

SOUTH AFRICAN LOW EARTH ORBITING MICROSATELLITE (SUMBANDILASAT)

BACKGROUND

In October 2005, the Department of Science and Technology announced a three-year integrated capacity-building and satellite development programme. Stellenbosch University (SU) was tasked with the development of a low earth orbiting satellite and academic training programme. SU subsequently subcontracted Sunspace to build the satellite. The Council for Scientific and Industrial Research's Satellite Applications Centre (SAC) was contracted for operations, telemetry, tracking and command, as well as data capturing.

In 2006 a competition for high school students was held to find a name for South Africa's first government-funded satellite. Entries in various official languages were received, but ultimately the Tshivenda name "Sumbandila", which means "Lead the Way", was chosen, and announced in 2007.

SumbandilaSat is part of the integrated space programme South Africa is working towards, and will serve as a research tool to investigate the viability of affordable space technology. It will generate satellite imagery at 6.25 m ground sampling distance resolution, and the data acquired will be used for agriculture and environmental monitoring in Southern Africa.

AMATEUR RADIO EXPERIMENTAL PAYLOAD TO CREATE INTEREST IN SPACE AT SCHOOL LEVEL

SA AMSAT, the Southern Africa Amateur Radio Satellite Association with SU developed a control system that commands the transceiver and allows it to function as an FM repeater for use by licensed radio amateurs. The system also includes a parrot repeater, a device that will record 20 seconds of audio and plays it back on the downlink frequency. The parrot is an ideal system to take space into the classroom. SA AMSAT is already working on several projects that will be implemented after launch.

Another feature of the payload is an audio beacon that will carry a 15 second message. The beacon is programmable from the ground and various messages can be uploaded as part of a satellite tracking competition for learners at schools and other youth groups such as the Scouts, Girl Guides and Voortrekkers. The beacon message was selected from entries in a country-wide competition and recoded by the winner, at the time a Kimberley Technical High School Student, Anton Coetzee. The message reads: "This is ZSOSUM in space. I am the voice of the South African youth.

We are knocking on the door of opportunity, marking our place in the orbit of space research and communication. Hear us! Listen to us! "ICASA has already allocated the amateur call sign ZSOSUM to the SA AMSAT payload.

OBJECTIVES OF SUMBANDILASAT

The main objectives of SumbandilaSat project are:

- to strengthen the technological capabilities and space resources that exists in South Africa.
- Capacity development and training in satellite engineering.
- Provision of an earth observation satellite data for a wide range of applications.

The development of SumbandilaSat offers South Africa a number of competitive advantages that are of interest for scientific and economic growth; sustainable development, security, planning etc.

Sumbandila satellite imagery can be used for various applications which have direct benefits for society such as:

- Disaster management (floods, fire).
- Food security (crop yield estimation).
- Health (prediction of outbreaks).
- Infrastructure.
- Land cover/ land use.
- Safety and security.
- Water resource management.
- Energy.

Furthermore the approved National Space Strategy will focus on the following thematic areas identified as important for a viable space programme:

Earth observation: involves all activities connected with the collection of information on the Earth's surface or atmosphere from instruments on board satellites and in-situ ground sensors.

Navigation: This area will focus on the development of augmentation technologies, applications and services in navigation, timing and positioning. Attempts will be made to explore and exploit synergies with other competency areas like Earth observation and communications. The most promising application areas include fleet and traffic management, location-based services, and search and rescue.

Space science and exploration: Space science and exploration achievements in the past few years have captured the world's attention, interest and imagination. The primary benefits of this new age discovery are on their impact on humanity's appreciation of its own global habitat in the context of the terrestrial environment, the solar system and the universe beyond.

Communication: This competency area will focus on the development of technologies and applications in collaboration with the end users, primarily the Department of Communications.

SANSA

As part of integrating the national space programme, a request for the establishment of the National Space Agency was made and approved by Cabinet in 2006. The request was made due to the realisation that the landscape of the space sector has been fraught with difficulties due to a lack of coordination among the many stakeholders and a central authority to lead the development of the sector. The South African National Space Agency (SANSA) will serve as a central point of convergence in which all space related activities could be fostered and promoted. The Department of Science and Technology is currently working on establishing the Space Agency.

THE OBJECTIVES OF THE NATIONAL SPACE AGENCY ARE TO:

Promote the peaceful use of outer space.

Support the creation of an environment conducive to industrial development in space technologies.

Foster research in astronomy, Earth observation, communications, navigations and space physics.

Advance scientific, engineering and technological competencies and capabilities through human capital development and outreach programmes.

Foster international co-operation in space related activities.

THE SPACE PROGRAMME'S HUMAN CAPITAL DEVELOPMENT (HCD)

To build a successful space programme, South Africa will need to have the appropriate expertise and skills. Without these expertise and skills, all the existing and indeed envisaged infrastructure and programmes will be meaningless. In order to address our human capital development requirements we consider an integrated approach, where the focus extends from the schooling level up to professional development training. The core focus will be at the undergraduate and postgraduate training level with downstream activities focusing on schools and the general public and upstream activities focusing on professional development of technical experts.

For space science and technology there are two career streams that are of importance, namely -

Space science applications; and Space systems engineering.

There will essentially be two hubs with associated spokes and these are respectively for space science applications and for space systems engineering. For both of these the proposed spokes there will be Centres of Competence, Research Chairs, Universities, Science Councils and Private sector networked together according to their specialised expertise such as space materials, optronics and synthetic aperture radar, and data processing to support training and development in the space industry.

SPACE AWARENESS AND OUTREACH

To feed into the HCD spokes model it is necessary to have awareness programmes to educate the society to appreciate the importance and value of the space science and technology and its socio-economic impact.

The critical juncture in the schooling system is grade 9 where students are expected to make a decision with respect to the courses they will follow to steer them in the appropriate career direction. We will engage students well before the grade 9 level and if they decide to continue a career in space science and technology, we will then find a mechanism to further support them up to grade 12. In this regard, we will set up, in collaboration with the Department of Education a number of space schools and camps. Also, in order for this programme to be successful there is a dire need to train the teachers to prepare them for effective engagement in this discipline. In addition to engagements with the schooling system we will also have a robust programme for public awareness and advocacy initiatives with the general public.

