Research and Educational Opportunities in a Microgravity Environment for Developing Nations

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Outline

1. Introduction
   Nigeria’s Space Programme

2. Nigeria and the United Nations

3. Space Education in Nigeria - National Strategy

4. Space Research in Nigeria - National Strategy

5. Human Space Technology and the Developing World

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Summary
• Founded in 1999 as the National Space Research and Development Agency (NASRDA)

• Focus: developing and applying science and Technology for socio-economic benefit

• Goal: Achieving technological competence in the manufacture and launch of satellites by the year 2025.
To date, three satellites have been built by the agency:

- NigeriaSat-1 - Launched in 2003, 32m resolution, 3 bands, altitude of 686km, member of the DMC
To date, three satellites have been built by the agency:

- **NigeriaSat-2** - Launched in 2011, 2.5m resolution, multispectral imager, altitude of 700km, compatible with the DMC configuration
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- **NigeriaSat-X** - Launched in 2011, 22m resolution, multispectral imager, altitude of 700km, built by NASRDA engineers using facilities in the UK.
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The Activity centres of NASRDA are:

- Centre for Geodesy and Geodynamics (CGG), Toro
- Centre for Space Transport and Propulsion (CSTP), Epe
- Centre for Satellite Technology Development (CSTD), Abuja
- National Centre For Remote Sensing (NCRS), Jos
- Centre for Basic Space Science (CBSS), Nsukka
- Centre for Space Science and Technology Education (CSSTE), Ile-Ife
Nigeria has had good relationship with the UN and its space affairs office

- Member of several UN bodies/committees concerning space policy - UN-Spider for example
- Hosts a regional centre for space education, the African Regional Centre for Space Science and Technology Education - English (ARCSSTE-E)
- Signatory to major treaties and agreements concerning the peaceful uses of outer space
Space Education in Nigeria - National Strategy

- Space Science and Technology-related courses were introduced into the Nigerian University curriculum - Remote Sensing/GIS, Atmospheric and Climate physics as examples.
- An outreach programme is operated by NASRDA through the CSSTE: its objective is to popularize space science and technology in Nigeria.
Space Education in Nigeria - National Strategy

In co-operation with UN-OOSA, the following courses are taught at the Postgraduate Diploma level at ARCSSTE-E:

- Satellite Communication
- Remote Sensing/GIS
- Satellite Meterology
- Basic Space and Atmospheric Sciences

Courses in Space Law and Life Sciences are to be introduced soon.
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Space Research in Nigeria

Research in Space Science and Technology is divided into two broad areas

- Applied Research - This involves research into satellite technology, engineering techniques, Remote sensing/GIS applications (land-use/land-cover), Image Processing
- Basic Research - Astronomy/Astrophysics, Atmospheric and Climate Physics, Advanced Computation and algorithm development
Why Research/Education into Microgravity?

- It is a major part of national space policy
- Contributing to intellectual effort by humanity in that area of endeavour
- Curiosity!
What can HSTI do for a developing country like Nigeria?

In Education:

- Stimulate interest in science and technology among the youth
- Capacity Development
- Garner support for space-related research among the political class
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In Research:

- Basic research in microgravity will now be possible for scientists in developing countries
- Make Low-Earth orbit accessible to less-privileged nations
- Allow contributions from scientists/engineers from developing nations to Human Space Technology
How can This be Achieved?

- Capacity Development in developing nations
- Resolve that a certain percentage of research time on the space station be made available to scientists/engineers of all nations
- Contributing to space education initiatives in developing nations
An Example of Co-operation: Advanced Computational Code Development for Basic Research

- Computational Code Developed Originally to Study Neutron Star-Black Hole Collisions: Original Code is a product of US/Germany/UK universities.

- With new observations from ISS - More accurate models can be made
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Summary

• Cooperation between developing and developed nations is essential for future growth of space science and technology
• HSTI is a useful initiative to foster co-operation between developing and developed nations in research and education
Thank You!