

FRONTIERS

Space Landings

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Nigeria has joined the space race.
Others should join too.

For more than 50 years, the developed world, led by the USA and the former Soviet Union, dominated space science and space exploration, spearheading manned space flights, moon landings, travel to distant planets, the construction of a multinational space station, and the launch of some 4,000 communication and surveillance satellites.

Over the past few decades, the gap between the space ambitions and achievements of developed and developing nations has begun to close. China, for example, has embarked on a broad space science programme, conducted manned space flights, and built satellite launch sites and vehicles. It has announced plans for a permanent space station, possibly in cooperation with other developing countries, and an unmanned robotic mission to the Moon to explore the prospects of lunar mining. Other plans involve astrophysics research, including the launch of the world's largest solar space telescope and a deep-space tracking network involving the world's largest radio antennae.

Other developing countries are following, although on a smaller scale. A growing number now own and operate satellites (for example, Algeria, Argentina, Egypt, Indonesia, Iran, Malaysia, Nigeria and Pakistan), which they use in their efforts to improve agriculture, communications, environmental protection and national defence. India and Brazil also have satellite launch capabilities. Others, including Chile, Peru, Kenya and South Africa, have initiated space policies and programmes that are moving ahead at different rates.

Critics of space programmes in developing countries typically argue that funding could be better spent on more immediate concerns, such as health care, the building of infrastructure and universities. They fail to acknowledge that space science and technology can make significant contributions to a country's most pressing social and economic needs, and catalyse industrialization.

Nigeria, where I served as minister of science and technology from 2000 to 2007, offers examples of a systematic space programme in the developing world that is succeeding.

In 1999, Nigeria adopted a 30-year strategic space-policy agenda that led to the creation of the National Space Research and Development Agency (NASRDA). The country's first venture



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into space took place in 2003 with the lift-off of NigeriaSat-1, a remote-sensing satellite built in partnership with Surrey Satellite Technologies of the UK and launched from Plesetsk, Russia.

Last year, in partnership with China, we launched NigcomSat-1, a communications satellite. NigeriaSat-2, a higher resolution remote-sensing satellite, is due to be sent into orbit in 2009, again with help from the UK. There are also plans to send a Nigerian astronaut into space by 2015 and to launch a Nigerian-made satellite by 2018, taking advantage of Nigeria's geographic location to launch into near-equatorial orbit.

How has the country gained from these endeavours?

Among the benefits are the creation of new research and development (R&D) institutions that include a National Space Centre with a receiving station for information transmitted by Earth observation satellites, a ground control station for gathering signals from communication satellites, a satellite design and assembly centre, a soon-to-be completed planetarium, and the development of R&D centres in disciplines such as satellite technology and development, remote sensing, geodynamics, space transportation and propulsion, basic space science research and education. Many of these efforts will contribute to education at all levels, curb the migration of skilled manpower, and help to improve public awareness of science and technology.

The benefits are also monetary. Local and international private companies, government agencies and non-governmental organizations have paid for images created by the Sat-1 remote sensing satellite for environmental and disaster monitoring; and telecommunication companies across Africa and outside the continent have leased most of NigcomSat-1's 40 transponders, generating significant revenue.

Satellite technology has brought other advantages. Mobile phones, which depend on it, have been a great success in Africa. In 2000, the Nigerian national telephone company (NITEL) had fewer than 1 million landline subscribers. Today, Nigeria has over 40 million telephone

subscribers, most of whom use cell phones. The use of locally owned satellites reduces the cost of bandwidth and network connectivity.

Investing in satellite technology is expensive. Yet, buying satellite-related products and services from others is even more so. It also increases the risk of services being interrupted by limited supplies, or by concerns of suppliers or recipient countries over national security. Moreover, countries that pay only to use the products of advanced technologies are prohibited from drawing on proprietary knowledge for local production or for developing skills and innovations.

It is not just about technology and profits. Satellite technology has encouraged many more young people to pursue higher education and careers in mathematics, science and engineering. More than 100 Nigerian space science and engineering graduates are working on national satellite projects.

The launch of NigcomSat-1 was broadcast on television across Nigeria and received front-page coverage in national and international newspapers and magazines. The brief, non-orbital flight of Stella Onyiyechi Uzumma Felix, a 17-year old Nigerian student, from the Kennedy Space Centre in the USA in September 2006, inspired celebrations across Nigeria. Felix has since become a role model for young Nigerian students interested in science and technology. These space activities build national confidence within the Nigerian scientific community and the public, leading to continuing political support and commitment to a sustainable space programme.

If developing countries are to be competitive in a globalized world, they must devise strategies that lead to the frontiers of space technology. To achieve the cherished goals of equity and peace, they must contribute fully to international discussions about the future management and exploitation of space.

To paraphrase Socrates, we must rise above the clouds to master the world in which we live. ■

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