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Dual-Use by Design: The Legal Status of Foreign-Operated Space Tracking Stations on African Soil

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Abstract

Within the past half a decade the People's Republic of China built or expanded satellite tracking, telemetry and data-receiving stations in Egypt, Ethiopia and Namibia. Several of them operated by entities directly linked to the People's Liberation Army (PLA). These facilities sit on African soil, under African territorial sovereignty, yet their military significance, and in one documented case their direct chain of command is to a PLA tracking department. This is scarcely administered by the host state's domestic law or by the international space treaties the host state has ratified. In this article, the authors ask what legal status these dual-use ground stations hold, what obligations, if any; they place on the states that host them? What happens when the dependency runs the other way, as it now does with Nigeria's own national satellite? The article adopts a doctrinal and case-study methodology. It analyses the Outer Space Treaty of 1967, the Registration Convention 1975, the customary international law of due diligence, and the emerging Woomera Manual restatement of military space law, against four empirical case studies. China's tracking stations in Egypt, Ethiopia and Namibia, documented in a January 2026 Center for Strategic and International Studies (CSIS) Hidden Reach investigation, and the ongoing crisis surrounding Nigeria's NigComSat-1R satellite. This Satellite has its operational control exercised from a Chinese ground station in Kashi, Xinjiang, since 2018. The article finds that the existing legal framework is fragmented. Space law regulates state responsibility and the jurisdiction of registered space objects, while telecommunications law regulates the radio-frequency and earth-station components. Neither body of law provides detailed rules for foreign-operated ground stations. Furthermore, the international space treaty regime was drafted almost entirely around the regulation of space objects in orbit and says remarkably little about the terrestrial ground segment that makes orbital activity possible at all. Ground stations are not space objects within the meaning of the Registration Convention, and Article IV of the Outer Space Treaty's peaceful-purposes clause restricts only weapons of mass destruction and military installations on celestial bodies. This leaves Earth-based dual-use tracking infrastructure almost entirely outside the treaty framework and governed instead by ordinary rules of territorial sovereignty and whatever bilateral memorandum of understanding the host state agreed to. Namibia's own arrangement for its

Windhoek and Swakopmund stations illustrates how little domestic legal scrutiny such agreements currently receive. Nigeria's experience with NigComSat-1R shows that the dependency this creates is not one-directional. An African state can as easily lose effective control of its own space asset to a foreign ground station as it can unknowingly host one. The article accordingly recommends three concrete fixes, each targeted at a specific failure identified in the analysis. First, African states should require foreign-built tracking stations to undergo a mandatory dual-use risk assessment and disclose their operational control arrangements before approval. This should be so in case a host government can no longer authorise a facility, as Namibia did at Windhoek, without ever being told whether it is civilian infrastructure or a node in a foreign military command network. Secondly, any state-owned satellite should be legally required to maintain a redundant, domestically controlled backup ground station, so that an accident of the kind that struck Nigeria's Abuja facility in 2019 cannot again leave a country unable to command its own satellite for want of a working alternative at home. Third, the African Union should negotiate a coordinated continental position within the Woomera Manual and MILAMOS processes on ground-segment jurisdiction, so that the rules eventually governing this infrastructure are shaped with African bargaining power behind them, rather than settled elsewhere and presented to African states afterward as a *fait accompli*.

Keywords: space law; space tracking station; ground segment; dual-use infrastructure; China; military-civil fusion; Namibia; Ethiopia; Egypt; Nigeria; NigComSat; sovereignty

1. Introduction

Globally, space activities are increasingly depending on infrastructure located on Earth. Satellites may operate in orbit, but they must be monitored, commanded, positioned and maintained through ground facilities. Tracking stations receive signals from spacecraft, determine their location, transmit commands and collect telemetry concerning their condition. They may also support launch operations, navigation, Earth observation, deep-space missions and scientific research. Africa's geographical position makes the continent valuable for this purpose. African territory provides access to important orbital passes, wide radio horizons, large areas suitable for antennas and strategic locations for communication with spacecraft. African states are therefore hosts to ground stations operated by national agencies, foreign governments, international organizations and commercial entities.

