

**The roles of Africa's institutions in ensuring
Africa's active participation in the Space enterprise:
The case for an African Space Agency (ASA)**

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ABSTRACT

We currently have the African Leadership Conference on Space Science and Technology for Sustainable Development (ALC), a NEPAD initiative to establish an African Institute of Space Science (AISS) as a networked organisation of existing entities, and half a dozen national space or remote sensing agencies and programmes. There are also university departments and individual academics in astronomy, physics, maths, or other areas relevant to space science and technology, plus amateur astronomy associations.

First, what is the optimal way to articulate all of these to each other so that we achieve continental coordination? Second, the requirements of the space industry make it optimal to pool our scarce human and financial resources in an African Space Agency. As a continent, we will be able to negotiate better offers for satellite construction, space launches, technology transfer, and share data, scarce facilities and infrastructure.

1. INTRODUCTION

Currently, our continent has the African Leadership Conference on Space Science and Technology for Sustainable Development (ALC), a NEPAD initiative to establish an African Institute of Space Science (AISS) as a networked organisation of existing scientists, half a dozen national space agencies, and national remote sensing agencies and programmes. The Regional African Satellite Communications Organization, RASCOM, was founded in 1993. There are also university departments and individual academics in astrophysics or other areas relevant to space science and technology, plus amateur astronomy associations.

This proliferation of institutions makes it overdue to explore the optimal way to articulate all of these to each other so that we achieve continental coordination. The requirements of the space industry make it optimal to pool our scarce high-level human and financial resources.

2. THE CASE FOR CONTINENTAL COORDINATION

Let us start with a revealing paradox. The wealthy industrial countries of Europe realized that none of their countries' economies was by itself a match for the United States' economy, and merged half a century ago into the European Union.

The space dimension of this was that these wealthy, highly educated, countries realised that their national space programmes could never get the budget of NASA, and so merged most of their efforts to found the European Launcher Development Organization (ELDO) and the European Space Research Organization (ESRO) in 1962, which were in turn merged into the European Space Agency (ESA) in 1975. It is instructive that those European countries who lacked the political will to support continental cooperation only marginalized themselves. For example, the United Kingdom's Governments declined to participate in building the European space launcher. Today, this ex-world power has a smaller space programme than either its former colony, India, or China. Even ESA as a whole lacks the budget for human spaceflight, so it cooperates closely with the Canadian and Japanese space agencies, and is now negotiating closer links with the Russian Space Agency.

By contrast, the underdeveloped, poorer countries of our continent only managed to re-engineer the ineffective OAU into the African Union in 2002 – and have not yet pooled their resources to form an African space agency. Let us spell out explicitly the case for continental coordination.

First is the efficient and effective use of our scarce resources. Africa is a capital-scarce continent. The allocation of resources to the extreme cost of access to space requires solid justification. The space enterprise also demands an allocation of scarce high-level human resources, plus costly hi-tech peripherals. Even combined as a continent, Africa will command less space resources than an individual member of ESA such as France. Consequently, the space enterprise in Africa needs such coordination far more than Europe does.

Second is the argument from spherical geometry. The Geo-Synchronous Orbit footprint of a satellite is continental, and of all the continents, Africa more than any other has the equator in its middle, optimal for geo-stationary orbit-keeping. Medium-Earth Orbit satellites have a footprint which covers the whole of a Regional Economic Community, such as the Economic Community of West African States (ECOWAS), the East African Community (EAC), or the Southern African Development Community (SADC).

One after another, Algeria, Egypt, Nigeria, South Africa, we are now launching national constellations of microsats whose image swathes run through each other's countries - but we download data from less than 1% of each orbit of our satellites. It is logical to download data continuously during the transect of every satellite's orbit over the whole of Africa, and to centrally archive and process such data. South Africa is discussing co-ordinated satellite programmes with African countries.¹ As a continent, we will be able to negotiate better offers for satellite construction, space launches, technology transfer, and share data, scarce facilities and infrastructure, than as individual small countries alone. Security issues, such as images of a specific location, or of a specific resolution, can be easily resolved by inter-governmental agreement. The African Resource Management Constellation will be best operated by a continental space agency.

Third is that international cooperation is most efficiently negotiated at continental levels. One example amongst many is that South Africa is part of the India-Brazil-South Africa trilateral alliance, IBSA. Brazil is a space player, India is a rising space power. Where African countries seek existing or future space agreements with space powers on other continents, it would make sense to share the benefits, and seek continental opportunities from such partnerships. Imagine if we had an India-Brazil-African Union treaty.

For example, the Abuja Treaty of 1991 explicitly commits the AU to establishing a satellite-based system of communications.² NEPAD's e-Schools initiative aims to provide some 600 000 African schools with necessary infrastructure, ICT equipment and digital content, and appropriately trained teachers.³ India became the world's leader in space-based tele-education long before its 1.95t edusat.⁴ While optic cable networks can deliver some of this, an African EduSat, GSO, DBS, is indisputably required. The spread of cellular communications to vast geographic areas with relatively sparse population, such as Chad, DRC, Mozambique, and the Sudan, are creating a huge demand for satellite capacity that exceeds availability.⁵

India's immediate past President, Abdul Kalam, used his 2002 visit to propose Indo-AU space cooperation to the Pan-African Parliament,⁶ while India has extended a credit line available for such NEPAD projects, as well as those in tele-medicine, e-commerce, and e-governance. One current Indian proposal is for a reusable launch vehicle, the Trans-Atmospheric Vehicle, which would lower the cost of access to space by two orders of magnitude.⁷ Should this proposal be actually implemented in future, it has major implications for the affordability of access to space for our continent.

