



# Brazil's space program: Dreaming with its feet on the ground<sup>☆</sup>



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## ABSTRACT

Brazil's space program represents an anomaly among those of the world's 10 largest economic powers. During a time that has witnessed the rapid emergence of a variety of national space programs—even among lesser powers like Iran and South Korea—Brazil's failure to emerge as a significant space actor requires further analysis. This article traces the history of Brazil's space efforts and examines the factors that have held it back, some of which continue to influence its policies today: inadequate funding, conflicting organizations, poorly handled foreign relations, and an unclear national vision for Brazil's "place" in space. Recent efforts to overcome these hurdles through an improved domestic strategy and smarter international relations show promise. But a more sustained political commitment to space development will be needed if they are to succeed.

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The linkage between the global ambitions of rising powers and their decisions to develop space programs has been clear since the Soviet Union's launch of *Sputnik* in 1957. More recently, a number of countries seeking greater military power, economic influence, and/or international political prestige have undertaken the costs of seeking independent spaceflight capability. Since 1980, these countries have included India, Israel, Iran, North Korea, and South Korea, which have joined the more established space powers (the United States, Russia, China, Japan, and the countries of the European Space Agency [ESA]). Among the world's top 10 economies, notably, Brazil is the only country that lacks either a national space launch capability or membership in a space-capable regional body

like ESA. What accounts for Brazil's failure to date to develop a major space program and an independent capability to access space? Is Brazil on a path to address this shortcoming or, if not, why not? Brazil has had past ambitions to join the ranks of top-tier space powers, and yet to date has failed to achieve this goal.

This article examines Brazil's comparative place among the world's space programs and seeks to explain its relative lag among major economic powers. Brazil seems stuck in a category that includes all of the countries of Latin America and, among the world's top 20 economies, Turkey, Indonesia, and Australia. Notably, nations with much weaker economies like Iran and North Korea have built independent space access capabilities. Some late-developing middle powers, such as South Korea, now have far more advanced satellite manufacturing capabilities than does Brazil. This article asks, what has caused this mismatch between Brazil's limited space accomplishments and its significant international political and economic influence? Has Brazil been uninterested or instead incapable of succeeding in space? And, finally, will recent initiatives aimed at breaking through past barriers enable it to join the community of major space actors?

<sup>☆</sup> This title is a paraphrase of a sub-heading on page 5 of the National Program of Space Activities: 2012–2021, or PNAE, which states: "A PNAE that dreams with its feet on the ground." The phrase is clearly intended to imply that Brazil's space dreams are realistic and well-grounded, but there is a double meaning in English, suggesting that perhaps the space program is "stuck" on the ground. This dual meaning nicely summarizes the debate both within and outside of Brazil of whether the space program can indeed achieve its ambitious objectives.

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## 1. The existing literature

The English-language literature on Brazil's space activities is small but growing. Some of the most detailed recent studies have come in the form of chapters in edited volumes on emerging space powers, including works on Brazil by the academic analyst Robert

C. Harding and by the journalist Henk Smid [1]. These accounts have provided valuable histories of space efforts in Brazil, while also documenting key political problems. As Harding observes, “a principal obstacle faced by the Brazilian government is not so much technical as bureaucratic” [2]. Brazil is featured in a recent Center for Strategic and International Studies report on Latin American space programs, which notes Brazil’s regional leadership but also its last place among the BRIC (Brazil, Russia, India, and China) countries in space [3]. The report discusses Brazil’s ambitious plans for satellite manufacturing and equatorial launch operations, but also the major gap between these dreams and current reality. It concludes: “A country that does not have independent access to space cannot pretend to the ranks of greatness” [4]. Other recent English-language studies on more specific aspects of Brazil’s space activities have been published by such foreign analysts as Douglas Messler and Yun Zhao and by Brazilian space experts and officials, including Otavio Duraó and Darly Henriques da Silva [5]. Messler notes that Brazil will need to undertake “major changes” in order to implement its goals, observing that “Brazil’s small, fragmented space effort is hamstrung by a shortage of resources, money and talent” [6]. Duraó agrees, but argues that the joint efforts of the military and private industry “pressure politicians and government space authorities to establish a more reliable working environment to develop space projects” [7]. The Portuguese-language literature on space is voluminous. This project reviewed a cross-section of recent material from Brazil, which proved extremely useful to this report. In the past few years, for example, the Brazilian legislature sponsored a two-volume study *A Política Espacial Brasileira* published in the *Cadernos de Altos Estudos* series and featuring essays by some two dozen Brazilian technical and policy experts and officials on various aspects of the space program [8]. The Brazilian Space Agency (Agência Espacial Brasileira, or AEB) also recently published its fourth long-term strategic plan, which provides a detailed discussion of the political, economic, and military rationales for space activity, the technologies Brazil plans to build, and its overall vision for the period up to 2021 [9]. Finally, independent Brazilian analysts, such as Marco Cepik and Roberto Maltchik, have added much information on the domestic political context of Brazil’s space decision-making and the up-and-down budgetary realities that have caused some of the country’s recent problems in developing its reliable capabilities [10]. The consensus among Brazilian experts is that greater stability in budgeting and planning will be needed to ensure decisive progress in space. But, even then, they conclude that making the Alcântara launch center commercially viable—given its considerable infrastructure problems and the fierce international competition it faces around the world—will be a major challenge, if not an impossible goal. These points likely factored into Brazil’s recent decision to cancel a decade-long joint venture rocket project with Ukraine.

