SOUTH AFRICA'S SPACE POLICY AND INTERESTS: A NEW DAWN OR A BLACK HOLE?

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Abstract

Several major developments in 2009 contributed to South Africa's 180 year involvement in space science and technology. These include the release of the South African National Space Policy; the establishment of a South African National Space Agency; and the launch of the first government-owned satellite. This article contextualises South Africa's space ambitions within the international politics of Outer Space. It proceeds with an overview of the country's space facilities, programmes, policies and institutions, and with a discussion of South Africa's predominantly functionalist and symbolic space diplomacy. The article concludes with some caveats pertaining to the implementation of South Africa's ambitious National Space Policy, and the expansion of its space interests in a competitive global environment.

1. INTRODUCTION

Four important space-related events took place in South Africa in 2009, namely it celebrated the 180th anniversary of astronomy in the country; the South African government released its National Space Policy in March 2009; the National Space Agency is to be established in terms of the South African National Space Agency Act (Act 36 of 2008); and the country's first government-built satellite, Sumbandila-SAT, was launched. These events and developments are illustrative
of South Africa's space ambitions. As an analysis of South Africa's space policy and interests the purpose of this article is fourfold, namely to provide an historical background to space science and technology in South Africa; to outline the country's space facilities, programmes and policies; to analyse its space diplomacy; and to assess the international significance of the country's space ambitions.

2. THE ORIGINS OF SOUTH AFRICA'S SPACE INTERESTS

In 1685, 76 years after Galileo's first astronomical observations, a Jesuit priest en route to Siam (Thailand), Father Guy Tachard, established a temporary observatory in what is now known as Cape Town. In 1751, France's Royal Academy of Sciences sent the Abbé Nicolas-Louis de La Caille to the Cape where he set up an observatory in what is now Strand Street, Cape Town. Between 1751 and 1753, De La Caille charted the positions of almost 10 000 stars, catalogued 42 nebulae, discovered 14 new constellations and is today widely regarded as the founder of modern Southern Hemisphere astronomy. 1)

In 1820, the British Admiralty agreed to construct an observatory at the Cape, which was completed in 1829 and run by the Cambridge mathematician and clergyman, Reverend Fearon Fallows. Fallows' assistant and wife, Mary Ann Fallows, who discovered a comet in the constellation of Octans, is regarded as South Africa's first female astronomical observer.

Fallow's successor, Thomas Henderson, compiled a catalogue of the stars of the Southern Hemisphere and, at the time, made the most accurate calculation of the distance between the Earth and the Moon. Henderson was succeeded by Thomas Maclear and Sir John Herschel, both of whom made significant contributions. Maclear founded geodetic surveys in South Africa and Herschel catalogued 1 707 clusters and nebulae, and more than 2 000 binary stars. Since 1879, Herschel's successor, David Gill produced a photographic survey of the Southern Skies which was published as Carte du Ciel (Map of the Heavens) and the Cape Photographic Durch-musterung (catalogue). 2)
During the 1900s, scientific exploration was interrupted by the South African War, and World War I and II. From the middle of the 20th century, Cold War political and scientific imperatives provided new impetus to South Africa's involvement in Outer Space. In 1958, merely a few months after the Soviet Union's launch of Sputnik, South Africa's first satellite tracking facility near Johannesburg — funded by the United States (US) space agency, NASA (National Aeronautics and Space Administration) — became operational. In 1961 it was moved to Hartebeesthoek, west of Pretoria and renamed the Deep Space Implementation Facility. This facility participated in major US space activities, amongst others, tracking and communicating with the Mercury, Gemini and Apollo missions.

Although a US government initiative, the Hartebeesthoek facility was staffed and controlled by the South African government. The facility has developed and is currently known as the South African Council for Scientific and Industrial Research's (CSIR) Satellite Applications Centre (SAC). A public entity, the SAC has international agreements with most of the major international satellite operating companies and international space agencies. SAC receives imagery and data from numerous satellites and tracks and controls spacecraft for international clients. These relations and activities contribute significantly to the country's status in the area of satellite imagery reception, analysis and exploration. As a result, South Africa is, along with the US and other leading space powers, a member of the international committee overseeing the development of the Global Earth Observation System of Systems (GEOSS). The latter co-ordinates all satellite-based earth observation systems, ensures the rapid flow of information between them, and identifies gaps in Earth observation which should be covered.