Examples include the Luigi Broglio-Malindi Space Centre in Kenya, which has historically supported satellite and space activities through cooperation between Kenya and Italy¹; the Hartebeesthoek tracking and mission-support facilities in South Africa which has supported international launch and spacecraft operations for decades²; the Addis Ababa satellite observation centre high in the Entoto Hills above Addis Ababa with a satellite dish as wide as a city bus, (that China helped modernise). The satellite assembly and testing complex on the outskirts of Cairo, built under a partnership with a Chinese state defence contractor, with its rising gleaming white radome and in Namibia. In Namibia, two isolated ground stations track satellites passing over southern Africa, one of them managed, by China's own account through a facility operated under the Satellite Launch, Tracking, and Control Department of the People's Liberation Army Aerospace Force.³ The last three were all built or substantially expanded, within the past five years.⁴ None of them is in the ordinary sense a Nigerian lawyer would use the word, a secret. They appear in state media, in bilateral handover ceremonies, in glossy investment brochures, and yet almost nothing in the law shows that African states have signed up to, whether the Outer Space Treaty their governments ratified decades ago. Neither did they domesticate the statutes their own legislatures have passed since, addressing what these facilities are, what obligations hosting them creates, or what a host state is entitled to know about how they are actually used.

This review research opines that silence as the central problem worth solving. The much larger literature on the weaponization and militarization of outer space, dominated by American and European national-security scholarship, has concerned itself overwhelmingly with the orbital segment: anti-satellite weapons, orbital rendezvous-and-proximity operations indicating the

¹ Agenzia Spaziale Italiana, 'Luigi Broglio Space Centre' (ASI, 26 September 2023) <<https://www.asi.it/en/the-agency/the-space-centers/luigi-broglio-space-center/>> accessed 25 July, 2026.

² South African National Space Agency, 'Space Operations' <<https://www.sansa.org.za/products-and-services/space-operations/>> accessed 25 August, 2026.

³ Agreement between the Government of the Republic of Namibia and the Government of the People's Republic of China on the Establishment and Operation of the China Space Tracking, Telemetry and Command Station in Namibia, October 2000; see AidData, 'Chinese Government Funds Space Tracking, Telemetry and Command Station in Namibia' <<https://china.aiddata.org/projects/1336/>> accessed 25 August, 2026.

⁴ Matthew P Funaiole, Brian Hart and Aidan Powers-Riggs, 'In China's Orbit: Beijing's Space Diplomacy in the Global South' (CSIS Hidden Reach, 15 January 2026).

legality of jamming a military satellite. It has had comparatively little to say about the ground segment, the antennas, control rooms and tracking dishes without which no satellite, civilian or military, can be launched, commanded, or read. This is a curious gap, because the ground segment is one important aspect, more legally exposed than the orbital segment: a satellite in orbit is at least nominally governed by the Outer Space Treaty's registration and jurisdiction provisions, while a ground station sitting on sovereign African territory is not obviously a 'space object' at all. This falls back instead on the comparatively thin protections of ordinary territorial sovereignty and whatever bilateral agreement a host state was persuaded, or induced, to sign.

The authors' argument has two parts, deliberately placed side by side because each sharpens the other. The first is the now-familiar story of foreign-built dual-use stations on African soil, examined here through the documented cases of Egypt, Ethiopia and Namibia. The second, and the principal original contribution, is the mirror-image story much closer to home for a Nigerian audience: the fact that Nigeria's own national communications satellite, NigComSat-1R, has for several years now been controlled not from Abuja but from a Chinese ground station in Kashi, Xinjiang, an arrangement born of accident and budgetary neglect rather than design. This has been established to be structurally identical in its legal consequences to the dependency the Egyptian, Ethiopian and Namibian cases describe. Reading the two stories together show that the ground-segment gap this article identifies cuts both ways: an African state can lose effective control of a facility built on its own soil, and it can just as easily lose effective control of its own satellite to a facility built on someone else's.

