and the Vision*, which included both the author's own summary of Sarabhai's professional achievements and first-person accounts from other contributors. Joshi summarized Sarabhai's life under five roles – 'The man', 'The scientist', 'The entrepreneur', 'The policy maker' and 'The educationist' – a combination of scientific achievement and care for human welfare.⁸ Amrita Shah's later book *Vikram Sarabhai: A Life* (2010) interweaves Sarabhai's professional career and personal life, incorporating accounts from his wife and children.⁹ The biography also includes private photographs of the technocrat with families, other space celebrities and politicians at home and abroad. The publishing of these photographs more concretely outlines the international reputation the scientist enjoyed, but also his amiability as a husband and father. In 2019, Joshi and Divya Arora published another illustrated biography, *Vikram Sarabhai: India's Space Pioneer*, at his centenary. The cover quote from former president of India A.P.J. Abdul Kalam – 'Vikram Sarabhai taught us how to dream' – reiterates a visionary spirit associated with the scientist and the cultural inspiration he left behind for the public 'us' across India.¹⁰

As is discussed in the introduction to this special issue, both fictitious and 'real-life' techno-celebrities appear across national space flight histories to embody the societal fascination with outer space but also geopolitical agendas on national and global scales.¹¹ What remains latent in both historical writings and biographical accounts of Sarabhai is why and how his founding status became established and sustained throughout Indian space history. Besides examining what roles Sarabhai himself played in leveraging for the Indian space programme, the way his public image underwent a continuous process of construction and the intentions thereof merit further scrutiny. Adopting a persona approach, this article examines how Sarabhai was made into the founding father of Indian space history and historiography by the Indian state, colleagues, international actors and his own self-fashioning.¹² Marshall, Moore and Barbour's definition of 'persona' centres on the 'performance of the self for strategies to be used in some public setting', which understands the self as inherently performative and constantly mediated under a collective framework.¹³ Unlike biographical accounts, the article looks at Sarabhai's life and posthumous image from a distance and understands it as constantly mediated in specific sociocultural contexts. Rather than treating Sarabhai's thinking and policy making as an individual venture, therefore, the article understands his persona as a reflection of the revolving cultural imaginaries of Indian space flight across time.

Examining Sarabhai's persona brings out a temporal gap between the scientist's technoscientific manoeuvres as discussed and critiqued by space historians, and their public promotion and recognition. As the article shows, Sarabhai's public image was most extensively constructed not during his career and life, but posthumously. From the 1960s to his death in 1971, Sarabhai represented the voice of developing countries to advocate for the peaceful use of outer space. Intentional construction and promotion of his public image were limited, and a crisis in authority arose during his leadership due to his ambiguous stance regarding India's push for nuclear weapons. It was from the 1970s onwards that Sarabhai's posthumous persona gained its full appeal as a basis on which the Indian state

⁸ Padmanabh K. Joshi (ed.), *Vikram Sarabhai: The Man and the Vision*, Ahmedabad: Mapin Publishing Pvt Ltd, 1992.

⁹ Shah, op. cit. (2), pp. xi–xiv.

¹⁰ Padmanabh K. Joshi and Divya Arora, *Vikram Sarabhai: India's Space Pioneer*, New Delhi: Natraj Publishers, 2019.

¹¹ Alexander C.T. Geppert, 'Rocket stars, space personas and the global space age', *BJHS*, this issue.

¹² For the theoretical discussions around persona studies see Geppert, op. cit. (11).

¹³ P. David Marshall, Christopher W. Moore and Kim Barbour, *Persona Studies: An Introduction*, Hoboken, NJ, Wiley Blackwell, 2019, pp. 10, 238.

could weave narratives for the nation's space flight history. Domestic accounts of the Indian space programme came out in various media forms with Sarabhai as the main protagonist. Stretching into the post-Cold War period, his public profile became further integrated as an Indian variant of the global trope of 'founding fathers', as the commercialized and privatized satellite communication systems spread on a global scale.

Historicizing Sarabhai's persona contributes to understanding the construction of Indian astroculture, which only began a decade after the initiation of its space programme. The concept of astroculture has been coined by Alexander Geppert to comprise 'a heterogeneous array of images and artifacts, media and practices that all aim to ascribe meaning to outer space while stirring both the individual and the collective imagination'.¹⁴ By focusing on the meaning-making of outer space, astroculture enables the historicization of collective and epistemic accounts of outer space, which are contextualized in but not reduced to Cold War geopolitics.¹⁵ The rhetoric of leapfrogging can be considered as an essential component of such astrocultural resonance in the Indian context. Its proposition arose from both modernization ideals upheld by Indian technocracy and pragmatic security concerns. But it was through Sarabhai's persona that the rhetoric transformed from serving a strategic and diplomatic function to attaining cultural-nationalistic value and, more lately, entering the public imagination both within India and globally. Alongside examining Sarabhai's image making in the 1960s, therefore, the article also contextualizes the rhetoric of leapfrogging in relation to pan-Asian regional tensions, India's stance on the atomic bomb and the technocratic mindset of its top leadership. It shows how, from the 1970s to the 1990s, the leapfrogging rhetoric acquired astrocultural resonances to form a geocentric promise of space flight specific to India, embodied in Sarabhai's posthumous persona. Acknowledging the technocratic constraints and susceptibility to technological dual use, the article concludes by discussing how Sarabhai's image making and the fashioning of geocentric space flight by Indian leadership offer a different historiographical frame of reference to the post-Apollo astroculture, with growing interest in orbital satellite communication back on earth.

Scientific authority and leadership in crisis

While much has been written in detail about Sarabhai's diplomatic manoeuvres in the 1960s, his public image at the time was known mainly within scientific and technocratic communities, who positioned him as an expert in astrophysics with an extensive international network. In 1962, the Indian National Committee for Space Research (INCOSPAR) was established as a side project of the Department of Atomic Energy. Through Sarabhai's mediation, an agreement was signed between INCOSPAR and NASA, where the latter agreed to provide the Nike-Apache rocket vehicles for a rocket launch at the Thumba site. More nations joined the project and made use of Thumba's proximal location for their own space-related experiments.¹⁶ In June, Sarabhai was appointed chairman of the United Nations Outer Space Conference and was given the task of setting up an 'international research rocket range near the equator'.¹⁷ One year later, a formal agreement was signed between the Hydro-meteorological Service in the USSR and INSCOPAR, with the Soviet Union delivering testing facilities, helicopters and digital computers to Thumba for the rocket experiment.¹⁸ Also in 1962, Sarabhai received the Shanti Swarup Bhatnagar Prize, an

¹⁴ Alexander C.T. Geppert, 'Rethinking the space age: astroculture and technoscience', *History and Technology* (2012) 28(3), pp. 219–23, 220.

¹⁵ Geppert, *op. cit.* (14).

¹⁶ 'U.N. body backs our proposals: Kerala rocket project', *Times of India*, 26 February 1963, p. 7.

¹⁷ 'U.N. space group names scientific exchange body', *Chicago Daily Tribune*, 6 June 1962, sec. 4.