With the onset of so-called grand apartheid in the 1970s, the international community imposed sanctions against South Africa. With the Soviet Union and Cuban military presence in Angola and the intensification of the armed liberation struggle, the South African government accelerated its nuclear and space weapons programme. By the 1980s, the programme had initiated the development of rocket-based delivery systems and a domestic launching capacity with mainly military applications. Terminated in the early 1990s, the only remnants of the country's military space programme are its support facilities in the Western Cape, including a satellite ground
station complex at the Overberg Test Range near Bredasdorp and the satellite integration facility near Grabouw.\textsuperscript{5)}

South Africa's democratic elections in 1994 paved the way for the normalisation of the country's international relations. Ironically, projects to complete a South African launcher and satellite were discontinued in 1994.

3. THE INTERNATIONAL POLITICS OF SPACE

South Africa only re-entered the international space arena 20 years after the end of the Cold War. Compared to 1989, the space race at the beginning of the 21\textsuperscript{st} century has considerably different features. No longer the domain of a group of space-faring states, the geo-strategic realm of space has changed as more developing countries are acquiring space capabilities and own space-based technological resources. Today, only eight states have an independent launch capability, whereas 27 states — compared to three in 1980 — have satellite-based earth observation resources. In 2009, 25 space agencies operated globally.\textsuperscript{6)} Moreover, since 1957, approximately 6 000 satellites have been sent into orbit.\textsuperscript{7)}

This increased commercialisation and militarisation of Outer Space have increased the competition between private and state actors. The following are some of the implications of this development:

— It increases the competition in the geosynchronous orbit, which is the orbit around the Earth where satellites operate. The use of and access to this limited resource are allocated by an intergovernmental organisation, the International Telecommunications Union (ITU).

— As the privatisation of space affairs increases, more objects are launched which increase competition in the space industry between states and multinational corporations. The increase in launched objects also adds to space debris. As The Economist recently stated, "Space junk is dangerous". It is estimated that of the 18 000 tracked objects in orbit around Earth and larger than 10cm, only 900 are active satellites. The rest consists of
space debris which include fragments from space equipment. The smallest piece of space debris can derail and destroy the communications of a surveillance satellite.\(^8\) This was clearly illustrated, for example, by the collision of a US communications satellite with a defunct Russian satellite (launched in 1993) in February 2009.

— There is a need for International Space Law to take cognisance of new technological, political, military and commercial developments vis-à-vis Outer Space. For example, The 'peaceful use of Outer Space' is not defined in any of the United Nations (UN) Treaties and Principles on Outer Space. A definition of this is important as it will not only restrict actors, but also provide them with certain rights.

— Space is big business. By 2000 and 2008 the global satellite industry had respectively generated US$64 billion and US$90 billion in revenue.\(^9\)

— The cost of the development of space capabilities has encouraged international co-operation in the field and this is no longer restricted to, for example, the International Space Station (ISS).

— The 'nationalist nature' of space programmes is increasingly evident.\(^10\) States' space capabilities are politically-coloured symbols of national pride, power and prestige. This 'techno-nationalism' is changing the geo-politics of space activities.\(^11\) Although asymmetrical, developing countries are developing this capability which challenges the existing balance of space power.\(^12\)

— Preliminary efforts are made to redesign the international space regime. Since 2006 and under NASA leadership, a group of 14 space agencies developed the Global Exploration Strategy outlining the rationales, objectives and schedules of future space exploration and exploitation.\(^13\)

— The myth of space demilitarisation endures after the end of the Cold War as the US, China and Russia continue with military space programmes.

— Increasingly, calls are made for the use of space-based technology to enhance sustainable development in the fields of, for ex-
ample, tele-medicine and tele-education in developing countries.

These events and developments have important implications for South Africa's interests and identity as an emerging actor in the international politics of Outer Space. Firstly, South Africa has joined the exclusive club of so-called space-faring nations and groupings, which includes, for example, the US, the European Union (EU), France, Russia, India, China, Nigeria and Brazil. Secondly, it adds a new dimension to South Africa's diplomatic relations. For example, as a member of the UN Committee on the Peaceful Uses of Outer Space (COPUOS), South Africa is bound by International Space Law and has, due to the high cost of space science and technology, to cooperate with international actors in these fields. Thirdly, the country's space capabilities will bestow it with significant international status and prestige.