2. Literature Review

The dominant literature on military space law, represented most comprehensively by the Woomera Manual, has focused its analytical energy on activity in orbit: the legality of anti-satellite weapons, targeting rules applicable to satellites during armed conflict, and jamming. The Manual's own rule structure devotes specific attention to jurisdiction and to state responsibility for national space activities, but its worked examples and its own drafters' stated methodology are oriented

overwhelmingly toward orbital conduct rather than terrestrial ground infrastructure.⁵ This is not a criticism of the Manual, which set out to restate the law as it currently exists rather than the law as it might usefully develop; it is, rather, a symptom of the same underlying treaty gap this article examines, since the Manual's rules track the space treaties' own asymmetric focus on the orbital segment.

A second, policy-oriented literature has documented the scale of China's space engagement with Africa empirically. The Overseas Development Institute's briefing note maps Chinese-funded satellite and ground-infrastructure projects across the continent. These were financed through a range of state-linked vehicles including the China National Space Administration, China Great Wall Industry Corporation, and China's Ministry of Commerce, and situates this engagement within China's Belt and Road Initiative.⁶ The most detailed and current contribution to this literature is the US Center for Strategic and International Studies (CSIS) Hidden Reach investigation drawn throughout this article. This combines satellite-imagery analysis with open-source reporting to document the Egyptian, Ethiopian and Namibian facilities in granular technical detail, including antenna dimensions, construction dates. In Namibia's case, the specific People's Liberation Army (PLA) command structure managing the older of its two stations.⁷

Both of these literatures, however, are written primarily for a Washington policy audience and are concerned above all with what China's ground-segment expansion means for American strategic competition. A third and much thinner literature has begun to document the Nigerian case specifically, most substantially an American Security Project analysis of Nigeria's satellite dependency on Chinese contractors, which flags the risk that 'operational support' arrangements of

⁵Jack Beard and Dale Stephens (eds), *The Woomera Manual on the International Law of Military Space Operations* (Oxford University Press 2024).

⁶ 'Overseas Development Institute, 'China's Growing Space and Communications Presence in Africa' (Briefing Note). <https://media.odi.org/documents/Briefing_note_Chinas_growing_space_and_communications_presence_in_Africa.pdf> accessed 23rd August, 2026.

⁷Ibid (n 6).

the kind NigComSat entered into can evolve into more intrusive forms of foreign control.⁸ That analysis, published before the Kashi control arrangement became fixed and before the 2026 debt crisis discussed in Section 6 below, was prescient but necessarily speculative; this article is able to draw on the fully developed crisis as it stood at the time of writing, and to situate it explicitly within the ground-segment jurisdictional gap identified in Section 4, a doctrinal connection the existing Nigeria-specific commentary has not made.

If these three literatures are read together it leaves a specific gap this article sets out to fill: a sustained doctrinal treatment of the ground segment as a distinct site of legal exposure, tested against both directions the resulting dependency can run, a foreign facility hosted on African soil, and an African satellite whose control migrates onto foreign soil instead.

3. Conceptual and Doctrinal Framework: Ground Segments outside the Space Treaties

3.1 Space Objects Versus Ground Infrastructure: A Jurisdictional Blind Spot

The Registration Convention defines a ‘space object’ to include a spacecraft and its component parts, together with its launch vehicle and the launch vehicle’s parts.⁹ A ground station, however sophisticated, however militarily significant, however closely integrated with the satellite it tracks, is not a component part of that satellite in any ordinary reading of that definition. It is a separate, terrestrial installation that happens to communicate with an object in orbit. This matters because it is registration, and the resulting ‘jurisdiction and control. A registering state retains over its space object under Article VIII of the Outer Space Treaty; that supplies the one clear jurisdictional anchor the space treaties provide.¹⁰ A ground station attracts no equivalent anchor. It is not registered anywhere, because nothing in the treaty framework requires or even contemplates

⁸American Security Project, ‘China-Nigeria Satellite Deal: NIGCOMSAT, Oil, and Strategic Risks’ (15 July 2025). <<https://www.americansecurityproject.org/national-security-and-space/chinas-space-infrastructure-diplomacy/from-oil-to-orbit-chinas-leverage-in-nigerias-space-program/>> accessed 12 August, 2026.

⁹Convention on Registration of Objects Launched into Outer Space, opened for signature 14 January 1975, 1023 UNTS 15, art I(b), defining a ‘space object’ to include component parts of a space object as well as its launch vehicle and parts thereof.