Despite Brazil’s aim for technological autonomy, the role of international collaboration may be crucial to the country’s future advancement in space. Brazilian officials argue that the country *can* meet its objectives through national means, but admit that: “... in terms of space, we need to take a leap. A qualitative leap. A transforming leap. And with all possible haste” [11]. South American politics expert Harold Trinkunas has noted that the Brazil–Argentina conflict’s demise and the low probability of a serious military threat has greatly reduced the “demand” for military capabilities, causing Brazilian defense spending to lag considerably in relation to rising powers elsewhere in the world [12]. These dynamics seem to have had a significant influence in slowing Brazil’s space development in the first two decades following the return of civilian rule in 1985. Now, Brazil must play catch-up if it wants to become a significant space actor on par with its fellow Brazil–Russia–India–China (BRIC) member India or even a smaller power like South Korea.

The rest of this article provides a brief overview of Brazil’s history in space and then examines its comparative place within the international space community. It discusses the troubled path Brazil has followed to date in regard to space activity—worsened by accidents and frequent difficulties with international partners—and analyzes the various factors that have resulted in its limited success to date in developing space capabilities equal to its global economic and political position. Finally, it examines current perspectives within Brazil on space activity and examines new initiatives and possible other mechanisms through which Brazil might advance its future trajectory in space despite a welter of competing national priorities.

## 2. A short history of Brazilian space activity

### 2.1. Beginnings and military rule (1957–85)

Brazil has long envisaged a major role for itself in space exploration, commercial development, and military support operations. In the run-up to the 1957–58 International Geophysical Year, Brazilian students and scientists cooperated with the U.S. Naval Research Laboratory to set up a Minitrack ground station to receive signals from the planned U.S. *Vanguard* satellite in 1958 [13]. Shortly after a visit by Soviet cosmonaut Yuri Gagarin to Brazil in July of 1961 (just months after his historic flight), Brazilian President Janio Quadros formally established an Organizing Group for the National Commission on Space Activities [14]. Despite the participation of civilian scientists, the Brazilian military naturally emerged after the 1964 coup as the leading “driver” in space activities, which were centered largely on efforts to develop national missile capabilities [15]. To facilitate its research, the military established in Rio Grande do Norte the Centro de Lançamento Barreira do Inferno (Barrier of Hell Launch Center), where it experimented with a series of sub-orbital, solid-fuel sounding rockets. NASA and later ESA space vehicles benefited from a Brazilian tracking station, which received their communications as they passed over South America [16].

In 1971, the military reorganized Brazilian space activity by creating the Brazilian National Institute for Space Research (INPE) as the central hub for implementing decisions of the new Brazilian Commission on Space Activities (COBAE) [17]. The head of COBAE, however, was the leader of the Armed Forces General Staff, making the organization’s main focus the promotion of Brazilian security interests [18]. Still, not all activities aimed at narrow military programs. In 1972, for example, COBAE established the Cuiabá Data Reception Station for gathering remote-sensing data from the U.S. *Landsat-1* [19], thus beginning a long-standing and steadily expanding Brazilian use of space assets for mapping its huge territory and monitoring resources and land use.

In 1979, the military again reorganized the country’s space activities into an effort called the Brazilian Complete Space Mission (Missão Espacial Completa Brasileira, or MECB) [20]. The new plan called for increased funding and set out long-term plans for satellite development, mapping, Earth environmental monitoring, and communications, as well as expanded launch-sector development. This included construction of a major new launch site at Alcântara [21]. Due to budgetary difficulties, actual funding for space increased slowly, rising only a few percent per year and remaining less than \$70 million annually during the last years of military rule [22]. The bulk of the focus during this time remained on missile development.

### 2.2. Civilian rule and new challenges in space policy (1985–2003)

Over the next 18 years, Brazil’s space policy came into the open and began to challenge old habits of military control. President Jose

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