Report:

BRAZIL'S ACCESSION TO THE MTCR

by Wyn Q. Bowen

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In October 1995, Brazil's membership in the Missile Technology Control Regime (MTCR) was approved unanimously at the regime's 10th plenary meeting in Bonn, Germany. Acceptance in the MTCR was the outcome of a series of policy changes initiated by Brazil in early 1994 to address international missile proliferation concerns. This report considers the past Brazilian rocket and missile activities that generated these concerns and the policy changes which Brazil undertook to gain acceptance in the MTCR. The implications of Brazil's membership in the regime are also considered, along with some of the missile proliferation concerns which continue to be raised.

HISTORICAL DEVELOPMENT OF BRAZIL'S ROCKET AND MISSILE PROGRAMS

Brazil began developing the Sonda series of sounding rockets (1, 2, 3, and 4) with American assistance in the 1960s. It was not until 1979, however, that Brazil established the Brazilian Complete Space Mission (MECB) to realize three specific objectives: the design, development, and construction of indigenous satellites; the design, development, and construction of the VLS (Veiculo Lancador de Satellites) rocket to deploy these satellites to a low earth orbit (LEO); and the design and construction of a center from which to launch the VLS at Alcantara (CLA), in the northern state of Maranhao.[1] The VLS was to be developed using technology derived from the Sonda rocket series.[2]

The central role of the military in the MECB during the 1980s, however, cast doubt over the true nature of the space program. The Brazilian Commission for Space Activities (COBAE), responsible for overseeing and running the MECB, was chaired by the armed forces chief of staff.[3] The prominent role of the Air Force's Aerospace Technical Center (CTA) in developing the VLS also suggested the military might have other reasons for developing space launch vehicles. Suspicion deepened in the mid-1980s when the firms Orbita and Avibras began developing ballistic missiles (the MB/EE and SS series, respectively) derived primarily from technology developed for the Sonda rocket series.[4] Moreover, the Armed Forces Joint Command assumed responsibility for coordinating all missile development and production in Brazil in 1986.

Brazil's missile aspirations were fueled in part by Argentina's simultaneous effort to develop the medium-range Condor-2 ballistic missile. In addition, Brazil's profitable export of weaponry, strategic technology, and the associated technical know-how in the 1980s and early 1990s suggested that Brazil's missile programs were also driven by financial motivations. Prior

Missiles Derived from Sonda Technology and Reportedly Under Development in the 1980s

Missile	Payload (kg)	Range (km)	Fuel type
MB/EE-150	500	150	Solid
MB/EE-350	Up to 500	350	Solid
MB/EE-600	Up to 500	600	Solid
MB/EE-1,000	Up to 500	1,000	Solid
SS-150	-	150	Solid
SS-300	1,000	300	Solid
SS-600	500	600	Solid
SS-1,000	Up to 1,000	1,000	Solid

Sources: Brian G. Chow, *Emerging National Space Launch Programs: Economics and Safeguards* (Santa Monica: RAND, 1993), pp. 11-12; "Country Survey: Brazil," *Jane's Defence Weekly*, May 9, 1992, pp. 808-813; Pericles Gasparini Alves, *Access to Outer Space Technologies: Implications for International Security*, U.N. Institute for Disarmament Research document UNIDIR/92/77, Research Paper No. 15, 1992, pp. 62-63, 113-117; "Prithvi Deployment Will Test Control Rules," *Flight International*, November 8, 1995, p. 20.

to the 1991 Gulf War, Brazilian engineers reportedly assisted Iraq in extending the range of its Soviet-supplied Scud-B ballistic missiles.[5] Avibras was also accused of working on joint missile research and development programs with Iraq.[6] Indeed, Avibras transferred numerous Astros-2 artillery rocket systems—also derived from Sonda rocket technology—to Iraq during its war with Iran in the 1980s.[7] Some reports even claimed that Iraq shipped a Scud missile to Brazil where Avibras replicated the missile's components in order to provide replacement parts to the Iraqi military.[8] In North Africa, Libya reportedly offered to conclude a $2 billion arms cooperation package with Brazil in exchange for assistance in missile development.[9]

Missile proliferation concerns subsequently drove Washington to persuade its MTCR partners to stop exporting space launch and other strategic technologies to Brazil. For example, the Bush administration initiated a successful campaign to dissuade the French government from approving an Arianespace-proposed transfer to Brazil of rocket-motor technology for the VLS that could potentially be used in the development of ballistic missiles.[10] Arianespace had offered liquid-fueled Viking rocket-motors, and the capability to manufacture them indigenously, in an attempt to sweeten its bid for a contract to launch two Brazilian satellites.[11] White House officials asserted, however, that such a transfer would set back the international effort to stem missile proliferation because of Brazil's history of developing military rockets using technology from its civilian space program.[12] American concern focused on the possible diversion of this technology to states such as Iraq and Brazil's potential development of a long-range nuclear-armed missile. The latter was of concern due to Brazil's "parallel program" to develop a nuclear weapon. In June 1992, the U.S. Department of Commerce included the Sonda-3, Sonda-4, and VLS rockets and the SS-300, SS-1,000, and MB/EE missiles, on a list of missile projects of concern.[13] Indeed, the MTCR embargo had succeeded in restricting considerably Brazil's access to the technology needed to complete development of the VLS by the early 1990s. According to a 1992 U.S. Department of Defense study, the VLS program was particularly limited in the area of "inertial navigation and vehicle control systems."[14] This occurred despite Brazil's efforts to acquire the necessary materials and assistance from non-MTCR members such as Russia.[15]