4. THE EVOLUTION OF SOUTH AFRICA'S SPACE LEGISLATION AND POLICY

South Africa's space-related activities preceded the adoption of a national space policy and of space-related legislation. Since the launch of Sputnik in 1957, South Africa was mainly involved in satellite tracking and reception, and since the 1960s, as a Deep Space Station in mission support to NASA. Subsequently, various national space facilities such as the South African Astronomical Observatory (SAAO) and the Hartebeesthoek Radio Astronomy Observatory (HartRAO) were established.

Although largely overshadowed by the political transition (from 1990 to 1994) and the announcement of the termination of South Africa's nuclear weapons programme in March 1993, a consensus nevertheless emerged on the formulation of a South African space policy. This resulted in the enactment of South Africa's first space legislation in 1993.

4.1 Space legislation (1993-1999)

The Space Affairs Act (No 84 of 1993) regulates government and non-governmental space-related activities and confirms the central role of the government in space affairs. It prohibits the following activ-
ities, except when the launching party has been granted a licence by the National Space Council:

— any launching from the territory of the Republic;
— any launching from the territory of another state by or on behalf of a juristic person incorporated or registered in the Republic;
— the operation of a launch facility;
— the participation by any juristic person incorporated or registered in the Republic, in space activities, entailing obligations to the State or which may affect national interests; and
— any other space or space-related activity prescribed by the Minister.\textsuperscript{14)}

In addition, one of the earliest policy initiatives of the post-1994 ANC-led government was the enactment of the \textit{Space Affairs Amendment Act} (No 64 of 1995) to provide for the appointment of a vice-chairperson to the South African Council for Space Affairs.

\section*{4.2 Developments during the Thabo Mbeki-era}

South Africa's post-1994 space diplomacy is one of the legacies of former President Thabo Mbeki. Mbeki’s first presidential term commenced in 1999. This period was characterised by the increased activity and involvement of the South African government in national and international space affairs. Since 2000, the construction of the Southern Africa Large Telescope (SALT) commenced and South Africa submitted its bid to host the data-collecting Square Kilometre Array (SKA).

In 2003, the National Working Group on Space Science and Technology (NWGSST) was established. As an inter-departmental government initiative to co-ordinate and promote the study and peaceful uses of Outer Space for the benefit of South Africa and its people, the NWGSST comprises of representatives of various government ministries, including Communications, Foreign Affairs, Trade and Industry, Science and Technology, as well as representatives from various space science and technology related South African organisations.\textsuperscript{15)}

By the time Mbeki's second presidential term commenced in 2004, South Africa was elected as the co-chair of the Group on Earth
Observations (GEO) and started with the construction of the Karoo Array Telescope (MeerKAT). In 2005, the Department of Trade and Industry (DTI) announced a framework for space policy development, which coincided with the announcement of the ZA-002 satellite programme. The DTI's South African Space Roadmap 2005-2014 provides for the:

— development of an Earth Observation Strategy;
— development of a space policy;
— establishment of a Space Agency;
— development of an Aeronautics and Defence Strategy;
— development of outreach and capacity building;
— establishment of an industrial space programme, including manufacturing, research and development, and the application of research and development (R & D);
— review of the Space Affairs Act;
— finalisation of a space budget;
— launch of ZaSAT, a micro-satellite; and
— joint development of the African Constellation Initiative.¹⁶)

In December 2005, the South African cabinet approved the National Space Agency Bill which paved the way for the establishment of a National Space Agency. The Bill outlines the objectives of the Agency, namely 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, navigation and space physics;
— advance scientific, engineering and technological competencies and capabilities through human capital development and outreach programmes; and
— foster international co-operation in space-related activities.¹⁷)

The Bill also proposes the functions of the Agency. It must:

— implement any space programme in line with the Space Affairs Act;
— develop and implement the national space science and technology strategy; and
— acquire, assimilate and disseminate space satellite data for any organ of state.18)

By 2006, members of the South African Space Council were appointed and, subsequent to this, the government announced its intention to establish a national space agency. At the time the South African government stated that "(t)he Space Council now has a significant role to play in the environment of South Africa’s renewed commitment to space for sustainable development and towards the achievement of national developmental goals".19)

The South African government, through DTI, also tasked Z-Coms Consortium to develop a National Space Policy Framework. Released in 2006, the National Space Policy Framework was an attempt to "address and analyse a number of critical space-related issues such as research, applications, commercialisation of space, the role of government and international space matters".20)