¹⁸ Siddiqi, *op. cit.* (4), p. 438.

award by the Indian government recognizing outstanding research in science and technology. The award citation acknowledged that Sarabhai 'has demonstrated the significance of the study of anisotropy, within the solar system, of cosmic rays from the galaxy', but did not mention his diplomatic efforts in facilitating the Thumba programme.¹⁹ Sarabhai's standing was rather secondary to that of the renowned chairman of AEC Homi Bhabha (1909–66), who had been Sarabhai's mentor since his return to India in 1947 and brought the scientist's name to international colleagues in the respective nations' space departments.²⁰

On 14 January 1966, Indira Gandhi became prime minister of India following the sudden death of the late Lal Bahadur Shastri. Ten days later, news came that Bhabha too had died in a plane crash at Mont Blanc, France, on the way to Geneva. On 1 June 1966, Sarabhai was appointed by Gandhi the new chairman of the DAE. The change in leadership gave the scientist the freedom to self-fashion as a spokesperson for the peaceful use of space technology on behalf of India. Two years later, he was again appointed the scientific chairman for the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE I). Throughout the years from 1967 to 1970, Sarabhai gave a series of lectures in the field of atomic energy, space research and development in science in India and abroad.²¹ Numerous photographs within Shah's biography showed Sarabhai's many meetings with other space technocrats and celebrities at home and abroad, including Indira Gandhi, the president of UNISPACE I Kurt Waldheim, and the American astronaut Neil Armstrong. Whether these photographs were accessible to the public at the time remains unknown, but they attested to the transnational networks that Sarabhai wove for the initial stages of Indian space flight.²²

The seemingly peaceful imperative in developing space flight technology, however, ran alongside the desire to keep India's nuclear options open. After three years of negotiation, India eventually withdrew from the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in 1967, which immediately sparked speculation regarding India's potential resort to nuclear weaponry.²³ Putting aside the diplomatic delicacy, Sarabhai's obliqueness on the issue of atomic bombs while upholding the peaceful image of Indian space flight did not win applause from within the Indian leadership.²⁴ On 22 July 1970, he submitted to the government a ten-year plan for the AEC titled *Atomic Energy and Space Research: A Profile for the Decade 1970–80*, which outlined the nation's nuclear infrastructure and development of space technology in the coming years.²⁵ As the *Indian Express* noted, the issuing of this document was linked to increasing pressure from China, who had recently put its first satellite, Dong Fang Hong I, into low-earth orbit on 24 April, indicating its military competence in developing nuclear weapons.²⁶ In comparison, India's nuclear set-up both in civilian and

¹⁹ 'Dr. Vikram Sarabhai', award citation, *Shanti Swarup Bhanagar Prize*, New Delhi: CSIR Human Resource Development Group, 1962.

²⁰ 'Correspondence on the Pugwash conferences on science and world affairs, 1962', 1962, The Royal Society, UK, PB/9/1/96/3.

²¹ See Vikram Sarabhai, *Science Policy and National Development* (ed. Kamla Chowdhry), New Delhi: Macmillan, 1974.

²² Siddiqi, op. cit. (4).

²³ See George Perkovich, *India's Nuclear Bomb*, Berkeley: University of California Press, 1999, esp. 'War and leadership transitions', pp. 106–24, 108. See also Ashok Kapur, *India's Nuclear Option: Atomic Diplomacy and Decision Making*, New York: Praeger, 1976; Dharendra Sharma, *India's Nuclear Estate*, New Delhi: Lancers, 1983.

²⁴ In Sarabhai's public speeches, the bid for developing space technology often came on par with the arena of atomic energy. See, for instance, Vikram A. Sarabhai, 'Development: horizontal and vertical control systems', *Indian and Foreign Review*, 15 February 1968, pp. 19–20.

²⁵ Vikram Sarabhai, *Atomic Energy and Space Research: A Profile for the Decade 1970–80*, Government of India: Atomic Energy Commission, 1970, p. 14.

²⁶ 'Sarabhai submits 10-year plan infrastructure for nuclear option', *Indian Express*, 26 May 1970, pp. 1, 7.

military sectors had seen relatively slow progress. Several newspapers raised doubts, seeing the financial demands and industrial goals of the *Profile* as a manifestation of Sarabhai's impotency in leading the atomic sectors. The *Times of India* described Sarabhai's programme as 'indiscreet if not altogether objectionable', requiring extensive financial investment that could not be 'justified in India's technological and economic environment'.²⁷

Accompanying this public suspicion of the programme's feasibility was a crack in the coherence of Sarabhai's persona as perceived by state authorities. For one thing, the scientist's advocacy for the peaceful use of outer space was seen by his pro-explosive colleagues as idealist and unfavourable to increasing India's geopolitical leverage in the region.²⁸ As remarked by the late nuclear scientist Homi Sethna, who eventually replaced Sarabhai as the head of the AEC in 1972, 'He was a Gandhian, believed in peace at all costs. But, you know, he was so rich, his life was so different. He never went to school as a boy but was educated at home. He never rubbed shoulders with common people; he was so sheltered.'²⁹ This description indicated the discontent with Sarabhai's elitist profile from his colleagues: having received a foreign education and believing firmly in the idea of development, his persona was shadowed by the Eurocentric ideal of modernity, which served more to win recognition from the West than to accommodate India's own interests and realities.

For another thing, Sarabhai's diplomacy was seen as one of political complacency, and the peaceful image he curated for India's space programme as a mask for the scientist's implicit consent to developing nuclear armament. Even though the Indian Space Research Organisation had been dedicated to space flight activities since it was established in 1969, it remained institutionally housed under the atomic sector. As the *Times of India* pointed out, Sarabhai's submission of the ten-year plan would 'add to the confusion within the country, and at the same time give rise to misgivings abroad' with regard to the building of nuclear weapons.³⁰ The author of Sarabhai's most recent biography, Amrita Shah, has attributed Sarabhai's apparent complacency regarding this potential conflict to the restrained aspect of the scientist's personality and his desire to handle different opinions with patience and tolerance.³¹ Shah suggests that the existence of different views between Sarabhai and other governmental officials, including the prime minister, had potentially put him in a vulnerable position, and that he appeared 'to have been torn apart' but 'concealed his mounting agitation' in order to mediate between the demands of his colleagues and superiors.³² For Shah, Sarabhai's ambiguous stance was actually proof of his moral high-mindedness in halting the nation's militarizing intentions from backstage.

Still, the perception of diplomatic impotency by his fellow officials revealed that Sarabhai's persona was then not sufficiently adaptable to navigate the changing political interests and priorities of the Indian state. As much as the peace-making profile of Sarabhai enabled India to claim a distinct space in the network of space powers, this profile could not override its primary purpose – adhering to national interests and priorities. When the geopolitical priority of India turned increasingly towards nuclearization, Sarabhai's peace-making image came to be at odds with the collective demand. In order to manage this tension, the 'leapfrogging' rhetoric had to remain at the metaphorical level, with Sarabhai's nascent persona held in critical isolation from any intervention in India's military and security build-up.

²⁷ Quoted in 'Sarabhai's imaginative programme', *Indian and Foreign Review*, 15 June 1970, p. 21.

²⁸ See Itty Abraham, 'From the commission to the mission model: technology czars and the Indian middle class', *Journal of Asian Studies* (2017) 76(3), pp. 675–96, 683; Raj Chengappa, *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power*, Delhi: HarperCollins Publishers India, 2000, p. 104.

²⁹ Perkovich, op. cit. (23), p. 114.

³⁰ 'Sarabhai's imaginative programme', op. cit. (27), p. 21.

³¹ Shah, op. cit. (2), pp. 191–2.

³² Shah, op. cit. (2), p. 206.

The geopolitical undercurrents of ‘leapfrogging’

While his celebrity status was not yet established in his own lifetime, Sarabhai continued to advance the idea of ‘leapfrogging’ as a definitive catchline for describing the benefit of space technology. It was in the National Programme of Talks in October 1966 that he first connected the rhetoric of ‘leapfrogging’ to the space programme in particular, arguing that India would take a ‘peaceful’ approach to space technology and, by extension, to atomic energy. Here, the language of political and military necessity was altered into one of national will: ‘In India the immediate goals of our space research are modest. We do not expect to send a man to the moon or put elephants, white, pink or black, into orbit round the earth.’³³ The socio-economic impetus pinned a unique rhetorical position for Indian space flight: space technology was to be developed not for prestige or scientific truth per se, but for boosting the socio-economic development of the nation. In 1969, Sarabhai reiterated the leapfrogging idea in the speech ‘Science and national goals’ and called for the setting up of a more specific five- to ten-year objective.³⁴ Space was not explicitly mentioned, but in the resulting ten-year plan for atomic energy and space research, Sarabhai connected ‘leapfrogging’ to space infrastructure in promoting the setting up of synchronous communications satellites. He suggested that television programmes broadcast to the entire countryside would allow ‘not only advanced technology and hardware but imaginative planning of supply and consumption centres, of social organisation and management, to leapfrog from a state of backwardness and poverty’.³⁵ Beyond efficiency, ‘leapfrogging’ here carried the idea that space technology could ignite holistic development in other societal sectors, from production to consumption, and from politics to culture.

