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BUILDING A VIABLE CAPACITY FOR SPACE TECHNOLOGY DEVELOPMENT IN AFRICA

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OUTLINE OF PRESENTATION

- Overview of Space Science Infrastructure in Africa
- Space Science and Technology Needs
- Capacity Building
- Recommendations

1. Overview of Space Science Infrastructure in Africa

(a) The African Space Forum

❖ **The Pretoria Declaration (November 8, 1996)**

*“There is now a very urgent need for national and regional leadership in Africa to adopt space technology as a tool for meeting national and continent-wide development needs, particularly in the following areas: resource management and the environment, information and communications, food, health and **capacity-building**”*



African leadership Conferences (ALC's)

- ✓ First proposed by Algeria, Nigeria and South African delegations at the 47th Copuos meeting in June 2004.

Objectives

- To raise awareness of African institutions and users on the importance of space sciences and technologies for sustainable development of African continent;
- To set up a sustained and coherent framework for exchange of information and development of competence around common themes;
- To enhance intra-African cooperation in the development and application of space technology;
- To provide a regular forum for the exchange of information among African countries.

Past ALC's

- 1st ALC: Abuja, Nigeria, 2005
- 2nd ALC: Pretoria, South Africa, 2007
- 3rd ALC: Algiers, Algeria, 2009

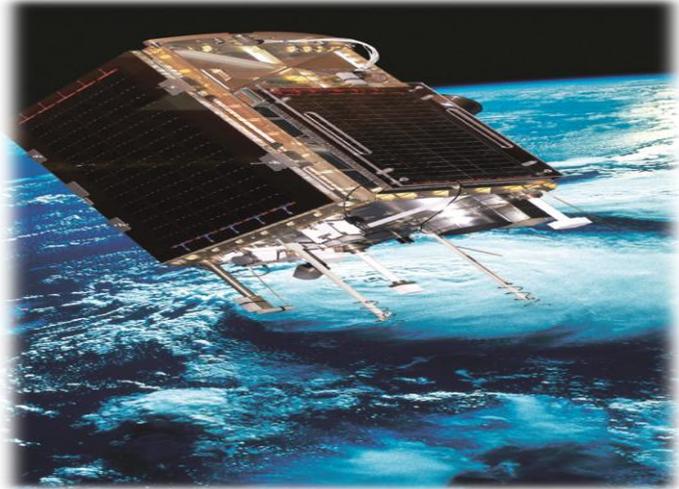
- 4th ALC: Mombasa, Kenya, 2011

Target Audience

- National Leadership of African countries.
 - African Union (AU) and the New Partnership for Africa's Development (NEPAD)
 - African space community (Agencies, Institutions, Industries, Universities...)
- ✓ NB: These ALC's have seen the birth of African Resource and Environmental Management Satellite Constellation (ARMC) Initiative: Algeria, Kenya, Nigeria and South African to pool resources and launch at least one satellite in space every two years w.e.f 2013. Open to other African countries willing to join.

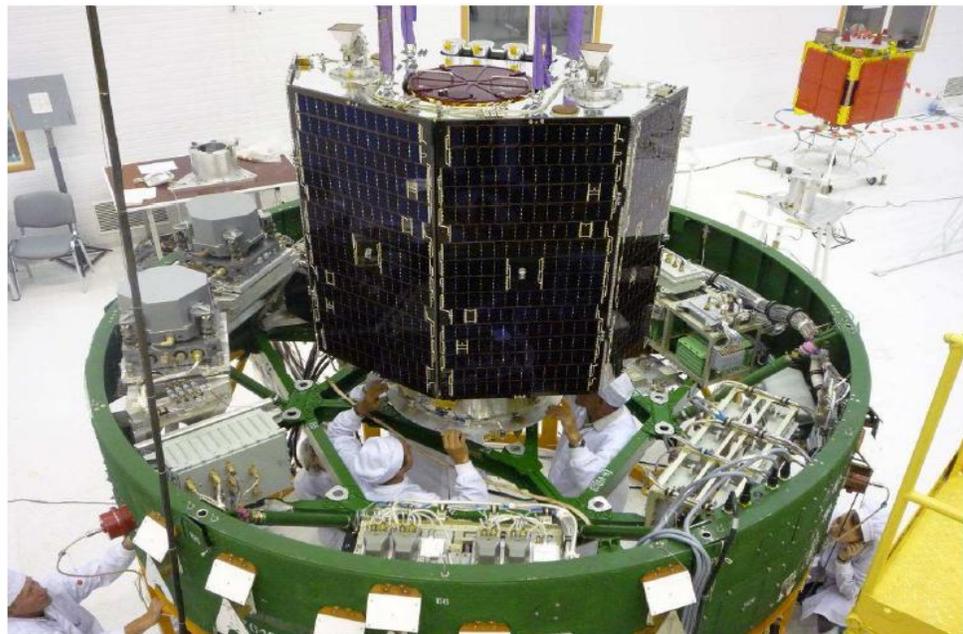
(b) National Space Science Programmes

- South African National Space Agency (SANSA)



