

IGSC 2025

Geospatial AFRICA

Landstronaut Global Satellite Conference 2025

Advancing Satellites, Space Architecture, Remote
Sensing, Communication and Technology

SATELLITES

LANDSTRONAUT
INSTITUTE OF
TECHNOLOGY

Advancing the Geo-Orbit



- LISA THE LANDSTRONAUT



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GEOSPATIAL GHANA

Advancing geostationary Earth orbit (GEO) satellite infrastructure is vital for Africa's socio-economic growth. Ghana is well-positioned to lead this initiative due to its political stability, proven satellite expertise, and geographical advantage. This study examines the state of Africa's satellite landscape, highlighting Ghana's potential to pioneer GEO technology through collaborations with countries like Nigeria, South Africa, Egypt, and Senegal. Key recommendations include regional partnerships, investment in education, and addressing policy and technical challenges to drive Africa's autonomy in space technology.

ACTIVATIONS: Ghana's Strategic Position in Space Technology

- **Stable Governance and Strategic Vision:** Ghana's political stability and commitment to technology-driven development create a conducive environment for long-term space initiative
- **Proven Technical Expertise:** The GhanaSat-1 project highlighted Ghana's ability to harness local expertise and collaborate internationally.
- **Geographical Advantage:** Ghana's equatorial proximity offers favorable conditions for satellite launches and operations, reducing energy requirements for achieving GEO.
- **Regional Influence:** As a member of the African Union and a participant in the African Space Policy, Ghana is well-placed to mobilize regional support and collaboration.

INDUSTRY: Collaborative Opportunities with African Nations

- **Nigeria:** As a leader in African satellite technology with programs like NigComSat-1R, Nigeria offers valuable expertise and resources that can complement Ghana's efforts.
- **South Africa:** With its advanced space infrastructure, including the SumbandilaSat program, South Africa can provide technical support, training, and research collaboration.
- **Kenya and Rwanda:** These nations' emerging space programs demonstrate a commitment to innovation that aligns with Ghana's vision. Collaborative projects can focus on knowledge sharing and capacity building.
- **Egypt:** Egypt's long-standing investment in space technology and its position as a space policy leader in Africa make it a strategic partner for policy alignment and regional advocacy.
- **Senegal:** Senegal's emerging space initiatives, driven by its focus on digital transformation and sustainable development, present an opportunity for partnership in knowledge sharing, capacity building, and co-development of satellite applications.

GEOSPATIAL AFRICA

Geostationary satellites provide critical advantages, including broad coverage for communication, real-time weather monitoring, and disaster management. However, Africa's current reliance on foreign GEO satellites limits the continent's autonomy, increases costs, and creates vulnerabilities in data security. Indigenous GEO satellite infrastructure would provide Africa with greater control over its data, foster innovation, and drive economic development through improved telecommunications and remote sensing capabilities.

INFRASTRUCTURE

Ghana's leadership in advancing GEO satellite infrastructure presents an opportunity to transform Africa's space capabilities, addressing critical challenges in communication, disaster management, and economic development. By leveraging its unique strengths and fostering collaborations with other African nations, Ghana can spearhead a new era of space innovation, driving the continent's transition to a sustainable and autonomous space economy.



45%

POLICY CONSIDERATIONS

- **Spectrum Allocation:** Ensuring efficient and equitable use of radio frequencies for GEO satellite communication is critical for avoiding interference.
- **Orbital Debris Mitigation:** Developing protocols for the safe disposal and management of decommissioned satellites is essential for long-term sustainability.
- **Cybersecurity:** Protecting satellite infrastructure from cyber threats is crucial for maintaining data integrity and operational reliability.
- **Funding and Investment:** Attracting investment through public-private partnerships and international grants can provide the financial foundation for GEO satellite development.
- **Capacity Building:** Establishing academic and vocational training programs in satellite engineering and space science will ensure a steady pipeline of local expertise.



ACTIONABLE PATHWAYS

- **Expand Existing Infrastructure:** Build on the CubeSat success by developing larger, more advanced satellite systems capable of GEO operations.
- **Strengthen Regional Collaboration:** Establish partnerships with African nations to share costs, expertise, and technological resources.
- **Invest in Space Education:** Create dedicated institutions and programs to train the next generation of engineers and scientists.
- **Engage the Private Sector:** Encourage private investment in space technology through incentives and partnerships.
- **Leverage International Support:** Collaborate with global space agencies and organizations for technical assistance and funding.



GEOSPATIAL MARKET

OVERVIEW OF GLOBAL SATELLITE MARKET

The global satellite market is projected to reach \$30 billion by 2030, driven by increased demand for communication, Earth observation, and navigation services. Africa's involvement remains limited but growing as nations like Ghana, Nigeria, and South Africa expand their capabilities. Regional efforts could capture 5-7% of this global market by 2035.

MARKET ALLOCATION BREAKDOWN



Telecommunications (50%)

The primary driver of satellite market growth, focusing on broadband services, mobile networks, and rural connectivity.



Earth Observation (30%)

Enabling applications in agriculture, climate monitoring, and disaster management.



Defense and Security (20%)

Supporting national security, surveillance, and strategic operations.

TOOLS AND RESOURCES



Consortiums: Collaborative frameworks such as the African Union's African Space Agency and the ITU ensure efficient resource sharing and policy alignment.



Non-Government Agencies: Organizations like UNOSA (United Nations Office for Outer Space Affairs) provide guidance on sustainable space operations and technical capacity building.