The epistemic underpinnings of leapfrogging were closely connected to post-Second World War ideals of Western modernity in the Cold War context. The term bore traces of what Siddiqi calls a ‘Bolshevik-flavoured technological utopianism of the interwar-era Soviet Union’ and Western modernization theory in the Cold War era.³⁶ In his article, Siddiqi traces the egalitarian ethos in India’s satellite project to US modernization theorists such as Daniel Lerner and Eugene Rostow, who argued for the use of mass media, science and technology in propelling economic development and nation building.³⁷ Such technological enthusiasm was evident in the policy making of Jawaharlal Nehru and endorsed by Indian technocratic elites such as Homi Bhabha and Sarabhai.³⁸ Jayita Sarkar described the early stages of the Indian space programme as ‘an embodiment of Sudipta Kaviraj’s notion of a revisionist postcolonial modernity through a “logic of self-differentiation” and improvisation’, where the implementation of modernity is inflected by local practices and ways of knowing.³⁹

In India, using space technology for balancing urban–rural economic divides constituted one such instance of self-differentiation. Between 1967 and 1971, civilian-oriented applications of space flight continued under Sarabhai’s leadership with the focus on satellite communication technology. In January 1967, a ‘pilot Agricultural TV project’ called ‘Krishi dashan’ (‘Agriculture vision’) was intended to be broadcast on over eighty newly installed

³³ Sarabhai, *op. cit.* (1), p. 92.

³⁴ Sarabhai, *op. cit.* (21), p. 3.

³⁵ Sarabhai, *op. cit.* (25), p. v.

³⁶ Asif Siddiqi, ‘Making space for the nation: satellite television, Indian scientific elites, and the Cold War’, *Comparative Studies of South Asia, Africa and the Middle East* (2015) 35(1), pp. 35–49, 39.

³⁷ Siddiqi, *op. cit.* (36), p. 41.

³⁸ Siddiqi, *op. cit.* (36), pp. 38–40.

³⁹ Jayita Sarkar, *Ploughshares and Swords: India’s Nuclear Program in the Global Cold War*, Ithaca, NY: Cornell University Press, 2022, p. 108.

community television sets in villages around Delhi.⁴⁰ On 20 November 1967, India's first indigenously designed sounding rocket Rohini-75 was launched into space to probe the upper atmospheric regions, acting as a prototype for more advanced satellite technologies. One year later, a memorandum was signed between India and NASA to initiate the Satellite Instructional Television Experiment (SITE).⁴¹ What was unique about SITE was its educational component. The idea was to produce instructional television programmes at major cities such as Ahmedabad, Delhi, Cuttack and Hyderabad. A total of around four hundred villages were selected as sites of instruction. One television set would be put up in public buildings and made available to the public, with programmes transmitted live by satellites.⁴²

The developmental ethos and the subsequent infrastructural set-up of satellite communication, however, were not unique to India alone, but an aspiration of many newly independent states within the global South. In 1962, the year Sarabhai founded INCOSPAR, Pakistani scientist Abdus Salam had raised a similar point regarding promoting scientific research in the Third World at the International Atomic Energy Agency (IAEA), leading to the later establishment of the International Centre for Theoretical Physics (ICTP) in Trieste, Italy. This proposition was strongly opposed by the Indian delegation and the Soviet Union, but also faced pushback by other developing countries, who disagreed on the usefulness of sciences such as theoretical physics for the needs of what was then known as the Third World.⁴³ Sarabhai's promotion of space technology within the international science community served a similar role in attempting to argue for science and technological development from the perspective of developing countries.⁴⁴ But compared to Salam's proposition, the 'leapfrogging' rhetoric was used primarily to convince the domestic audience. It did not ask for other developing nations to follow suit but constructed a pacifist image of India herself internationally. Also echoing the non-proliferation treaty in the making, the civilian orientation of 'leapfrogging' effectively won India support from major space powers such as the United States and the USSR to help set up its own space infrastructure and satellite programmes, from providing launch vehicles to personnel and knowledge exchange.

At the same time, the developmental ethos did not impede India's nuclear programme under way. Since 1962's India–China conflict, India's standing in the Third World, especially the non-alignment movement (NAM), became increasingly vulnerable vis-à-vis China's military rise.⁴⁵ Sarabhai's tenure began only one year after the 1965 India–Pakistan war over the status of the Jammu and Kashmir regions. Prior to the conflict, the AEC under Bhabha's leadership had inclined towards the development of nuclear armoury, encouraged by the implicit threat from China's 1964 launch of its first sounding rocket and its ongoing nuclear

⁴⁰ 'Planning for satellite broadcasting: the Indian instructional television experiment', *Reports and Papers on Mass Communication*, Paris: Unesco Press, 1976, p. 9.

⁴¹ Krige, Callahan and Maharaj, op. cit. (4), pp. 238–9. See also Library of Congress Science and Technology Division, *Astronautics and Aeronautics, 1969: Chronology of Science, Technology, and Policy*, Washington, DC: NASA, 1970, p. 310.

⁴² M.S. Gore, 'The site experience', *Reports and Papers on Mass Communication*, no. 91, Paris: Unesco, 1976, pp. 8–9.

⁴³ Alexis de Greiff, 'The tale of two peripheries: the creation of the international centre for theoretical physics in Trieste', *Historical Studies in the Physical and Biological Sciences* (2002) 33(1), pp. 33–59.

⁴⁴ See, for instance, Sarabhai's 1966 paper 'Space activity for developing countries', published in the *Science and Technology Series* journal of the American Astronautical Society. See also his 1971 publication 'Nuclear technology in developing countries' delivered at the Fourth UN Conference on Peaceful Uses of Nuclear Energy; Sarabhai, op. cit. (21), pp. 21–7, pp. 82–98.

⁴⁵ One evident marker of the geopolitical tension was the December 1962 Colombo conference which excluded China's participation for the first time, the latter turning to increase its manoeuvres in the parallel Asian–African internationalism movement. See Lorenz M. Lüthi, 'Non-alignment', in Lüthi, *Cold Wars: Asia, the Middle East, Europe*, Cambridge: Cambridge University Press, 2020, pp. 287–306, 298.

experiments. Motivated by regional security concerns but also dissatisfaction with the emerging nuclear hierarchies, India's withdrawal from the Non-proliferation Treaty in 1969 made clear its intention to keep the nuclear option open.⁴⁶ The rhetoric of leapfrogging and its egalitarian, developmental ethos thus served as a discursive tool to ease tensions from its stance on nuclearization. As Sarkar argues, India's invocation of non-alignment 'reformulated the Cold War through the lenses of decolonization and economic disparity between the Global South and the Global North'.⁴⁷ This insistence on economic rights 'checked dissent within the democratic polity by controlling the discourse on modernity' in order to fuel its nuclear programme.⁴⁸ Again, whether Sarabhai actively subscribed to this dual-use appropriation of leapfrogging was open to debate, but his own image making as the spokesperson of this developmental promise of space flight certainly contributed to diluting the militarizing incentives in India's atomic energy programmes.

