

# PROGRESSES AND CHALLENGES OF BUILDING CAPACITY FOR SPACE SCIENCE AND TECHNOLOGY IN EAST AFRICA



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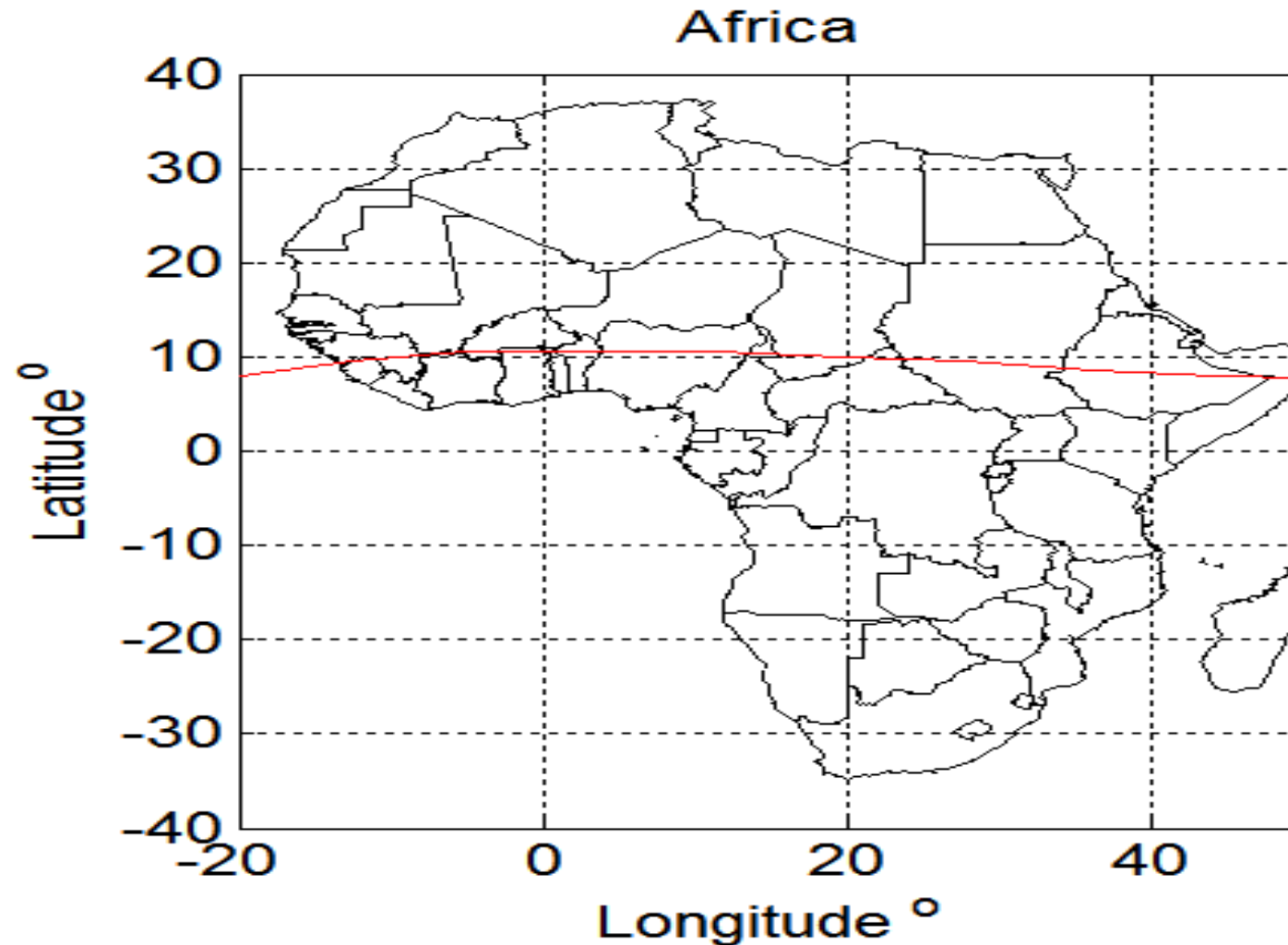
# Introduction

- Capacity building in Space Science and Technology is critical for developing competencies to efficiently respond to societal challenges and addressing sustainable development. To meet the Sustainable Development Goals (SDGs 2030), East Africa needs to build and strengthen her capacity to assimilate and generate knowledge for sustainable development.
- Many countries in East Africa are now well informed of the invaluable benefits, direct and indirect, derivable from the development and applications of space science and technology (SST).
- For effective assimilation and appropriate applications of space technology to succeed in East Africa, committed efforts must be made at the national and regional levels for the development of necessary high-level knowledge and expertise in all consequences of space science and technology.

# Introduction

- No country in East Africa has thought of launching their own space and Earth observation satellites, thereby joining the league of ‘sensing’ countries and moving East Africa out of the former class of being totally a ‘sensed’ Sub – Sahara African continent. Other African countries like Nigeria (2003), Algeria (2012), South Africa (2008) and now Ghana (2017) have been involved in space technology development, particularly in the area of astronomy for some time.
- Some GNSS systems have been supplied in East African region but some types like SCINDA, Mangida, VHF systems are no longer working.