BRAZIL ADDRESSES INTERNATIONAL MISSILE PROLIFERATION CONCERNS

In February 1994, Brazil began addressing international missile proliferation concerns by establishing the civilian-controlled Brazilian Space Agency (AEB).[16] AEB assumed the functions of COBAE and became responsible for coordinating the work of all ministries involved in the MECB.[17] Brazil also announced its

decision to abide by MTCR guidelines and its intention to join the regime at some point in the future. The deactivation of COBAE reduced significantly the military's role in the Brazilian space program. In December 1994, the Brazilian government announced it would begin controlling the trade in missile-related goods and services, pending Congressional approval of a government-sponsored export control bill. President Fernando Henrique Cardoso reiterated his government's commitment to nonproliferation in August 1995, when he announced that "Brazil no longer possesses, nor does it produce or intend to produce, to import or to export long-range military missiles capable of carrying weapons of mass destruction."[18]

The Brazilian Senate enacted President Cardoso's export control bill on October 5, 1995. Export Control Law 9112 gave the Strategic Affairs Secretariat (SAE) the authority to penalize Brazilian firms that breach export controls on the transfer of dual-use materials, including missile-related goods and services.[19] Sophisticated weapons and items intended purely for military use are also controlled by the new law. SAE has the authority to impose penalties on export control violators, ranging from simple warnings and fines, to the removal of export privileges and imprisonment. In response to the passage of this legislation, Brazilian Senator Hugo Napoleao said it would enable Brazil to acquire sensitive technology from abroad.[20] Indeed, the new law removed the final obstacle to Brazil's membership in the MTCR, and the members subsequently voted to accept Brazil into the regime on October 11, 1995.[21] Although Brazil was not required to sacrifice its space launch program, membership was approved on condition that the SS series of ballistic missile projects (SS-300, SS-600, and SS-1,000) had been terminated.[22] Moreover, membership was approved despite the Clinton administration's determination in May 1995 that Russia had transferred advanced missile technology to Brazil. The administration waived Congressionally-mandated sanctions against the entities involved, however, as part of the overall U.S. effort to encourage Brazil to become a full-fledged member in the MTCR.[23]

Although these policy changes can be traced ultimately to Brazil's adoption of a new constitution in 1988—which resulted in the country's transition from military to civilian authority—three other factors contributed to these changes in Brazil's attitude toward nonproliferation. First, radically improved relations with Buenos Aires and Argentina's termination of the Condor-2 project in the early 1990s, removed one of the principal rationales behind Brazil's past missile development efforts. Second, the MTCR embargo had brought the VLS program to a virtual stand-still by restricting Brazil's access to the advanced technologies, technical expertise, and investment it needed to complete development of the rocket. Third, these reforms were motivated by Brazil's desire to be seen as a responsible international actor because of its aspiration to become a permanent member of the U.N. Security Council upon its future possible enlargement.

IMPLICATIONS OF BRAZIL'S ACCESSION TO THE MTCR

Brazil is likely to reap two major benefits from its accession to the MTCR. First, membership allows Brazil to import the advanced civilian space launch technology, which it needs to complete development of the VLS, from other regime participants. The inaugural launch of the four-stage rocket has been delayed on several occasions. Although most recently scheduled for July 1996, the launch date has now been pushed back to 1997 due to technical problems.[24] One major

Brazil's Sonda-2, -3, and -4 Sounding Rockets and VLS Launcher

Rocket	Length (m)	Stages	Fuel type	Payload (kg)	Altitude capable of (km)
Sonda-2	4.534	1	Solid	Less than 70	50 to 100
Sonda-3	3.793	2	Solid	50 to 150	200 to 650
Sonda-4	5.348	2	Solid	300 to 500	700 to 1,000
VLS	19.8	4	Solid	200	750 (equatorial orbit)