As much as the 'leapfrogging' rhetoric operated at the level of state diplomacy and policy making, the rhetoric did not yet have cultural resonances amongst the Indian public. Cinematic representations of outer space in India, for example, continued to find appeal in going into outer space and extraterrestrial terrains. On 19 April 1963, five months before the official rocket launch in Thumba, the first Indian film featuring aliens from outer space, *Kalai Arasi* (Queen of Arts) had its poster promoted in the *Indian Express*.⁴⁹ Two other Hindi science fiction films, *Chand Par Chadayee* (Trip to the Moon) and *Wahan Ke Log* (People from Out There), were released in 1967.⁵⁰ The audiences of these Hindi sci-fi B-movies were primarily urban middle-class theatregoers who sought entertainment in the cinematic 'wonderscape'.⁵¹ This association with otherworldly wonder had to do both with the consumerist orientation of the film productions aimed for mass entertainment and with the historical association between popular visual culture and Indian mythology and folklore.⁵² Notwithstanding the escapist wonder they provided, references to India's political context could still be seen in both films. The anxiety over nuclear threats in the South Asian region was evident in *Chand Par Chadayee*, whereas explicit references to both the China–India war in 1962 and the India–Pakistan war in 1965 were wrapped in the storyline and footage in *Wahan Ke Log*.⁵³ However, no cultural manifestations of 'leapfrogging' – space technology for national development – were articulated in the morale of the cinematic narrative. This had to wait until the posthumous image making of Sarabhai, which crystallized this rhetoric within the public imagination as Sarabhai's pioneering 'vision', providing the key narrative anchor of the origin of Indian space flight.

Posthumous commemoration: the venter of an indigenous path

The more proactive state propagation of Sarabhai's legacy began shortly before his death in 1971. In the same year, a documentary titled *Space and India* was released by the Films

⁴⁶ Perkovich, op. cit. (23), p. 120; Gabrielle Hecht, 'Negotiating global nuclearities: apartheid, decolonization, and the Cold War in the making of the IAEA', *Osiris* (2006) 21(1), pp. 25–48, 34.

⁴⁷ Sarkar, op. cit. (39), p. 25.

⁴⁸ Sarkar, op. cit. (39), p. 28.

⁴⁹ 'Kalai Arasi', *Indian Express*, 19 April 1963, p. 10.

⁵⁰ T.P. Sundaram, dir., *Chand Par Chadayee*, Mumbai: Golden Cinema Studios, 1967, 150 mins; N.A. Ansari, dir., *Wahan Ke Log*, Mumbai: Bundelkhand Films, 1967, 136 mins.

⁵¹ Raminder Kaur, 'The fictions of science and cinema in India', in edited by K. Moti Gokulsing and Wimal Dissanayake (eds.), *Routledge Handbook of Indian Cinemas*, London: Routledge, 2013, pp. 282–96, 286–8.

⁵² Kaur, op. cit. (51), p. 287. See also Keval J. Kumar, 'The "bollywoodization" of popular Indian visual culture: a critical perspective', *tripleC* (2014) 12(1), pp. 277–85, 278.

⁵³ Kaur, op. cit. (51), p. 290.

Division of India, by then the major state film unit, whose productions had compulsory distribution in major cinema halls.⁵⁴ Directed by experimental film-maker Vijay B. Chandra, *Space and India* interspersed snapshots of planets in the solar system, satellite antennas, launch stations and the technical crew at work in the space research centres, creating an effect of fantasy and perceptual disorientation. The use of electronic music mimicking satellite signals augmented the sense of alienation from high-end technology. At the outset, the narrator announced that ‘organising space research activities in India started in 1962 with the creation of Indian National Committee for Space Research under the leadership of Professor Vikram A. Sarabhai’.⁵⁵ This was the first time the state had created a reflexive account of the Indian space flight programme, taking Sarabhai’s most direct engagement with outer space as its starting point.⁵⁶ Towards the end of the film, Sarabhai was featured explaining the principle of satellite communication on a blackboard to a rural audience. Wearing a plain cotton shirt and smiling from time to time, the image of a calm and amiable educator was shown to the spectator. Still, one could not help but wonder whether the rural audience at the scene would fully understand the space technology jargon Sarabhai used, all in fluent English.⁵⁷

Sarabhai’s death and posthumous image making constituted the next important occasion for the state to promote Indian space flight in the form of memorialization. On 31 December 1971, Sarabhai was found dead due to cardiac arrest in Trivandrum. The following day, the *Times of India* published the first obituary to announce the unexpected news to the public. In the cover image, Sarabhai’s face was half-covered in the ‘flower-bedecked brown coffin wrapped in the national tricolour’, his wife Mrinalini Sarabhai and daughter Mallika holding each other by the arm in grief.⁵⁸ Large crowds were reported to have appeared at both sites of Trivandrum and Ahmedabad, with ‘an estimated 10,000 people [having] already paid their homage during the first one hour’ at the Sarabhai family residence.⁵⁹ Importantly, the newspaper headline identified Sarabhai as a ‘space pioneer’ rather than using his official position as chairman of the Atomic Energy Commission. This domestic portrayal struck a contrast with the same-day obituary from the *New York Times* with its headline ‘Dr. Vikram A. Sarabhai dead; led India’s atomic energy body’.⁶⁰ In 1972, two other obituaries of Sarabhai appeared in the international scientific journals *Nature* and the *Bulletin of Atomic Scientists*.⁶¹ Whether to attribute his legacy to the arena of atomic energy or to space research remained unsettled at this point. The lack of consensus on his title in

⁵⁴ Giulia Battaglia, *Documentary Film in India: An Anthropological History*, London: Routledge, 2018, p. 61.

⁵⁵ Vijay A. Chandra, dir., *Space and India*, India: Films Division, 1971, 20:00.

⁵⁶ In 1972, Vijay Chandra made a second documentary titled *Atomic Energy and India*, which took a documentary approach to highlight the necessity of developing nuclear power in India. See Fathima Nizaruddin, ‘Peaceful nuclear tests, eco-friendly reactors, and the vantage point of Tamasha’, *BioScope: South Asian Screen Studies* (2017) 8(2), pp. 204–23.

⁵⁷ There is little record on the spread of the English language among rural populations in the 1970s and 1980s. After independence, there was active official promotion of replacing English with Hindi, although the latter’s use witnessed a steady increase nationally. That said, it is likely that the rural population remained largely illiterate and had difficulty understanding or speaking English. See Hans Raj Dua, ‘The spread of English in India: politics of language conflict and language power’, in Joshua A. Fisherman, Andrew W. Conrad and Alma Rubal-Lopez (eds.), *Post-imperial English: Status Change in Former British and American Colonies, 1940–1990*, Berlin: de Gruyter, 1996, pp. 557–88. See also L.M. Sowmiya, ‘Learning English in rural India: difficulties and remedies’, *International Journal of Engineering and Technology* (2015) 3(22), pp. 1–3.

⁵⁸ ‘Space research pioneer, Vikram Sarabhai, dead’, *Times of India*, 31 December 1971, p. 1.

⁵⁹ ‘Space research pioneer, Vikram Sarabhai, dead’, op. cit. (58), p. 11.

⁶⁰ ‘Dr. Vikram Sarabhai dead; led India’s atomic energy body’, *New York Times*, 31 December 1971, p. 22.

⁶¹ ‘Obituary, Dr. Vikram Sarabhai’, *Nature* (1972) 236, pp. 185–6; Glenn T. Seaborg, ‘Vikram A. Sarabhai’, *Bulletin of the Atomic Scientists* (1972) 28(4), p. 48.



Figure 1. Stamp of the Arvi Satellite Earth Station, released on 26 February 1972, with the satellite icon appearing at the centre of the world map. Author's collection.

the media coverage at home and abroad was a telling indication of the close connections between the atomic and space sectors during Sarabhai's leadership.

Still, shared across these obituaries was the portrayal of 'Indianness' in Sarabhai's public profile, the equation of his persona with the image of the state. This emphasis on his Indian identity recurred in the two commemorative stamps released in 1972. The first stamp commemorated the establishment of the Arvi satellite station, the first commercial earth station for telecommunications (Figure 1). At its inaugural ceremony on 26 February 1972, president of India V.V. Giri named the station 'Vikram Earth Station' to 'depict in graphic style India's emergence into the space age'.⁶² The remark underlined the centrality of satellite communication in constituting the self-image of Indian space flight. On 30 December, the Indian Postal Department released another commemorative stamp to mark the first anniversary of the scientist's death (Figure 2). In the background of the stamp was the Rohini-75 rocket launched from Thumba Equatorial Rocket Launching Station in 1967, with the tropical jungles of Thumba coloured in dark green. On the stamp, the peace dove both signalled the humanistic spirit of Sarabhai's thoughts and hinted at his active involvement in the United Nations promoting the peaceful use of outer space. Compared to the first stamp, the composition of the second design conveyed a more outspoken message: India would follow its own path in developing its space technology, and this path would remain peaceful in its primary ethos.