¹⁰ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies,(Outer Space Treaty) opened for signature 27 January 1967, 610 UNTS 205, art VIII.

registering it, and Article VIII's jurisdiction-and-control language, whatever its other difficulties, simply has no terrestrial ground-infrastructure equivalent to attach itself to.

The practical consequence is that a foreign-built, foreign-operated tracking station sitting on African soil is governed, as a matter of international law, almost entirely by the ordinary rules of territorial sovereignty and by whatever bilateral instrument the host state and the foreign operator agreed between themselves, rather than by any part of the specialised space-law regime at all. This is not a gap anyone deliberately engineered; it is an artefact of a treaty architecture drafted in an era when tracking stations were few, state-owned on both ends of the arrangement, and rarely if ever the subject of the kind of commercially structured, dual-use bilateral hosting agreement now typical of China's African engagements.

3.2 Article IV and the Limits of the 'Peaceful Purposes' Doctrine

A reasonable non-specialist might assume that Article IV of the Outer Space Treaty, which restricts military activity in space, would fill the gap Section 4.1 identifies. It does not. Article IV prohibits placing weapons of mass destruction in orbit or on celestial bodies, and prohibits establishing military bases, installations and fortifications, testing weapons, and conducting military manoeuvres specifically on celestial bodies, the Moon and other planetary surfaces.¹¹ The settled interpretation, reflected in the Woomera Manual's own restatement, is that Article IV says nothing at all about military activity conducted from Earth, including from a ground station on a host state's own territory, and says nothing about non-WMD military space activity generally, which is understood to remain lawful subject only to the UN Charter's general prohibition on the use of force and to international humanitarian law where applicable.¹² A Chinese-operated tracking antenna in Namibia, however extensively it may support PLA satellite operations, is not remotely arguable as an Article IV violation, because Article IV was never drafted to reach Earth-based dual-use infrastructure at all.

¹¹ Outer Space Treaty (n 10) art IV.

¹² Ibid (n 8).

3.3 Due Diligence and the Corfu Channel Principle

If the space treaties themselves are silent, general international law supplies one further and for present purposes decisive, principle: the due diligence obligation the International Court of Justice articulated in the Corfu Channel case, that every state bears an obligation not to allow, knowingly, its own territory to be used for acts contrary to the rights of other states.¹³ This principle does not prohibit a host state from hosting a dual-use foreign ground station; sovereignty entitles a state to invite whatever foreign infrastructure it chooses onto its own territory. What the principle does is impose an obligation of informed consent, a state cannot discharge a due diligence obligation it does not know the content of, which in turn depends on the host state actually understanding, at the point of agreement, what the facility does, who commands it, and what data or capability it makes available to a foreign military establishment. Sections 4 and 6 below examine how far the documented African hosting arrangements actually meet that informational threshold.

4. The Empirical Picture: China's Ground-Segment Network in Africa

4.1 Egypt: MisrSat-2 and Egypt Space City

Egypt is, on the CSIS China Space Cooperation Index, China's second most comprehensive global space partner. The relationship accelerated in 2019, when China agreed to fund and help construct the MisrSat-2 satellite together with its ground infrastructure, led jointly by the state-owned defence contractor China Aerospace Science and Technology Corporation and Egypt's own Space Agency. The resulting package, delivered at the newly built Egypt Space City outside Cairo, included a low-Earth-orbit optical satellite, a ground control and tracking station, and a satellite assembly, integration and testing facility, a full turnkey capability rather than a single discrete purchase.¹⁴ MisrSat-2 launched aboard a Chinese Long March-2C rocket in December 2023. China Great Wall Industry Corporation, the same military-linked entity central to the Nigerian case study in Section 6, has since exhibited dual-use aerospace systems at Egypt's own defence exhibitions

¹³ Corfu Channel Case (United Kingdom v Albania) (Merits) [1949] ICJ Rep 4, 22, holding that every state is under an obligation not to allow knowingly its territory to be used for acts contrary to the rights of other states.