In July 2007, the Technology Innovation Agency (TIA) Bill was introduced to the South African Parliament. It provided for the establishment of the TIA as a public agency aimed at "stimulating and intensifying innovation and inventions in order to improve economic growth as well as enhance the quality of life of all South Africans by developing and exploiting technological innovations and inventions and creating an enabling environment wherein these could be commercialised".21)

The Space Affairs Act (Act 84 of 1993) and the Space Affairs Amendment Act (Act 64 of 1995) remained the primary legislative instruments governing space matters in South Africa until the promulgation of the Astronomy Geography Advantage Act (Act 21 of 2007) and the release of a policy document on South African Space Policy (March 2009).22) In June 2008, the Astronomy Geography Advantage Act (Act No 21 of 2007) was assented to. The purpose of the Act is "to provide for the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy and to provide for inter-governmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas".23) In pursuance of the Astronomy Geography Advantage Act, the Minister of Science and Technology officially declared areas
around the SALT, MeerKAT and the possible site for the SKA in the Northern Cape as Astronomy Advantage Areas.\textsuperscript{24}

Regarded as a 'foreign policy president', Mbeki applied space affairs as a diplomatic instrument to attract foreign direct investment and to give impetus to South Africa's self-imposed role as norm entrepreneur. Moreover, these developments created the opportunity for increased international co-operation in areas such as astronomy and Earth Observation. Furthermore, South Africa's space programme presents itself with a vehicle to realise South-South co-operation through technology transfers between developing countries. India and Brazil, for example, are both emerging space powers and are South Africa's partners in the India-Brazil-South Africa (IBSA) Dialogue Forum. In fact, a case has been made for greater co-operation on space affairs between IBSA member states.\textsuperscript{25}

\section*{4.3 A new dawn?}

Promulgated in 2008, the \textit{South African National Space Agency Act} (No 36 of 2008) paves the way for the establishment of the country's space agency. According to the Act, the objects of the agency are to promote the peaceful use of Outer Space, and to support the creation of an environment conducive to the development of a South African space industry, space-related research programmes and international co-operation in space-related activities. The South African National Space Agency will be the implementing agency for all South African space programmes established in terms of the \textit{Space Affairs Act} (No 84 of 1993). A Board will oversee all functions of the Agency and Members of the Board will be appointed by the Minister of Science and Technology. The South African National Space Agency will be financed by funds appropriated by Parliament, fees, royalties and other revenues obtained in terms of the \textit{Space Agency Act}.\textsuperscript{26}

On 6 March 2009, the Minister of Trade and Industry released the South African government's National Space Policy (NSP), which aims to:

\begin{itemize}
  \item Improve co-ordination throughout the South African space arena to maximise the benefits of current and planned space activities; avoid or minimise duplication of resources and efforts; and organise existing initiatives, programmes and insti-
\end{itemize}
tutions into a coherent network for all providers and users of space systems.

— Promote capacity-building initiatives, both as a means towards effective participation in the space arena, as well as develop capacity in space science and technology, and science and technology in general.

— Promote the development of an appropriate and competitive domestic commercial space sector in order to provide the industrial base to meet the nation’s needs for space technology.\textsuperscript{27}

The NSP will guide the development of appropriate space capabilities and space system applications "to contribute to economic growth and reduce poverty in the country". Moreover, the NSP will improve South Africa’s participation in the international space arena. It will also provide guidance to the public and private sectors involved in the space industry.\textsuperscript{28}

The National Space Policy will be administered by the DTI, whereas the government's Space Strategy will be managed by the Department of Science and Technology (DST).\textsuperscript{29}

5. SOUTH AFRICA'S SPACE-RELATED REGULATORY INSTITUTIONS AND SPACE PROGRAMMES

South Africa's space-related regulatory institutions include the Independent Communications Authority of South Africa (ICASA), the Space Affairs Council, the Civil Aviation Authority, the Maritime Authority and the Non-proliferation Council.\textsuperscript{30} This signifies the institutionalisation of space matters by the South African government.

South Africa's space programmes continue to be predominantly government-funded and include:

— The Pathfinder Satellite Programme (PSP), which includes the development of a small earth observation satellite. The PSP is to be carried out by the University of Stellenbosch in conjunction with the University of Stellenbosch's SunSpace and Information Systems, and the CSIR's SAC. In September 2009, the
South African government announced that SumbandilaSAT, the South African government's first satellite, was due to be launched by Russia from Baikonur in Kazakhstan in the same month.\(^{31}\) The eventual launch was successful.