The portrayal of this indigenous and peaceful path in space flight took place alongside strategic alliances with the USSR in response to the tightening pan-Asian regional tensions and the country's continuing nuclearization. As China–Soviet relations worsened in the late 1960s, the diplomatic confrontations between the United States and China showed increasing signs of softening, marked by President Richard Nixon's assistant Henry Kissinger's visit to Beijing in 1971 and Nixon's in-person meeting with Mao one year later. To find a balance of power in the Asia-Pacific region, India turned towards the Soviet Union for formal and military partnership, signing the Indo-Soviet Treaty of Friendship and Cooperation in

⁶² 'Vikram Earth Station', *Indian and Foreign Review* (1972) 9(11), p. 6.



Figure 2. Stamp of Dr Vikram A. Sarabhai, released on 30 December 1972, with image of the scientist at the front, in the background the Rohini rocket launching from TERLS, and a peace dove at top right. Author's collection.

August 1971. This allowed the superpower to offer India ample military weaponry and material during the 1971 December War.⁶³ The Soviets also found India a more capable and more easily worked bulwark to China's power in Asia.⁶⁴ On 10 May 1972, another agreement was signed between the USSR and ISRO for the first indigenous satellite to be launched on the Soviet vehicle as part of the Interkosmos programme, later named Aryabhata.⁶⁵ In the same year, Prime Minister Indira Gandhi voiced support for the preparations for future nuclear testing that were under way, while the newly appointed AEC chairman, Homi Sethna, separated ISRO from the atomic sector, housing it in the newly established Department of Space, in order to give the nuclear programmes more liberty.⁶⁶ The visual collage of the roaring rocket, the peace dove and the tropical landscape of Thumba in the commemorative stamp moralized such nuclearizing moves by constructing a pacifist origin story for the space programme. Likewise, Sarabhai's posthumous persona proved effective for substantiating such a narrative due to his developmentalist mantra.

Besides state propagation, the scientific community at home and abroad also started building up Sarabhai's founding status in narratives around Indian space flight. In 1973, a memorial symposium was set up for Sarabhai at the 13th Cosmic Ray International Conference in Denver, and in 1974 the scientist's long-term colleague and partner Kamla Chowdhry compiled an anthology of his speeches titled *Science Policy and National Development*.⁶⁷ Three years later, the Vikram Sarabhai Professorship was initiated by the Physical Research Laboratory to 'provide a continuing stimulus to young researchers at

⁶³ Robert H. Donaldson, 'India: the Soviet stake in stability', *Asian Survey* (1972) 12(6), pp. 475–92, 478.

⁶⁴ Donaldson, op. cit. (63), p. 478.

⁶⁵ Perkovich, op. cit. (23), p. 170.

⁶⁶ Perkovich, op. cit. (23), p. 154.

⁶⁷ See Bruno Rossi, Bernard Peters, U.R. Rao, M.G.K. Mellon and P.M.S. Blackett, 'Vikram Sarabhai memorial symposium', in *13th International Cosmic Ray Conference*, vol. 5, Denver: University of Denver, August 1973, pp. 3451–86. See also the aforementioned collection of Sarabhai's speeches edited and published by his long-term colleague and partner Kamla Chowdhry: Sarabhai, op. cit. (21).

PRL'.⁶⁸ Renowned international speakers at these lecture series included Jacques E. Blamont, Buckminster R. Fuller and Arthur C. Clarke.⁶⁹ The lecture series drew on Sarabhai's established connections internationally to propagate his international fame to the domestic audience.

In 1976, an eighty-nine-page book titled *India in Space* by popular-science writer Mohan Sundara Rajan was published by the Ministry of Information and Broadcasting, with specific reference to the recent implementation of the Aryabhata and SITE projects. In the United States, SITE was known to be admired by Wernher von Braun, who served as vice president of engineering and development at Fairchild Industries during the development of ATS-6. Clarke also constituted a key interlocutor in promoting the project along the way.⁷⁰ Later on, through the collaboration between Yash Pal, then the director of the Space Applications Centre under the Department of Space, and Braun, India gifted Clarke the satellite ground station in Sri Lanka.⁷¹ Following the Indian invasion of Pakistan and nuclearization from 1971 onwards, the claim of non-alignment was proving hard to sustain among other nations. In this context, the gift was a sign of India's willingness to share space technology with Third World nations, enabling it to play the philanthropic distributor and moralistic leader, while simultaneously using the celebrity of space promoters such as Clarke to draw international, especially Western, attention to India's space flight development.⁷²

Despite its apparently transnational register, little reference to the collaboration with the United States or the USSR was mentioned in *India in Space*.⁷³ As Rajan wrote in the introduction, the book attempted to introduce 'India's space programme to the layman' from a third-person perspective.⁷⁴ Structured in twelve chapters, the narrative began with the earlier rocket tests in Thumba, going on to explain rocket technology and the Aryabhata and SITE projects. In the last chapter, 'Pioneers at work', Rajan demonstrated Sarabhai's foundational role in the nation's space flight history by using his direct quote across four whole pages and including a photograph of the scientist as the only portrait in the entire publication. Apart from underlining the developmental ethos, *India in Space* also specified an additional task of 'working together, merging our different identities based on language and region', and that '[t]he very method of functioning could infuse a new discipline and a

⁶⁸ 'Vikram Sarabhai professor', Physical Research Laboratory, Government of India, at www.prl.res.in/prl-eng/vikram_professor#:~:text=The%20Vikram%20Sarabhai%20Professorship%20was,distinguished%20researchers%20around%20the%20world (accessed 6 January 2025).

⁶⁹ For more commemoration of Sarabhai within the scientific community see Buckminster R. Fuller, 'Humans in universe', *Vikram Sarabhai Memorial Lecture IV*, Ahmedabad: Dr. Vikram A. Sarabhai AMA Memorial Trust, 15 December 1978, RRI Digital Repository. See also Arthur C. Clarke, 'The poetry of space', in *Vikram Sarabhai Memorial Lectures*, Ahmedabad: Physical Research Laboratory, 30 July 1980, pp. 8–13.

⁷⁰ See Michael Neufeld, 'The heaven declares the glory of God (1972–77)', in *Von Braun: Dreamer of Space, Engineer of War*, New York: Alfred A. Knopf, 2007, pp. 458–72; Bob Ward, *Dr. Space: The Life of Wernher von Braun*, Annapolis: Naval Institute Press, 2005; Arthur C. Clarke, 'Foreword', in Robert O. Wales (ed.), *ATS-6 Final Engineering Performance Report*, vol. 1: *Program and Systems Summaries; Mechanical and Thermal Details*, NASA Reference Publication 1080, 1981, p. xvii.

⁷¹ David Skogerboe and David Baneke, 'The prophet business: Arthur C. Clarke, Sri Lanka and the making of a global space persona', *BJHS*, this issue.

⁷² Skogerboe and Baneke, op. cit. (71).

⁷³ Mohan Sundara Rajan, *India in Space*, New Delhi: Ministry of Information and Broadcasting, 1976, esp. 'Preface'. In the same year as *India in Space* was published, a short documentary titled *The First Leap* was also released to report on the Aryabhata satellite project. Compared to the book *India in Space*, the film more explicitly mentioned Soviet assistance in the technological set-up and eventual launch of the project, featuring footage of the two nations signing the agreement of cooperation. See Shankar Gangooli, dir., *The First Leap*, India: Films Division, Ministry of Information and Broadcasting, 1976, 11 min.