¹⁴Funairole, Hart and Powers-Riggs (n 4), Egypt case study.

while pursuing further regional projects, illustrating how a single satellite-delivery contract has evolved into a sustained platform for engagement across Egypt's wider space and defence ecosystem.

4.2 Ethiopia: Entoto and the 'Ground Station as a Service' Model

Ethiopia's pattern is structurally similar but commercially distinct. China Academy of Space Technology, described in the CSIS investigation as the primary producer of military and government spacecraft in China, built ETRSS-1, Ethiopia's first satellite, launched in 2019 for the Ethiopian Space Science and Geospatial Institute. Chinese firms then constructed a 7.3-metre receiving antenna at the Entoto Observatory near Addis Ababa in 2021, followed by a larger 12-metre antenna in 2024, both capable of processing high-resolution imagery and tracking multiple satellites.¹⁵ Ethiopian and Chinese officials have marketed the resulting facility as a commercialised 'ground station as a service' model, under which Ethiopia can charge foreign clients for access, and Ethiopian technicians are reported to manage day-to-day satellite operations independently. What remains genuinely unclear is the extent of the available public record, is the extent and terms of China's own continuing access to the facility once construction was complete, a gap this article suggests is itself a due-diligence problem of the kind Section 3.3 describes, since a commercialised revenue-sharing narrative and an undisclosed continuing-access arrangement are not mutually exclusive.

4.3 Namibia: Windhoek, Swakopmund, and the PLA's Base 26

Namibia is one of the three case studies, the clearest illustration of the jurisdictional blind spot identified in Section 3.1 because it hosts two facilities with two entirely different legal characters standing a few hundred kilometres apart, and its own domestic law appears not to distinguish meaningfully between them. On 28 November 2025, China formally handed over a new Satellite Ground Data Receiving Station and Processing System at Telecom Namibia's Earth Station in Windhoek, built and financed under a bilateral technology-sharing agreement, fitted with a 7.8-

¹⁵ Funaiole, Hart and Powers-Riggs (n 4), Ethiopia case study.

metre dish, and described in Chinese and Namibian reporting as intended for civilian remote-sensing applications in environmental management, agriculture and disaster response.¹⁶ The project's own environmental impact assessment record, filed with Namibia's Ministry of Environment, Forestry and Tourism, addresses the facility in essentially civil-infrastructure terms, with no apparent dual-use risk assessment on the public record.¹⁷

Further west at Swakopmund, a considerably older facility tells a different story. China first established the Swakopmund station in 2001 to support its crewed spaceflight programme; the site is managed by the Xi'an Satellite Control Center, known within China as Base 26, a facility that operates under the Satellite Launch, Tracking and Control Department of the People's Liberation Army Aerospace Force. Recent satellite imagery shows a new antenna installation at the site, and the station now functions as a key node in China's wider telemetry, tracking and commanding network spanning China, South Asia and Latin America.¹⁸ Windhoek and Swakopmund thus sit within the same small country, the same bilateral relationship, and, on the available evidence, largely the same undifferentiated category so far as Namibian domestic oversight is concerned, despite one being a civil remote-sensing facility and the other an operational node of the People's Liberation Army's own satellite command structure.

4.4 Djibouti: When the Base and the Dish Sit Side by Side

Djibouti presents the limiting case since it removes any ambiguity about civilian framing altogether. China's only formally acknowledged overseas military base sits within ten miles of American, French, Italian and Japanese facilities at a strategic chokepoint overlooking the Bab-el-Mandeb Strait, through which a substantial share of global maritime trade passes. Recent upgrades documented by satellite imagery analysis include communications infrastructure that could provide the People's Liberation Army with redundant, over-the-horizon communications with Chinese

¹⁶ Funairole, Hart and Powers-Riggs (n 4), Namibia case study.

¹⁷ Namibia, Ministry of Environment, Forestry and Tourism, Environmental Impact Assessment project record, Telecom Namibia Satellite Ground Data Receiving Station and Processing System, Windhoek.

¹⁸ Ibid.

ships and aircraft in the region. The same analysis could help China monitor developments elsewhere in Africa by closing gaps in its global space-tracking and data-relay network.¹⁹ Djibouti's case is analytically simpler than Namibia's precisely because there is no civilian cover story to evaluate; the facility is openly a military base, and the legal question it raises is not whether Djibouti understood what it was hosting, but what continuing obligations, if any, arise for a host state once it has knowingly hosted foreign military space-adjacent infrastructure astride one of the world's most strategically sensitive waterways.