3. INSTITUTIONAL ARCHITECTURE

Our usual starting point for lobbying is with our national ministries & departments of Science & Technology, national space agencies or remote sensing agencies, and national parliament portfolio committees on Science & Technology.

The African Union Commission is based in Addis Ababa. One of the eight African Union Commissioners has the portfolio for Human Resources, Science & Technology, which also corresponds to the portfolio of one of the fourteen African Union directorates. The African Union has seven Specialized Technical Committees, reporting to the Executive Assembly, which includes one that groups together all of Industry, Science & Technology, Energy, Natural Resources & Environment. The African Ministerial Council on Science and Technology adopted amongst its flagship programmes cluster 4: ICT, and Space Science and Technologies.⁸

Moving from Addis Ababa to Midrand, the Pan-African Parliament has six portfolio committees, one of which groups together Transport, Industry & Commerce, Energy, Science & Technology. One task for the ALC is to ensure

that the AU and PAP become supporters of the space enterprise, and understand that it is essential in every aspect of our economic and cultural life from communications to environmental management.

RASCOM already has a continental mandate for communications satellites.

In any country, Parliament is less influential in day-to-day decision-making than a ministry; in some countries Parliament is more decorative than being a king-maker. Nevertheless, it remains crucial to brief the legislators. In all our countries the space enterprise remains vulnerable to the perennial political or media challenge: in a country where millions lack household electricity or toilets, how can a government justify spending millions or billions on space? The overwhelming majority of university graduates do not study space policy - and many political leaders and journalists never had the opportunity to attend university.

Space advocates have the responsibility of repeated public outreach, of explaining that all our space budgets are spent on the ground, and that satellite applications earn their keep through everything from disaster management to daily communications. The African Leadership Conference could be one ideal entity to contribute towards this role.

The NEPAD initiative to establish an African Institute of Space Science (AISS) will facilitate a networking of isolated individual scientists working in space fields in university departments and other institutions.

For those countries which have a national space agency or have reached the stage of a developed space programme, such as at least Algeria, Egypt, Kenya, Nigeria, and South Africa, it is overdue to inaugurate a Pan-African space agency to coordinate the activities of both RASCOM and the national agencies. As in Europe, where CNES, DLR and other national space agencies work both through and alongside ESA, the national space agencies of our under-resourced continent need an African Space Agency – ASA. It will also need to facilitate via the proposed AISS inclusion for individual researchers working in universities and other institutes in countries without national space or remote sensing agencies.

A further role for the ALC and an ASA is to compile an inventory of space infrastructure in Africa that was operated by foreign space agencies, and explore how Africa itself can make better use of them. For example, the U.S.-built runways and lighting to accommodate emergency shuttle landings in Gambia and Morocco; the Italian-built San Marco launch platform, and Malindi telemetry facilities in Kenya; the OTB test range and NASA-built 26m dish in South Africa, should be conceived of as the nucleus of a potential continental space infrastructure. The same applies to the optical, radio, and gamma ray telescopes in Egypt, Mauritius, Namibia, and South Africa.

The ALC could propose that one of its roles should be as a think-tank for the proposed AISS and the ASA proposed here. The ALC could set up a

virtual network, including video-conferencing, to increase its capacity for this. The ALC and ASA could also take the lead in helping Africa take up the Indian and other foreign offers of technology cooperation.

4. CONCLUSIONS

This paper concludes that first, the ALC should strengthen itself, and maintain contact between conferences through a dedicated email forum, with video-conferencing as and when necessary.

Second, the ALC should act as an African caucus to try to ensure, wherever possible, a united African bargaining position in the UN Committee on the Peaceful Uses of Outer Space, and similar global organizations.

Third, the ALC should see itself as proposing initiatives such as an African Space Agency, and giving leadership to that and the proposed African Institute of Space Science, which will itself be largely administrative in nature. Indeed, the ALC needs to assist into ensuring that an ASA and an AISS are swiftly constituted. Fourth, the ALC needs to establish and sustain contact with the appropriate sections of the African Union Commission in Addis Ababa, and with the Pan-African Parliament in Midrand.

Fifth, the ALC members need in their home countries to consistently lobby their decision-makers in science and technology, in both the Executive and the Legislature. They must also devote time and patience to public education through the media, and seek to get a page or two into appropriate high school textbooks.

Sixth, it is preferable for an ASA assisted by the ALC, rather than national space agencies, to negotiate future MOUs and agreements with NASA, ESA, ISRO, JAXA, and other space agencies.

For the world, this is the golden anniversary of the dawn of the space age that was launched by Sputnik. It is our duty to ensure that in the twenty-first century the space age also dawns for Africa.

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