SumbadilaSat

- Nigerian Space Agency: National Space Research and Development Agency (NASRDA)



NigeriaSat-2 is lowered onto the launcher platform, surrounded by the rocket control systems

- Algerian Space Agency

- Egyptian Space Agency: National Authority for Remote Sensing and Space Sciences (NARSS)



Satellite receiving station (Egypotsat-1, SPOT, CEBRES2)

- Ghana Space Agency*

- Kenya Space Agency *



Broglio Space Centre , Malindi, Kenya (established in1964).



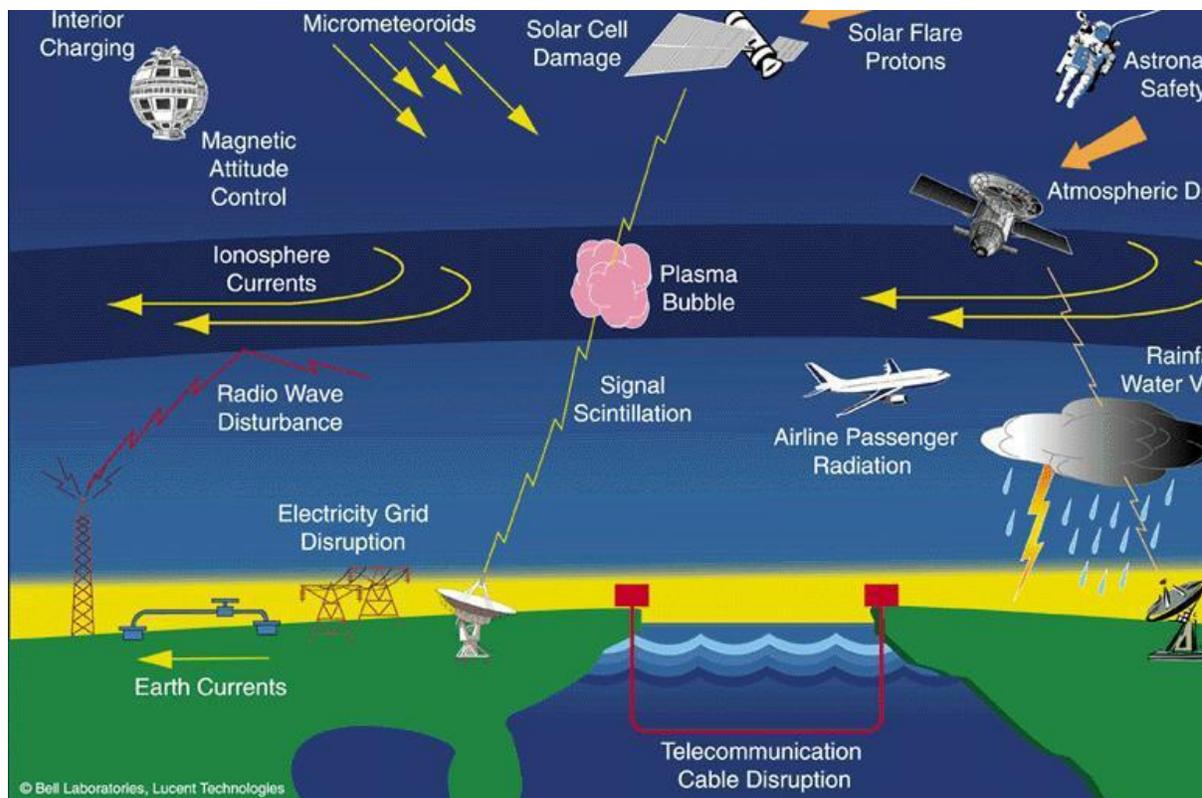
Satellite Platform, Malindi, Kenya

- Sudanese Space Agency*

✓ *NB: National Space Policies still being formulated.

(c) Equipment Arrays

(i) Space Weather Science Facilities :



- Magnetometers
- Ionosondes
- GPS Receiver Systems

- Callisto (Compact Low –Frequency Low – Cost Instrument for Spectroscopy in Transportable Observatories)
 - Satellite Beacon Receivers
 - Sudden Ionospheric Disturbance (SID) Monitors
 - Awesome (Atmospheric Weather Electromagnetic System for Observation Modelling and Education)
- ✓ NB: Largely deployed through international collaborations.

(ii) Astronomy & Astrophysics

- Optical Telescopes e.g Optical telescopes at Sutherland, including SALT (South Africa), Egypt, Ethiopia (under



SALT –Largest Optical Telescope in the Southern Hemisphere.