# SIGNIFICANCE OF CAPACITY BUILDING IN EAST AFRICA



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- A fundamental goal of capacity building is to enhance the abilities of stakeholders to evaluate and address crucial questions related to the understanding of the environmental potential and limits of the needs perceived by the people of the country concerned.
- It implies therefore that the development of space education in the region of East-Africa is critical to the adoption and diffusion of space technology and its benefits to all Africans.
- Ethiopia joins a handful of other African nations, including Nigeria, South Africa, Ghana and Egypt, that have their own space programs, and the East African governments hope the move will boost the local agriculture and communication industries since these countries are naturally Agriculturalist.
- The region has some GNSS systems like GPS installed to most of the stations in East Africa by US Air Force Research Laboratory (AFRL) which are used to provide data to academicians and help in carrying out research.

## CONT'

- Some countries from eastern part of Africa such as Ethiopia and Kenya, have gone far in reaching agreement to launch and operate a constellation of African Resource and Environmental Management satellites as part of the strategies to develop the required capacity for the East African space enterprise.
- As one of only a handful of equatorial states, Uganda is ideally cited for a spaceport to launch satellites into geostationary orbit, but this option has never been pursued. The closest regional facility, and the only one ever active in East Africa, is the Italian-owned Broglio Space Centre located off the coast of neighboring Kenya.

# CAPACITY BUILDING CENTRES OF EXCELLENCE IN EAST AFRICA

- Some of the institutions of higher learning in East Africa are already contributing towards the building of competencies in space science and technology (SST) through their teaching, research and development activities in core areas such as basic space and atmospheric sciences, remote sensing (RS) and geographic information system, satellite meteorology and Global Navigation satellite systems (GNSS).
- Education on space science in East Africa can be taught from Universities like Makerere University in Uganda, Technical University of Kenya (Kenya), Mbarara University of Science and Technology (Uganda), Bashar Dar University (Ethiopia), Addis Ababa University (Ethiopia) and many others. The other training centres of excellence in East Africa include the Regional Centre for Training in East African Civil Aviation Academy found in Soroti Uganda.



# CHALLENGES OF CAPACITY BUILDING IN EAST AFRICA.

- Old – fashioned curricula and facilities. The curricula is rigid in such a way that the system of education is in semester basis with no short courses offered for a short period of time in space science and technology
- Inadequate enabling technologies: Many of the enabling technologies for modern geoinformatics curricula are in various stages of development in East Africa.
- Poor Quality of data collection and management practices. Less number of GNSS ground systems are installed in the East African countries leading to less research in space science and technology and those that are installed are not working (malfunctioned).
- There is also lack of data infrastructure and inaccessible in these East African countries. Lack of regional coordinator to provide details of accessing information on space science and technology using space systems.
- United Nations on outer space affairs does not have any training centres in East Africa and has not funded students from East African Countries directly on space based programs, it's the individuals who have sponsored themselves from the indigenous institutions to gain this knowledge and carryout research using the GNSS instruments.

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- Lack of financial resources for overseas training; many organizations in East African countries can't afford to send many members of staff to more developed countries for training due to financial constraints
- East African countries should stop setting up top-heavy bureaucratic structures, whose prime function is political support. This approach diverts scarce financial resources away from science and engineering into a bloated bill for remuneration to parasitic personnel.
- Furthermore, funding inter-governmental agencies requires learning multilateral ways of thinking and doing. Issues of negotiating inter-operationality with software, hardware and agencies are prolonged.
- East Africa still lacks the necessary scientific and technical capacity to assess fully and to monitor the possible future impacts of climate change.
- it still remains a major challenge for East Africa to explore the full potential of Earth observation satellites in addressing East African needs.

## WAY FORWARD FOR THE IMPLEMENTATION OF SPACE TECHNOLOGY AND CAPACITY BUILDING IN EAST AFRICA.

- Development of an education curriculum on space science, technology and related issues, including education material on systems engineering, mission design, satellites, their buses, subsystems and payloads and operational aspects should be implemented by the national institutions of higher learning in East African.
- The education curriculums on satellite communications, meteorology, remote sensing and space science developed for use by the Regional Centres for Space Science and Technology Education, affiliated to the United Nations and other educational institutions could provide a model.
- East African nations need to collaborate with the developed countries that are involved and are part of the manufacture of space based systems so as to design, implement, and carry out maintenance mechanisms to facilitate the sharing, access, and be responsible in the use of geospatial data at an affordable cost for various applications.

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- The operation of communications satellites that provide services in East African nations must be complemented with cost-effective ground infrastructure to enable use of these services.
- It is clear that the necessity for East Africa to participate in and coordinate its space activities cannot be over emphasized, and a commitment from developed countries to assist East Africa's endeavors, both financially and in knowledge transfer, is vital for the success of the Africa's continental space programs.
- The recommendation is that space activities should be an integral part of any East African national programme devoted to technology acquisition and development.
- The East African governments through their institutions, should propose and support projects to promote and coordinate the development of space science and application payloads that could be deployed on standardized satellite platforms.
- They should also support existing standardization and inter-operability efforts for ground stations, software and hardware standards, by promoting their use in worldwide space technology projects.

# SUCCESS STORIES

- The East African countries especially Kenya and Uganda institutions started conducting postgraduate courses in space science and related courses like Remote Sensing, Geographic Information Systems, Satellite Communications, Satellite Meteorology and Global Climate.
- Over 100 professionals from East African member countries have successfully completed these Post Graduate programs.
- In conjunction with postgraduate training, workshops have been organized, in Kenya, Uganda and Rwanda which have been attended by over 200 participants and experts.
- These scientific events addressed topics related to the use of space science and technology astronomy – astrophysics and so on.

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