Source: Homepage of the Brazilian Embassy in Washington, D.C.: `http://brasil.emb.nw.dc.us/esp-vls.htm`

difficulty has been Brazil's failure to acquire technology to complete the rocket's inertial guidance system: needed to control the VLS in flight. This failure brings into question reports that Brazil had managed previously to acquire guidance technology from Western Europe, Russia, and the United States via the black market.[25] The successful completion and launch of the VLS will probably depend upon the degree to which MTCR states are willing to provide Brazil with the necessary technology and assistance. Before joining the regime, Strategic Affairs Secretary Ronaldo Sardenberg said German collaboration in the VLS project would be made possible by Brazil's accession to the regime.[26] In September 1995, President Cardoso visited Germany to discuss, among other things, strategic cooperation with Brazil.[27] British Aerospace and France's Societe d'Applications Generales d'Electricite (SAGEM) have also been identified as two of the European firms which might provide guidance technology for the VLS project.[28] In March 1996, the U.S. and Brazilian governments signed a cooperative agreement for civilian uses of space which might eventually result in technology exchange.[29] Future cooperation could also involve Russia. This potential was illustrated in early October 1995, when Brazil and Russia concluded a defense agreement that provides for expanded military cooperation between the two states.[30]

MTCR membership will also improve Brazil's chances of successfully marketing Alcantara's space launch facilities to foreign companies and organizations for satellite launching and/or to conduct rocket experiments. For example, in the summer and fall of 1994, AEB and the U.S. National Aeronautics and Space Administration (NASA) implemented the Guara 94 Campaign at Alcantara, which involved the launch of more than 30 sounding rockets to conduct experiments in the ionosphere.[31] Alcantara is well situated for launching satellites because of its location approximately 250 kilometers (150 miles) south of the equator; rockets launched from an equatorial location can carry heavier payloads and use less fuel than those launched from elsewhere. Brazil has invested millions of dollars in Alcantara's facilities, which include a satellite preparation complex, a satellite fitting and assembly building, a chemical laboratory, a ground station, a facility for storing pyrotechnics and propellants, and a large runway.[32]

Several entities have shown an interest in using Alcantara. Rockwell sent a delegation to evaluate Alcantara as a potential launch site in September 1995, and Lockheed-Martin's International Launch Services has shown an interest in Alcantara as a potential alternative to Kazakstan's Baikonur Cosmodrome for launching Russian-manufactured Proton SLVs.[33] Alcantara is also located close enough to the European Space Agency's (ESA) launch site at Kourou in French Guiana to receive any future overflow of small launches; ESA already uses Alcantara to track Ariane launches from Kourou.[34] Moreover, Brazil's Barreira do Inferno Sounding Rocket Range near Natal is ideally situated to become a future tracking station for Brazilian space launches from Alcantara (see map).

At least one country appears willing to provide technology to the VLS program in exchange for access to Alcantara. On a trip to Brazil in late October 1995, Ukrainian President Leonid Kuchma said Kiev may supply rocket technology for the VLS in return for a cheap launch site to conduct rocket tests. Kuchma said Ukraine was interested specifically in Alcantara because its lo-

cation reduces the cost of placing satellites into equatorial orbits. On the same trip, the heads of the Brazilian and Ukrainian space agencies also discussed cooperative space efforts.[35]

CONCLUSION: REMAINING PROLIFERATION CONCERNS?

A September 1995 side agreement to the Strategic Arms Reduction Treaty (START I) may contribute to Brazilian space launch ambitions.[36] The agreement allows Russia and Ukraine to transfer space launch vehicles that have been converted from mobile intercontinental ballistic missiles (ICBMs) to foreign launch sites, provided the United States is notified first and the rockets remain under the control and ownership of Moscow or Kiev, respectively.[37] Russian and Ukrainian interest in Brazil makes Alcantara a likely foreign launch site for these converted missiles. Moreover, the recent accession of Russia and Brazil to the MTCR legalized the future transfer of converted road-mobile SS-25 ICBMs from the former Soviet republic to this South American nation. Although Ukraine remains outside the MTCR and faces no restrictions on where it can transfer converted rail-mobile SS-24 ICBMs, Kiev is currently negotiating membership in the regime. Given Ukraine's interest in gaining access to Alcantara and in supplying rocket technology for the VLS, Kiev's membership in the regime could prove invaluable to Brazil's future space launch development.

Skeptics have criticized the side agreement, however, because of its potential contribution to the proliferation of ICBM technology if transferred outside Russia and Ukraine. Critics argue these converted missiles will not make good satellite launch vehicles and could potentially be re-armed in the future.[38] In particular, concern has focused on the difficulty of establishing control over a host nation's launch facilities, such as Alcantara, and the related problem of ensuring that rocket technology is not diverted illegally to noncivilian end-uses in the host country or elsewhere.

However, such proliferation concerns should be considered in the context of Brazil's radically improved nonproliferation credentials of recent years. In addition to joining the MTCR, Brazil completed its ratification of the Treaty of Tlatelolco in 1994, which established a nuclear-weapon-free zone in Latin America and the Caribbean. Brazil also signed the Mendoza Declaration in 1991, which prohibits the Latin American signatories from producing, purchasing, stockpiling, using, or cooperating in the development of chemical and biological weapons.[39] These policy changes suggest that Brazil now poses less of a threat to the nonproliferation regime.

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