- Radio Telescopes at HartRao, MeerKAT (South Africa), and Mauritius.



Karoo Array Telescope (KAT)

- Square Kilometre Array (SKA) – bid brings into partnership: South Africa, Kenya, Botswana, Mauritius, Madagascar, Namibia, Zambia and Ghana. If south Africa wins the bid to host the world’s largest radio telescope (budget of approx. 1 billion Euros) each country to host anode.



Square Kilometre Array

- Telecommunications Dishes for VLBI - International collaboration between African Countries and their European counterparts.
- ✓ NB: Many Africans scientists trained as Astronomers/Astrophysicists through the

National Astrophysics and Space Science
Programme (NASSP), South Africa.

(d) Satellites in Space

(i) Nationally owned:

- Nigeria- 4 satellites
- South Africa - 2
- Algeria-1
- Egypt- 1

(ii) African Resource and Environmental Management Satellite Constellation (ARMC) Initiative: Algeria, Kenya, Nigeria and South African to pool resources and launch at least one satellite in space every two years w.e.f 2013. Open to other African countries willing to join.

(e) Human Resource

- No critical mass of expertise currently available in majority of African countries to drive the Space Science and Technology agenda.
- No industries to sustain human capital development with home grown capabilities and capacities.
- No focused government funded human resource development programmes for space science and technology development in many African countries.
- Non existence of National Space Science policies to guide space science and technology agenda in many countries.
- Non existence of policies on Science, Technology and Innovation in many African countries; a situation aggravated by a disconnect between academia, researchers and policy makers.

2. CAPACITY BUILDING

(a) Gaps to be filled

- A needs assessment be carried out by space aspiring nations in order to identify areas to focus on and cut a niche (e.g Canada's expertise in Space robotics is worth emulating).
- A void attempting to venture in all areas of space science as this would amount to spreading too thin and enormous consumption of the already scarce resources.

(b) Visions (e.g Kenya's vision 2030).

- Individual nations to identify areas of convergence of their National visions and establish bilateral agreements to pool resources, work together and develop joint capacity building programmes.
- Establish bilateral agreements for Science, Technology and Innovation cooperation for

exchange expertise and accessibility of learning resources at affordable rates.

(c) Strategies

- Embrace Regional and International cooperation and ensure that capacity building is an integral part of that arrangement e.g ARMC, ISS and others as the case may be.
- Acquire facilities to train locally to minimize brain drain and to ensure acquisition of local expertise and capabilities e.g Cape Peninsula University of South Africa.
- Create business entities to work very closely with institutions to ensure manufacturing of space systems/parts by local industries e,g Sunspace Micro-satellite manufacturing company of South Africa. This will also ensure sustainable internship by students and possible job placements for graduates of space science.

(d) Political and Social Dimensions

(a) Public Outreach:

- Necessary to ensure that the taxpayers are informed on what benefits will accrue from investment in Space Science and Technology.
- Necessary to inspire the youth to enroll for Natural Sciences, Mathematics and Engineering and Technology as these are the feeders of space sciences.
- Introduce Space Science Education at Primary school level all the way to University.
- Identify space programmes that the public can identify in order to buy their support for resource allocation to Space Science and Technology amidst challenges of poverty, hunger and disease.
- Sensitize users on availability of resources for commerce, education and research e.g in some African countries with satellites in space, little is known by own citizens about

availability of free data for education and research purposes. So the data is underutilized; so why put more satellites in Space?

(b) Harnessing Political Good Will

- Necessary to sensitize the political class to pass the necessary legislation to support space science and technology development (e.g Kenya's report on Space policy done in 1994 but to date no policy nor Space Agency in place; politicians are now pushing this agenda after the 4th ALC meeting in 2011 in Kenya).
- For possible long term funding for capacity building.
- For establishment of a National Space policy to guide the process of Space Science and Technology development and enterprise.
- To create a platform of engagement between policy makers and researchers for evidence

based advise to policy formulation to ensure visionary strategic planning.

- To ensure mainstreaming of Space Science and Technology as a key pillar for the attainment of National Visions.

3. RECOMMENDATIONS

- Space Science to be embraced not only for National pride, as is presently the case in some countries, but also for socio-economic advancement.
- Minimize purchase of ready made satellites to facilitate gradual acquisition of local capabilities for sustainability of Space Science and Technology programmes nationally and continent wide.
- Join the micro gravity space ISS programmes as away of fronting Space Science and Technology as multi-disciplinary endeavor requiring support of all and sundry. Possible breakthrough in HIV-AIDS vaccine development!

- Identify core service areas for partnerships e.g
Satellite Tracking , Telemetry and Command Centre
in Kenya to generate capital from existing space
enterprises to support capacity building.

END

THANK YOU!