⁷⁴ Rajan, op. cit. (73), p. 72.

sense of achievement and pride'.⁷⁵ The implicit reference here was to the nation's widening class divisions, where socio-economic interests fell increasingly into the hands of the private sector, monopolized by the upper middle elite class and small bourgeoisie.⁷⁶ Between 1975 and 1977, the State of Emergency was declared over the entirety of India by Indira Gandhi to suppress ongoing political unrest related to her 1971 election fraud. All publications were under strict censorship by the Ministry of Information and Broadcasting. The sense of 'achievement and pride' in space technology, Rajan implied, became a potential strategy for alleviating domestic unrest and forging political unification.

Altogether, cultural productions in the immediate years after Sarabhai's death – in print, stamps, films and other media – reflected the gradual formation of a nationalist self-image around Indian space flight. This self-image pointed to a geocentric promise of space flight, manifested in the model of low-earth-orbit satellite communication with benefits that would tackle unequal national and global development. On the one hand, the geocentric promise echoed the increasing investment in satellite applications from major space powers and the establishment of telecommunication networks globally, with SITE and Aryabhata projects two such instances.⁷⁷ On the other hand, it was also intentionally propagated by the Indian state to foster a sense of national cohesion domestically and to cope with geopolitical tensions internationally. Sarabhai's legacy became a resource through which to colaece these strategic concerns into a coherent national rhetoric for the domestic public, while simultaneously benefiting the interests of the Indian middle-class technocrats in power. His persona substantiated the geocentric promise by constituting a key historical reference in governmental narratives around the development of Indian space flight.

The geocentric promise described here shared similarities with the rhetoric of leapfrogging pronounced by Sarabhai in the 1960s. Both prioritized the use of space technology on Earth rather than deep space and called for more pragmatic civilian applications. However, if 'leapfrogging' remained as a rather abstract political rhetoric to be heard on the radio and in public speeches in the 1960s, the geocentric narrative in the 1970s transformed the term into a visually specific imaginary that entered the media consumption and everyday life of the public. Setting Sarabhai's persona as an individual embodiment of such imaginaries also allowed state narratives to sweep aside geopolitical and epistemological contexts such as Third World non-alignment, influence from modernization theories, and technological dual use underneath the 'leapfrogging' rhetoric. Instead, the geocentric promise highlighted the moralist tones of pacificism, the commitment to social welfare and national independence, all attached to and personified by Sarabhai's public image.

The crowning of the 'founding father'

In the 1980s, the number of space flight launches in India significantly increased: a total of seven satellite missions were carried out. Among them, the successful launch of Satellite Launch Vehicle 3 (SLV-3) to put the Rohini satellite in orbit made India, alongside the USSR, the United States, Japan, China and the European Space Agency, the sixth nation to possess satellite-launching capabilities, thus entering the 'exclusive club of space-faring nations'.⁷⁸ In 1985, the majestic building of the former St Mary Magdalene Church in Kerala was turned

⁷⁵ Rajan, op. cit. (73), 'Preface.'

⁷⁶ Donaldson, op. cit. (63), p. 487.

⁷⁷ Lisa Parks and James Schwoch, 'Introduction', in Lisa Parks and James Schwoch (eds.), *Down to Earth: Satellite Technologies, Industries, and Cultures*, New Brunswick, NJ: Rutgers University Press, 2012, pp. 1–18, 8.

⁷⁸ 'SLV', Department of Space, Indian Space Research Organisation, 2002, at www.isro.gov.in/SLV.html, accessed 6 January 2025.

into the space museum of the Vikram Sarabhai Space Centre (VSSC). The church was originally taken over by INCOSPAR engineers from the local fishing community as the site for assembling the Thumba rocket.⁷⁹ At first glance a commemorative moment for India's legacy in space flight, the transformation of the site marked the state's first step in evicting local villages and habitats to make way for its rocket and missile testing.⁸⁰ The measure heightened emphasis on security in the space sector, and, coupled with India's alliance with the superpowers for military arsenal imports, potentially transformed the perception of space flight technology from developmental pragmatism into insulated techno-industrial machinery.

The end of the Cold War in 1991, however, changed the geopolitical outlook in Asia. Although India's diplomatic relations with the United States were improving by the 1980s, its military-economic ties with the Soviet Union remained predominant, with over 70 per cent of defence hardware coming from there.⁸¹ The demise of the Soviet Union created an opportunity for the US to seek closer relations with India in order to expand its influence in the Asia-Pacific region. The arena of space technology constituted one of the key grounds for diplomatic and political manoeuvres. India also sought collaborations with the Western world on satellite and telecommunications projects, epitomized by the launch of the INSAT-2B by the European Space Agency in July 1993.

Economically, the new techno-economic wave marked by privatized satellite communication businesses took off in the post-Cold War market. With support from governmental and military sectors, pan-national corporations in the United States such as the Iridium project initiated by Motorola branded themselves after the model of global telecommunication through private investment in satellite infrastructure.⁸² Around the same time, the civilian application of satellite technology inside India also moved from direct state-level cooperation – as exemplified by the 1970s SITE experiment – into the state-corporate model, where governmental and private parties formed alliances to invest in telecommunications industries. In return, these investments from the allegedly private sector helped fund defence and military projects.⁸³ One early example of the public-private alliance was the successful setting up of the Centre for the Development of Telematics (C-DOT) in 1984, which both provided low-cost telecommunications services for the civilian market and collaborated with the Indian armed forces through the Tata Institute of Fundamental Research (TIFR) in following years.⁸⁴ The fiscal crisis in 1991 led to further privatization and restructuring of the industry, including manufacturing and the import of foreign equipment.⁸⁵

In this period of restructuring in international relations and economic markets, Sarabhai's persona gained increasing significance for the Western world. On 2 October 1993, the New Mexico Museum of Space History first attributed the title 'founding father' to Sarabhai when inducting him into the International Space Hall of Fame (ISHF) at

⁷⁹ Aravamudan and Aravamudan, op. cit. (6), pp. 22–34.

⁸⁰ Sujata Patel, 'Baliapal agitation: leadership crisis', *Economic and Political Weekly* (1990) 25(23), pp. 1238–40.

⁸¹ P.M. Kamath, 'The end of the Cold War: implications for Indian-American relations', *India Quarterly* (1993) 49(1–2), pp. 55–74, 61. See also Surendra Singh, 'Political and strategic dimensions of India-Russia relations in present scenario', *Journal of Siberian Federal University, Humanities and Social Sciences* (2013) 8(6), pp. 1232–39, 1235.

⁸² Martin Collins, 'One world ... one telephone: iridium, one look at the making of a global age', *History and Technology* (2005) 21(3), pp. 301–24.

⁸³ Itty Abraham, 'India's "strategic enclave": civilian scientists and military technologies', *Armed Forces and Society* (1992) 18(2), pp. 231–52, 240.

⁸⁴ See Abraham, op. cit. (28), pp. 677–9, 690–2.

⁸⁵ See J.P. Singh, 'Indian telecommunications: privatization and liberalization, 1991–98', in Singh, *Leapfrogging Development? The Political Economy of Telecommunications Restructuring*, Albany: SUNY Press, 1999, pp. 165–200.

Alamogordo in New Mexico, the United States.⁸⁶ On 6 October, the *Times of India* news brief followed suit to address Sarabhai as the ‘founding father of the Indian space programme’, announcing that ‘Dr. Sarabhai is the first Indian scientist to be honoured by the Americans in recognition of his great contribution to the Indian space programme and his pioneering work in applying space technology for the welfare of the people.’⁸⁷ A tone of pride in obtaining American recognition could be clearly detected in the report, as well as the reiteration of the developmental rhetoric. The 1 November 1993 report from *India News*, the official publication of the Indian embassy in Washington, DC, called Sarabhai’s induction a ‘milestone’ for the Indian space programme, placing the scientist on a level with ‘the illustrious group of scientists, pioneers and visionaries like Robert Goddard, Constantin Tsiolkovskii, Wernher von Braun, Sergei Korolev, Arthur C. Clarke, Yuri Gagarin, Neil Armstrong and others’.⁸⁸ Along with the induction, a special exhibit of the scientist was installed in the museum’s Satellite for Mankind gallery under the theme ‘One Planet, One People’, with the Indian flag set up at the space centre.⁸⁹ Implicit in both the induction speech and the exhibit was the extension of Sarabhai’s legacy from India’s space flight history to a universal appeal and impact, focused on satellite communication.