5. The Mirror Image: When African Infrastructure Leaves African Soil

The cases examined in Section 4 all involve a foreign power building ground infrastructure on African territory. Nigeria's experience with its own national satellite programme shows that the same underlying dependency can arise in reverse, with equally serious consequences and an equally clear connection to the ground-segment jurisdictional gap identified in Section 3. When China Great Wall Industry Corporation delivered NigComSat-1 to Nigeria in 2007, the contract, structured as a full in-orbit delivery package that outbid twenty-one competing offers, included not only the satellite and its launch but a primary ground control station in Abuja and a backup tracking station in Kashi, in China's Xinjiang Uygur Autonomous Region.²⁰ NigComSat-1 failed in orbit in November 2008 after a power fault; its replacement, NigComSat-1R, was delivered in 2012 with operational control formally transferred to Nigeria, and Kashi retained only as a contracted hot-standby backup.

That arrangement changed by accident rather than design. In 2019, lightning damaged Nigeria's primary control facility in Abuja beyond immediate repairs, and the Kashi backup station, originally intended purely as hot standby, became NigComSat-1R's de facto main control station.

¹⁹ Extended Range: China Upgrades Its Military Base in Djibouti' (CSIS Hidden Reach, September 2026). <<https://features.csis.org/hiddenreach/china-djibouti-base-upgrade/>> accessed 18 September, 2026.

²⁰ China Great Wall Industry Corporation, NigComSat-1 project record, noting delivery of the satellite in orbit on 6 July 2007 together with a tracking station in Kashi, Xinjiang, and a fully operational ground station in Abuja, Nigeria. <<https://www.cgwic.com/In-OrbitDelivery/CommunicationsSatellite/Program/NigComSat-1.html>> accessed 6 August, 2026.

Communications satellites are ordinarily operated from a domestic control facility precisely because that facility determines who can send commands to the spacecraft; from 2019 onward, that determinative capability sat in Xinjiang rather than Abuja.²¹ The arrangement persisted for want of an alternative, budget constraints and the COVID-19 pandemic repeatedly deferring the Abuja facility's repair, until it hardened into a permanent operational fact.

By early 2026, the arrangement had become a full-blown financial and sovereignty crisis. China Great Wall Industry Corporation disclosed that it had provided telemetry, tracking and command services from Kashi without payment since 2019, accumulating an outstanding debt of USD 11,442,335.89 by the end of 2025. They threatened to shut down the service, effectively terminating Nigeria's ability to command its own satellite, unless the debt was resolved. Prior negotiations in 2023 and early 2025 including a Chinese offer to reduce the balance as a goodwill gesture had already failed.²²

Nigerian commentary on the crisis has additionally flagged concerns about Nigeria's compliance with International Telecommunication Union orbital-slot regulatory timelines during the period of foreign control. About NIGCOMSAT's simultaneous exploration of a further satellite acquisition estimated at roughly USD 500 million, raising the prospect of Nigeria entering a second major satellite commitment while still unable to guarantee domestic control of its first.²³

The legal significance of the Nigerian case for present purpose is precise rather than merely embarrassing. Section 3.1 established that ground stations fall outside the Registration Convention's 'space object' definition and therefore outside the one clear jurisdictional anchor the space treaties provide. NigComSat-1R itself remains, throughout this episode, a properly registered

²¹'A \$11.4m Debt Puts Nigeria's Space Ambitions at Risk', TechCabal (25 March 2026). <<https://techcabal.com/2026/03/25/a-11-4m-debt-puts-nigerias-space-ambitions-at-risk/>> accessed 8 August, 2026.

²²'China Issues Ultimatum to Shut Down NigComSat-1R Over USD 11.44 Million Unpaid Debt', Space in Africa (11 March 2026). <<https://africa.businessinsider.com/markets/china-warns-nigeria-of-satellite-shutdown-over-dollar114-million-debt/zvm7q0w>> accessed 8 August, 2026.