— The South African National Antarctic Programme (SANAP) which is divided into four programmes. Only the Physical Sciences Programme is conducted throughout the year and includes the Southern Hemisphere Auroral Radar Experiment (SHARE), the Antarctic Magnetosphere, Ionosphere Ground-based Observations (AMIGO), the Antarctic Research on Cosmic Rays (ANOKS), the Astrid Satellite Telemetry Station, Upper Atmosphere Physics, and the GPS (Global Positioning System) Project.

— GEO, which is co-chaired by South Africa, the US, the European Commission and China, and which includes 47 countries and 26 international organisations. GEO co-ordinates strategies and systems for Earth Observations, identifies measures to minimise data gaps and aims to establish a comprehensive, co-ordinated and sustained Earth observation system.

— The South African Environmental Observation Network (SAEON) which monitors, amongst others, social and biological diversity and is affiliated to the Environmental Long-Term Observatories of Southern Africa (ELTOSA). The latter is a network of Southern African countries conducting environmental research and monitoring programmes.\(^{32}\)

South Africa is currently the only African country with an indigenous satellite design and manufacturing capability, and has, since the 1950s, maintained the most advanced ground support infrastructure and capability on the continent. In fact, South Africa's first satellite, SunSat, was built by the University of Stellenbosch and launched from Cape Canaveral in 1999.

6. **SOUTH AFRICAN GOVERNMENT-OWNED SPACE FACILITIES**

South African space facilities, which are predominantly state-owned
and for the most pre-date 1994, include the following:

(a) **Astronomy:** In November 2005, SALT — which is the largest single optical telescope in the Southern Hemisphere — was inaugurated. SALT is an international project involving researchers from South Africa, Germany, Poland, the US, New Zealand and the UK. In addition to six other installations operated by international scientists from the UK, the US, Japan, Germany and South Korea, SAAO hosts a number of international astronomy facilities at Sutherland (Northern Cape Province) (see Table 1).

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<thead>
<tr>
<th>Telescope</th>
<th>Institution</th>
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<tbody>
<tr>
<td>Birmingham Solar Oscillation Network (BiSON)</td>
<td>Birmingham University (UK)</td>
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<tr>
<td>Infrared Survey Facility (IRSF)</td>
<td>Nagoya University, Japan</td>
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<tr>
<td>Monitoring Network of Telescopes (MONET)</td>
<td>University of Göttingen, Germany</td>
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<tr>
<td>Yonsei Survey Telescope for Astronomical Research (YSTAR)</td>
<td>Yonsei University, South Korea</td>
</tr>
<tr>
<td>SALT</td>
<td>SALT Foundation, Germany, India, New Zealand, UK, US, Poland and South Africa</td>
</tr>
<tr>
<td>SuperWASP (Wide Angle Search for Planets)</td>
<td>Consortium of eight academic institutions and UK</td>
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Other South African astronomy facilities include the SAAO, the MeerKAT, HartRAO, HESS (High Energy Stereoscopic System), the Boyden Observatory, the Cape Town and Johannesburg Planetariums, and the Hermanus Magnetic Observatory (HMO). MeerKAT will be one the world's top mid-frequency radio astronomy facilities. By 2007, one-dish prototype was erected at HartRAO and, by 2012 it is expected to be a full 80 dish array.

(b) **Testing facilities:** Originally established for military purposes, South Africa's only testing facility, the Overberg Test Range (Western Cape), has a 60km range with fully controlled airspace. Built as a launch facility for the pre-1994 government's military space pro-
gramme, Overberg is adjacent to the Test Flight Development Centre which does flight testing for international clients, Denel and the South African Air Force. The South African Institute for Satellite and Software Applications (ISSA) is based at the Houwteq satellite integration facility in Grabouw (Western Cape).\(^{36}\)

(c) **Satellite communications facilities:** South Africa's satellite communications facilities include state-owned enterprises such as Sentech (reception and redistribution of television content) and Telkom (telecommunications).\(^{37}\)

(d) **Satellite applications and ground segment:** These include the CSIR SAC Ground Stations at Hartebeesthoek and the OTB.\(^{38}\)

(e) **Research and education:** South Africa's space science research institutions include the CSIR SAC, SAEON, SANAP, and HMO.\(^{39}\)

South Africa also contributes to the GEOSS via its South African Earth Observation Strategy (SAEOS) which collects, assimilates and disseminates Earth Observation products to support policy and decision-making for sustainable socio-economic development.