Following the 1993 crowning, Sarabhai’s image making underwent another boom domestically in the mid-1990s. The Indian leadership quickly moved to attach his new international recognition to its space programmes. In 1994, the quarterly journal of ISRO, *Space India*, reaffirmed him as the ‘pioneer who set the pace and direction for the Indian space programme’.⁹⁰ In 1995, a documentary titled *Vikram Sarabhai* was released by the Films Division of India, where the title ‘father of our space programme’ appeared for the first time in the domestic account of his life.⁹¹ Compared to earlier cinematic productions, the 1995 documentary also manifested a more personalized touch: private footage of the young Sarabhai at Cambridge and later with his family were featured, as well as interview recordings of his wife Mrinalini Sarabhai. Two years later, in 1997, in celebration of the nation’s fiftieth year of independence, another documentary, *India in Space*, was released by the Ministry of Foreign Affairs in collaboration with the Contiloe Films company.⁹² The ‘father’ trope was again invoked in the designation of Sarabhai, together with an emphasis on the civilian character and origins of India’s space flight projects.

Sarabhai’s accreditation as the founding father of Indian space flight in the 1990s was an illustrative case of Western appropriation, in which a discourse of globalization was propagated that emphasized privatized satellite communication as its techno-social anchor. The cultural-nationalist undertone in the geocentric promise was extended to ‘the good of the people around the world’ or, more precisely, individual consumers of satellite communication staying connected to the world.⁹³ For India itself, although the same rhetoric of space technology for societal welfare was employed, such welfare was substantially a

⁸⁶ The Space Hall was established in 1976 as ‘New Mexico’s tribute to science and to the men and women who challenged the unknown’. The first thirty-five inductees were nominated by the International Academy of Astronautics. ‘International Space Hall of Fame dedicated as New Mexico’s tribute: space pioneers enshrined’, *Las Vegas Daily Optic*, 6 October 1976, p. 6.

⁸⁷ ‘Sarabhai enters Hall of Fame’, *Times of India*, 6 October 1993, p. 14.

⁸⁸ ‘Vikram Sarabhai inducted into International Space Hall of Fame’, *India News*, 1 November 1993, p. 4.

⁸⁹ ‘Vikram Sarabhai inducted’, op. cit. (88).

⁹⁰ ‘75th birth anniversary of late Dr. Vikram Sarabhai celebrated’, *Space India*, July–September 1994, at www.isro.gov.in/SpaceIndia.html (accessed 6 January 2025), pp. 2–8, esp. 2–3.

⁹¹ Homi D. Sethna and G. Asho, dir., *Vikram Sarabhai*, India: Films Division, 1995, 42 min.

⁹² Karan Bali, dir., *India in Space*, Ministry of External Affairs and Contiloe Films, 1997, 27 min.

⁹³ ‘Vikram Sarabhai inducted’, op. cit. (88).

service that the urban and rural population purchased with fluctuating degrees of control from the Indian state.⁹⁴ At the same time, Sarabhai's persona might well contribute to maintaining the civilian semblance of telecommunications businesses both in India and in the West while at the same time hindering their military coalition.⁹⁵ With the scope of his legacy broadened from India and the Third World to the totality of mankind, public media in the West and India gave new discursive value to the geocentric promise of space flight to promote a satellite-based model of neoliberal governance on a global scale after the Cold War.

The thrust of a geocentric promise

In 2007, Indian space policies increasingly departed from the developmental and geocentric themes associated with Sarabhai's persona. 'The vision of Sarabhai has been fulfilled', announced the head of ISRO Madhavan Nair; 'We are looking at what's next.'⁹⁶ What followed was a resurgence of India's interest in space exploration, in particular the planned launch of Chandrayaan-I to the moon. But the change in directions of Indian space flight – going back to space – by no means diminished the appeal of Sarabhai's public image or the celebration of his legacy. In 2019, India celebrated the centenary of his birth by naming the lander of the Chandrayaan-II space mission after him, using his first name, 'Vikram', to evoke a sense of intimacy.⁹⁷ In September 2020, a series titled *Vikram Sarabhai* was released by Amar Chitra Katha, a well-known and bestselling Indian publisher of comic books and graphic novels. The fifty-two-page illustration intersperses key points in Sarabhai's career with images of a caring husband and father. Notably, at one point Sarabhai was portrayed as an amiable father teaching his daughter Mallika to play golf, which betrayed his elite class background (Figure 3). The scene also reflected the ideological predominance of the urban middle class as the dominant agent and narrator of Indian space flight, who took pride in a bourgeois model of modernity and considered achievements in technoscience a sign of national modernization.⁹⁸ Most recently, in 2022, the television series *Rocket Boys* was released on the Indian streaming service Sony LIV. The series returns to the early stages of Sarabhai's career, where he worked alongside Homi Bhabha in initiating the Thumba rocket programme. Despite its popularity among mainstream audiences, Sarabhai's biographer, Amrita Shah, pointed out the deviation of the series from the 'real-life Sarabhai',

⁹⁴ See Leela Fernandes, 'Framing the liberalizing middle class', in Fernandes, *India's New Middle Class: Democratic Politics in an Era of Economic Reform*, Minneapolis: University of Minnesota Press, 2006, pp. 29–87.

⁹⁵ For discussions regarding the military aspect of satellite communication see Collins, op. cit. (82), p. 310; Hugh Richard Slotten, 'Satellite communications, globalization, and the Cold War', *Technology and Culture* (2002) 43(2), pp. 315–50, 327–8; Paul E. Ceruzzi, 'Satellite navigation and the military–civilian dilemma: the geopolitics of GPS and its rivals', in Alexander C.T. Geppert, Daniel Brandau and Tilmann Siebeneichner (eds.), *Militarizing Outer Space: Astroculture, Dystopia and the Cold War*, London: Palgrave Macmillan, 2021, pp. 343–67.

⁹⁶ Jeff Foust, 'India and the US: partners or rivals in space?', *Space Review*, 11 February 2008, at www.thespacereview.com/article/1056/1 (accessed 6 January 2025). See also Sobia Paracha, 'Military dimensions of the Indian space program', *Astropolitics: The International Journal of Space Politics and Policy* (2013) 11(6), pp. 156–86, 158.

⁹⁷ See, for instance, three articles devoted to Sarabhai by his wife Mrinalini Sarabhai, chairman of the PRL Governing Council U.R. Rao, and chairman of ISRO K. Kasturirangan. Mrinalini Sarabhai, 'Vikram Sarabhai', *Resonance* (2001) 6(12), pp. 5–7; U.R. Rao, 'Vikram Sarabhai, the scientist', *Resonance* (2001) 6(12), pp. 10–18; K. Kasturirangan, 'Dr Vikram Sarabhai: the light that leads the Indian space program', *Resonance* (2001) 6(12), pp. 3–4.

⁹⁸ Abraham, op. cit. (28), p. 692. See also Sankaran Krishna, 'The bomb, biography and the Indian middle class', *Economic and Political Weekly* (2006) 41(23), pp. 2327–31.