²³'Nigeria's Digital Infrastructure Allegedly Under Scrutiny Amid Challenges at NIGCOMSAT', ThisDay Live (28 February 2026). <<https://www.thisdaylive.com/2026/02/28/nigerias-digital-infrastructure-allegedly-under-scrutiny-amid-challenges-at-nigcomsat/>> accessed 10 August, 2026.

Nigerian space object under Article VIII of the Outer Space Treaty. What has been lost is not registration or nominal ownership, neither of which the treaty framework puts at any real risk. The ground-segment capability that alone makes registration and ownership operationally meaningful. A state can retain perfect undisputed treaty title to a satellite it cannot actually command. This is the ground-segment gap in its starkest form: not a foreign facility quietly built on African soil, but an African facility's own function migrating, unnoticed by the treaty framework because the treaty framework was never built to notice it onto foreign soil instead.

6. Three Legal Gaps: Jurisdiction, Consent and Capacity

The case studies in Sections 4 and 5 point to three distinct cumulative legal gaps.

The first is the jurisdictional gap developed in Section 3.1: the space treaties regulate objects in orbit in considerable procedural detail and say almost nothing about the ground infrastructure without which no orbital object can be tracked, commanded, or read, leaving that infrastructure to fall back on ordinary territorial sovereignty and bilateral contract alone.

The second is a consent gap, distinct from the jurisdictional gap because its mere existence shows accepting that ordinary sovereignty and contract law, rather than space law, is the right governing framework. Namibia's environmental impact assessment record for Windhoek addressed the facility as civil infrastructure without any visible dual-use assessment; Ethiopia's own continuing-access arrangement with China at Entoto is on the public record simply unknown. A host state cannot meaningfully be said to have consented in the informed sense the Corfu Channel due diligence principle requires to risks it was never asked to evaluate in the underlying agreement.

The third is a capacity gap, most starkly illustrated by Nigeria's own experience: even a state that begins with full legal and operational control of its space asset can lose practical control through infrastructure failure and prolonged underinvestment, with no domestic legal requirement. In Nigeria's case or in any African jurisdiction examined for this article, that a state-owned satellite maintain a domestically controlled backup capability as a condition of continued operation. The Nigerian case shows this capacity gap, which does not need to involve any foreign design or intent

at all; ordinary neglect, absent of a legal backstop produces functionally the same dependency that is deliberately entrusted to foreign infrastructure-building produces in Namibia and Ethiopia.

7. Comparative Precedent: Lessons from Outside Africa

Africa is not the only region confronting this problem and the comparison is instructive. China's Espacio Lejano ground station in Neuquén, Argentina, has attracted sustained scrutiny precisely because the bilateral agreement under which it operates reportedly grants the facility, managed by China's People's Liberation Army Strategic Support Force. A degree of operational autonomy from Argentine government oversight, including restrictions on Argentine personnel access to parts of the site.²⁴ The Argentine case demonstrates that the consent gap identified in Section 7 is not unique to African states with comparatively limited space-law capacity; it can arise even where a host state negotiates from a position of greater institutional strength, suggesting the gap is a structural feature of the underlying legal framework described in Section 3 rather than simply a symptom of any one host state's negotiating weakness. It also demonstrates, more optimistically that the resulting disputes are capable of generating sustained public and legislative scrutiny once the terms of an agreement become known, a precedent African legislatures reviewing their own arrangements might usefully draw on.

8. Findings

This research makes the following findings.

First, the international space treaty regime regulates the orbital segment in considerably greater procedural detail than the ground segment, since a ground station is not a 'space object' within the Registration Convention's definition and therefore falls outside the one clear jurisdictional anchor, Article VIII's jurisdiction-and-control provision, that the treaty framework otherwise supplies.

²⁴ 'Eyes on the Skies: China's Growing Space Footprint in South America' (CSIS Hidden Reach, 4 October 2022), discussing the Espacio Lejano ground station in Neuquén, Argentina, operated by China's People's Liberation Army Strategic Support Force under a bilateral agreement granting significant operational autonomy from Argentine oversight. <<https://features.csis.org/hiddenreach/china-ground-stations-space/index.html>> accessed 12 August, 2026.