Space Physics is lectured at the Northwest University (Potchefstroom) and at the Universities of KwaZulu Natal and Stellenbosch (via SunSpace). South Africans are members of the multinational HESS research group, which received the EU's prestigious Descartes Prize for Science in March 2007. Three of the four patents which have so far resulted from the HESS research group belong to Northwest University.\(^{40}\)

7. **THE SOUTH AFRICAN NATIONAL SPACE AGENCY**

According to the South African government, the South African National Space Agency which will be established in 2009, "will promote the peaceful use of outer space; foster research in astronomy, earth observation, communications, navigation and space physics; foster international cooperation in space-related activities; and advance scientific, engineering and technological competencies through human
capital development and outreach programmes" and its purpose is to "facilitate the development of space missions, develop technology platforms, and acquire, assimilate and disseminate space satellite data for any organ of state".41) The National Space Agency will also implement the National Space Strategy (NSS) which was approved by Cabinet in December 2008. The purpose of the NSS is "to stimulate the capability to place SA among the leading nations in the innovative utilisation of space science and technology".42) The NSS derives from the DST's Ten-Year Innovation Plan which cites space science and technology as one of the country's five 'grand challenges'. In terms of the Innovation Plan government foresees that the Agency will address three 'strategic objectives', namely environment and resource management; safety and security; and innovation and economic growth. Regarding the latter, the government has declared its intentions "to win a growing slice of the global satellite industry" and to develop a local space industry.43) The Agency also manages South Africa's bid to host the SKA, SALT, as well as the launch of South Africa's second indigenous satellite, SumbandilaSAT.44)

8. SOUTH AFRICA'S SPACE INDUSTRY

Compared to established space-faring nations and multilateral actors such as the US, India, Russia, China, Japan and Europe, South Africa's space industry is very small. However, it is expected to be enhanced by the recently released NSP. The South African space industry nevertheless has expertise, services and experience in various fields, including:

— satellite, aerospace and electronic engineering and systems;
— satellite applications and ground support;
— telecommunications and information technology;
— radar and satellite antennae;
— research and consulting; and
— a small satellite, SumbandilaSAT, which was completely built by South Africans at SunSpace & Information Systems (Sunspace), a micro-satellite company established by the University of Stellenbosch.45) SumbandilaSat is owned by the South African De-
department of Science and Technology. Sunspace built the first ever South Africa satellite, Sunsat I, which was launched in 1999 (see Table 2 for SumbandilaSAT’s mission overview).

<table>
<thead>
<tr>
<th><strong>Table 2: SumbandilaSAT (ZA-002) mission overview</strong></th>
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<tr>
<td><strong>Features</strong></td>
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<tr>
<td>Owner</td>
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<td>Features</td>
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<tr>
<td>Managing entity</td>
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<tr>
<td>Contractor</td>
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<tr>
<td>Project budget</td>
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<tr>
<td>Life-time in orbit</td>
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<tr>
<td>Ground station</td>
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<tr>
<td>Post-graduate training and internship programme</td>
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SunSpace & Information Systems (Pty) Limited is one of the few South African commercial enterprises that can offer clients a range of satellites (between 50 and 400 kg) and subsystems for satellites. SunSpace co-operates with Europe to develop a Multispectral Micro Satellite Imager. As with most space initiatives in the country, the South African government, with a contribution of R17 million, is its major investor, whereas the European contribution amounts to €1 million.46)

9. SOUTH AFRICA'S SPACE DIPLOMACY

Since the formal discontinuation of South Africa’s military space programme in 1994, the country has maintained a modest astronomical and satellite research programme which includes international research co-operation. Since 1994, the research programme was in-
strumental in the country's space diplomacy. South Africa's space activities and diplomacy are predominantly functional and political in nature. The latter refers to the status and prestige associated with a space industry and programme and relates to the South African government’s African Project.