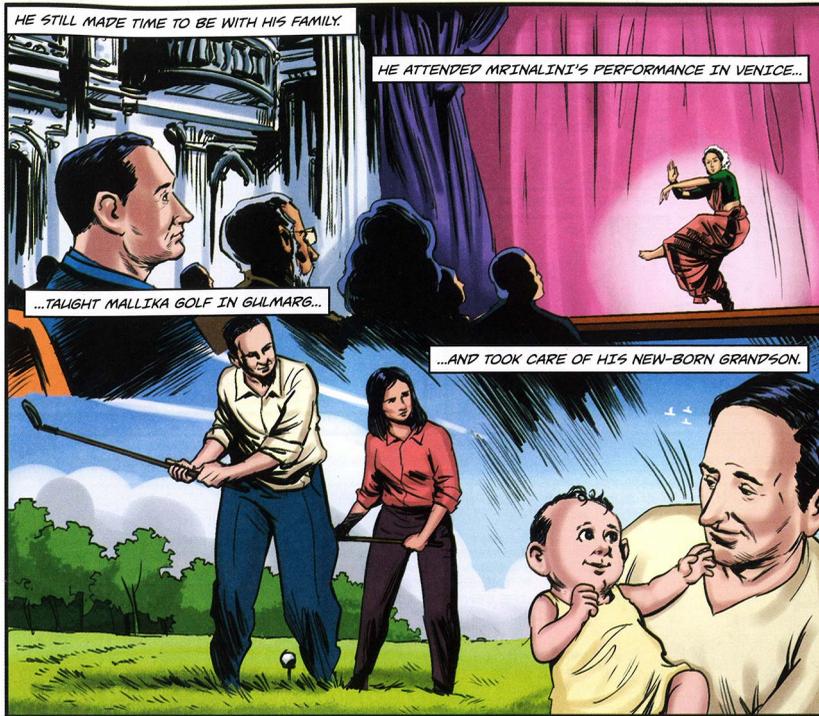


Figure 3. Page from the graphic novel *Vikram Sarabhai* where the scientist is shown dedicating time to his family away from work at the AEC, watching dance performances of his wife and playing golf. Tripti Nainwal and Arijit Dutta Chowdhury, *Vikram Sarabhai: Pioneering India's Space Programme*, Mumbai: Amar Chitra Katha, 2020.

reducing the technocrat to someone wondering 'in an air of dreamy abstraction, indulging in well-meaning but ill-thought-out ventures'.⁹⁹

Whether it resembled the 'real-life' Sarabhai or not, this idealist image of the scientist has proved its historic appeal in promoting the civilian, peaceful and developmental promise of space flight technology. From the 1957 launch of Sputnik I in the USSR to the 1961 Syncom project funded by NASA and the US Department of Defense, both superpowers understood the geopolitical significance of low-earth orbit in solidifying their political hegemonies.¹⁰⁰ In comparison, Sarabhai's rhetoric of 'leapfrogging' had a more domestic orientation: it put space technology in the service of nation building to bring forth wholistic reforms in other socio-economic and political sectors. Nevertheless, rather than representing an enlightened individual vision, as state narratives of Indian space flight and hagiographical accounts might suggest, the 'leapfrogging' rhetoric actually carried quite strategic considerations in the face of India's positionality amongst non-aligned countries and the push for nuclearization within the country's leadership. Sarabhai's posthumous persona – extensively constructed by the Indian state and the international science community – gave the rhetoric of 'leapfrogging' a sense of cultural resonance beyond pragmatic

⁹⁹ Amrita Shah, "'Rocket Boys' gets Vikram Sarabhai wrong", *Indian Express*, 2 March 2022, at <https://indianexpress.com/article/opinion/columns/rocket-boys-vikram-sarabhai-sony-liv-7796604> (accessed 6 January 2025).

¹⁰⁰ See Slotten, *op. cit.* (95), pp. 336, 342–3.

and diplomatic factors in response to Cold War tensions. His posthumous image making reflected the gradual focusing of Indian astroculture around geocentric space flight: the application of space technology was located within a specific range of the Earth's atmosphere as a pragmatic tool for enhancing economic productivity, providing education resources and fostering rural development.

Looking back at space history globally, this geocentric appeal in Indian space flight might offer a different way of framing what Geppert has described as the 'post-Apollo paradox' in the 1970s, where the emergence of theoretical discourses on globalization reached full bloom only after the fascination with space had faded, with its imaginaries increasingly planetized.¹⁰¹ Recognizing the limits in space exploration and the comparable insignificance of the lonely planet Earth as captured in the *Blue Marble* image (1972), the impact of space exploration in the 1960s had become the reflexive contemplation of global communication on Earth by the 1970s. Were one to broaden the scope of inquiry beyond more established space powers, however, this temporal paradox in the post-Apollo period may well have its spatial configuration unfolding in the 1960s through the 'leapfrogging' concept. On the South Asian subcontinent, the thinking, promotion and instrumentalization of the rhetoric of global connectedness paralleled the Apollo craze in the 1960s: Sarabhai's persona carried it through into the post-Apollo period. In this way, the development of satellite communications on a global scale may find more continuity in the imaginaries of earthbound space flight technologies in sites such as India. Following this logic, while the transfer of space technology as a vector of modernity appeared to 'diffuse' from the West to the rest, the development of space imaginaries from the 1960s to the 1970s could be said to witness simultaneous countermovements, with emerging space powers such as India considering the impact of their space infrastructure on earthbound political and economic relationships.¹⁰²

It was in the 1970s that this geocentric promise became culturally self-conscious for India's leadership, and the posthumous persona of Vikram Sarabhai central to this astro-cultural narrative. The plan for developing communication satellite systems became attributed to the scientist, and embellished as a 'vision' unique to him, and by extension to the Indian nation state. Constructed in response to ongoing class divisions and domestic unrest, this developmental and moralist self-image satisfied primarily the interests of the Indian technocratic class. Like its 'leapfrogging' precursor, geocentric space flight embodied Western ideals of modernity based on technological advancement. In this sense, the specific resonance of Indian astroculture must not be romanticized as a separate imaginary, but was inherently relational and even subservient to Eurocentric ideologies of nation building and techno-industrial progress in the Cold War context.

The historiographical entanglement between Indian space flight and the post-Apollo imaginaries of outer space continued into the 1980s and 1990s, with Sarabhai's persona serving as a recurrent reference point for the Indian state, the international scientific communities and political institutions. The relatively late crowning of the scientist with the title 'founding father' in 1993 constituted the convergence of the respective historiographical accounts: Sarabhai's persona was reappropriated to propagate the spread of commercial satellite systems in the 1990s. The political outlook in the geocentric promise – as a channel of nation building and bridging regional inequalities – quickly and easily became assimilated into the state-corporate machinery to substantiate a satellite-driven system of governance and control. Both for India and for the other nations it considered competitors or collaborators, the space sector after the late 1970s increasingly became one

¹⁰¹ Alexander C.T. Geppert, 'The post-Apollo paradox: envisioning limits during the planetized 1970s', in Geppert (ed.), *Limiting Outer Space: Astroculture after Apollo*, London: Palgrave Macmillan, 2018, pp. 3–26, 10–12.

¹⁰² Asif Siddiqi, 'Technology in the South Asian Imaginary', *History and Technology* (2015) 31(4), pp. 341–9, 341.

among many insulated industrial tokens of national power, its hands tied to the military as much as to business.

Acknowledgements. The author would like to express her thanks to her fellow collaborators in the Global Astroculture Research Group – Alexander C.T. Geppert, Lu Liu, Gloria Maritza Gómez Revuelta, David Skogerboe, David Baneke, Tilmann Siebeneichner and Asif Siddiqi – for their generous support and feedback throughout this collaboration. The author is also grateful for the constructive comments and suggestions from the anonymous reviewers and journal editor Amanda Rees, which helped sharpen the article. Special thanks to Amrita Shah, Gopal Raj, Brian Harvey, Gurbir Singh and Alex Perchatkin for the help and insight they have provided in the process of identifying and locating source material on Sarabhai's image making.

Cite this article: Ma Haitian, 'Leapfrogging India: Vikram Sarabhai and the developmental promise of geocentric space flight', *The British Journal for the History of Science* (2025), 1–20. <https://doi.org/10.1017/S0007087425000287>