Commercial Companies: Entities like SpaceX, Airbus, and SES offer launch services, satellite manufacturing, and technical expertise that Africa can leverage through partnerships.



Academia: Institutions such as the Ghana Space Science and Technology Institute (GSSTI) and South African universities are vital for fostering innovation and training.

GEOSPATIAL APPLICATIONS

INFRASTRUCTURE AND ECONOMIC DEVELOPMENT

- Satellite augmentation systems for safety and logistics: The African Satellite Augmentation System (ASAS) provides regional navigation, maritime safety, and logistics management. It also integrates terrestrial and maritime applications, offering critical infrastructure for economic activities (Ilcev, 2022).
- Spaceport development for economic growth: Africa's geographic positioning enables cost-effective equatorial satellite launches, which are pivotal for meeting the growing demand for satellite constellations globally. This market is projected to reach \$30.2 billion by 2025 (Nongo et al., 2021)

AGRICULTURAL AND RESOURCE MANAGEMENT

- Precision agriculture and environmental monitoring: Satellite technologies like remote sensing and Earth Observation (EO) support agriculture by monitoring crop health, water management, and land use. These technologies have improved food security and environmental conservation efforts (Ali, 2022).
- Water infrastructure management through satellite data: Satellites provide critical insights for aquifer monitoring, drought predictions, and water resource management, contributing to resilience against climate change (Mokgobu & Mason, 2022).

DISASTER MANAGEMENT AND CLIMATE

- Enhanced disaster response capabilities: Satellite data is pivotal in assessing drought vulnerability and improving disaster response. For example, Angola used satellite-derived insights to prioritize infrastructure investments and develop drought resilience (Serrat-Capdevila et al., 2022).
- Space geodesy for urban and climate adaptation: Satellite technologies provide precise topographical data, aiding in urban planning and flood risk mitigation. These applications ensure resilient infrastructure and sustainable urban development (Adjagan & Adalakoun, 2023).

GOVERNANCE AND TECHNOLOGY ADVANCEMENT

- E-governance through satellite connectivity: Satellites enable digital governance systems by improving connectivity, which supports services in healthcare, education, and emergency response (Froehlich et al., 2021).
- Blockchain-enabled satellite systems: Blockchain applications hosted on satellite platforms reduce remittance costs and improve financial inclusion, especially in rural areas (Lindgren et al., 2021).

CAPACITY BUILDING AND KNOWLEDGE TRANSFER

- Pan-African planetary and space science network: Initiatives like the PAPSSN project enhance local expertise in satellite and planetary sciences, offering bursaries for STEM students and fostering a skilled workforce (Franchi, 2021).
- Space innovation drives employment: The African nanosatellite sector has rapidly expanded, with over half of Africa's satellites launched in the last five years. These advancements have fostered innovation, job creation, and technical skill development (Wiid, 2022).

GEOSPATIAL CULTURE

JOIN THE LANDSTRONAUT COMMUNITY

- Become a member of Landstronaut's evolving community that is growing throughout Africa. Register as a member, affiliate, or become a part of the society. Landstronaut has joint partnerships and research consortium's important for fostering conversations and participation in facilitating a lifestyle of futurism from Land to Space. @LANDSTRONAUT

IMPORTANT CONSORTIUMS

Key Findings from International Consortiums

AU Space Policy Insights: Collaborative efforts reduce costs by an estimated 20–30% while ensuring broader coverage for underrepresented regions (AU, 2019).

ITU Spectrum Allocation Framework: International Telecommunication Union (ITU) guidelines provide clear pathways for fair spectrum allocation to African GEO satellites, ensuring minimal interference.

UNOSA on Sustainability: The UN Office for Outer Space Affairs highlights the importance of orbital debris protocols and cybersecurity measures, both of which Ghana can adopt as best practices.

NETWORKING OPPORTUNITIES

- The Landstronaut Global Satellite Conference 2025 offers a unique opportunity for space architects, engineers, satellite developers, and enthusiasts to connect and collaborate. Whether you're designing the next-generation habitat or advancing satellite capabilities, this conference will inspire you to think bigger and bolder.
- Together, let's imagine, design, and build the future of human presence in space.
- Join the movement at LGSC 2025 in Accra, Ghana.

#SpaceArchitecture #SatelliteInnovation #LGSC2025 #LandstronautGlobal #SpaceAfrica #FutureOfSpace
#SustainableExploration

CAPACITY BUILDING AND KNOWLEDGE TRANSFER

The future of space exploration lies in the integration of these two fields. Imagine habitats on Mars with embedded satellite communication systems, or satellites capable of scanning planetary surfaces to identify optimal building sites. This synergy is the key to sustainable exploration and long-term human presence in space.

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REFERENCES

Summary Table of Satellite Applications and Benefits

Category	Applications	Benefits	References
Infrastructure	Satellite augmentation, spaceports	Safety, economic growth	(Ilcev, 2022), (Nongo et al., 2021)
Agriculture	Precision agriculture	Food security, water management	(Ali, 2022)
Disaster Management	Drought and flood prediction	Resilience, urban planning	(Serrat-Capdevila et al., 2022), (Adjagan & Adelakoun, 2023)
Governance	E-governance, blockchain finance	Connectivity, financial inclusion	(Froehlich et al., 2021), (Lindgren et al., 2021)
Capacity Building	Pan-African space networks, nanosatellites	Skills development, innovation	(Franchi, 2021), (Wiid, 2022)