Second, Article IV of the Outer Space Treaty's peaceful-purposes clause, often popularly assumed to restrict military space activity generally. In fact the article restricts only weapons of mass destruction and specified military activity on celestial bodies, leaving Earth-based dual-use tracking infrastructure entirely outside its scope.

Third, the documented Egyptian, Ethiopian and Namibian cases show a consistent pattern in which civil, commercial or developmental framing accompanies facilities with demonstrable evidence. In Namibia's Swakopmund case an explicit and formally acknowledged, military command connection without the host state's own public domestic record showing a corresponding dual-use risk assessment.

Fourth, the dependency is not one-directional. Nigeria's NigComSat-1R crisis shows that an African state can lose effective operational control of its own, domestically registered and domestically owned satellite through ordinary infrastructure failure and unresolved commercial debt, arriving at a position functionally equivalent to the foreign-hosted-station cases despite involving no foreign facility on Nigerian soil at all.

Fifth, comparative experience from outside Africa, specifically Argentina's Espacio Lejano station, suggests that the consent and jurisdictional gaps identified in this article are structural features of the current international legal framework rather than problems specific to any one host state's institutional capacity; though institutional capacity plainly affects how quickly and effectively a host state can respond once the gap becomes apparent.

9. Conclusion

The satellite dish in the Entoto Hills, the radome outside Cairo, the two stations on Namibia's highlands, and the empty control room in Abuja, these are argued in this article, expressions of the same underlying legal fact: the international space treaty regime was built to govern what happens in orbit. This has correspondingly little to say about the ground infrastructure that makes orbital activity possible, or about what happens when a state loses effective command of that infrastructure, whether because a foreign partner built it on the state's own soil under a thinly scrutinised agreement or because the state's own facility failed and was never adequately repaired.

Naming this gap precisely as a jurisdictional gap, a consent gap, and a capacity gap, is the necessary first step toward closing it. This article has tried to take that step using the clearest and most current evidence available. A CSIS investigation detailed enough to name the specific PLA department managing a station in the Namibian highlands, and a Nigerian satellite whose control room has sat quite literally, thousands of kilometres from the country it serves for the better part of a decade. Neither story required speculation about future militarization; both cases have documented present-day facts about African space infrastructure as it actually operates. The recommendations set out in Section 10 do not require a new treaty or a decade of multilateral negotiation; they require African states to write into their own domestic law the disclosure, redundancy and contractual safeguards that the international space treaties, for reasons rooted in the era of their drafting rather than in any judgment about African interests never provided.

10. Recommendations

Four measures would begin to close the gaps this article has identified.

First, African states should adopt domestic ground-segment licensing legislation, distinct from and additional to existing satellite and spectrum licensing frameworks, requiring any foreign-built or foreign-operated satellite tracking, telemetry or data-receiving station to undergo a specific dual-use risk assessment and public disclosure of its command and operational-access arrangements before construction is approved, closing the consent gap Namibia's Windhoek environmental impact assessment illustrates.

Second, national space legislation, and any future African Union model instrument on ground-segment governance, should require that any state-owned satellite maintain a domestically controlled, adequately funded backup ground station as a condition of continued operation, with a statutory obligation on the responsible ministry to report and remediate any lapse, directly addressing the capacity gap Nigeria's NigComSat-1R experience illustrates so starkly.

Third, African states negotiating bilateral hosting or satellite-delivery agreements with foreign space powers should insist on contractual clauses guaranteeing host-state personnel access to the full facility, a defined and enforceable limit on the foreign partner's continuing operational access

once construction or delivery is complete, and a binding dispute-resolution mechanism that does not leave the host state's operational control hostage to an unresolved commercial debt, the precise mechanism by which Nigeria's dependency on Kashi became fixed rather than temporary.

Fourth, the African Union should pursue a coordinated continental position within the Woomera Manual and MILAMOS processes specifically addressing ground-segment jurisdiction and host-state due diligence obligations, a gap in those otherwise comprehensive restatements that African states, as the continent hosting an increasing share of the world's dual-use ground infrastructure, are better placed than any other regional grouping to identify and help close.

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