### 9.1 Compliance with International Law: Treaties on Outer Space

Whereas the *Outer Space Treaty*, 1966, signed during the Cold War, is more symbolic and normative in spirit, the subsequent treaties, principles and resolutions (see *Table 3*) are more practical in addressing problems arising from states' increased space activities.

| **Table 3: UN Treaties and Principles on Outer Space** |
|---|---|---|
| **UN Treaties** | **Principles adopted by the General Assembly** | **Resolutions adopted by the General Assembly** |

During the first two decades of international space activities and the making of International Space Law, South Africa ratified and/or signed some of the major UN Treaties on Outer Space (see Table 4).

<table>
<thead>
<tr>
<th>Treaty</th>
<th>Status</th>
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<tbody>
<tr>
<td><strong>UN Outer Space Treaty</strong> (1967)</td>
<td>Ratification</td>
</tr>
<tr>
<td><strong>UN Rescue Agreement</strong> (1968)</td>
<td>Ratification</td>
</tr>
<tr>
<td><strong>UN Liability Convention</strong> (1972)</td>
<td>Signature only</td>
</tr>
<tr>
<td><strong>Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water</strong> (1963)</td>
<td>Ratification</td>
</tr>
<tr>
<td><strong>Agreement Relating to the International Telecommunications Satellite Organisation (ITSO)</strong> (1971)</td>
<td>Ratification</td>
</tr>
<tr>
<td><strong>Convention on the International Mobile Satellite Organisation</strong> (IMSO) (1976)</td>
<td>Ratification</td>
</tr>
<tr>
<td><strong>Convention on the International Maritime Satellite Organisation (INMARSAT) Plus Operating Agreement.</strong></td>
<td>Acceptance</td>
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In July 2009, the DTI requested Parliament to ratify the *Liability Convention* and the *Registration Convention*. However, Parliament's Trade and Industry Portfolio Committee indicated that more research on the implications of these conventions should be conducted before it can make a decision on the matter. It is imperative that these Conventions be ratified, especially if the country wants to maintain its image as a good global citizen and if it wants to develop its space industry as stated in numerous documents.
9.2 Bilateral relations

Since 1994, South Africa has established various bilateral and functional agreements pertaining to space science and technology. South Africa maintains bilateral relations on space issues with space-faring states such as the US, France, Germany and the UK. Its relations with other European states include Italy, Hungary, Sweden, the Ukraine and Turkey. Its space-related bilateral relations with developing countries include India, Brazil, Kazakhstan and Russia. Since 2000, South Africa has signed Memoranda of Understanding and other international agreements regarding science and technology with several states and organisations, including, for example, Namibia, Lesotho, Indonesia, Senegal, Zambia, Japan, Turkey, France, Libya, and the EU.\(^\text{48}\)

South Africa also maintains space-related diplomatic relations with African states (such as Nigeria, Egypt, Algeria, Tunisia and Kenya); Asian states (such as Indonesia and Japan); and Latin American states (such as Brazil and Paraguay).\(^\text{49}\) The South African government has also established government-level bilateral agreements with international space agencies such as the agreements with NASA, the European Space Agency (ESA) and the Russian Aviation and Space Agency (Roskosmos). Since 2004, the CSIR's SAC provides daily satellite tracking as well as satellite launch and early orbit phase support for a number of international companies (such as Boeing Launch Services, Intelsat, Panamsat and CNES) and state space agencies of the US, France and Israel.\(^\text{50}\) In February 2006, the CSIR signed a skills development agreement with Alcatel Alenia Space, a French satellite-systems company to develop space science expertise in South Africa "with the ultimate aim of contributing to socio-economic progress both in South Africa and France".\(^\text{51}\)

One of South Africa's significant bilateral diplomatic relations is with Russia. This is in part explained by the fact that the former Soviet Union was one of the major ideological, political and military supporters of the ANC, the current governing party in South Africa, during its liberation struggle. Signed in September 2005, the Russia-South African Space Agreement aims to "create an appropriate organisational and legal framework for mutually beneficial cooperation in specific areas of exploration and use of outer space, practical
application of space equipment and technologies for peaceful purposes." This is to be achieved by developing a framework for commercial and other types of activities related to the launching of spacecraft, research, design, development, production, testing and operation of space equipment, and technology exchanges. Roskosmos has also expressed an interest in the remote launching of satellites from South Africa, from its Cosmodrome in Kazakhstan.

Originally set for December 2006, the launch of the South African government's first satellite, SumbandilaSAT's, by Roskosmos was delayed and postponed on a number of occasions. Subsequently, SumbandilaSAT was to have been launched from a Russian Navy submarine in the Barents Sea in June 2007, but this launch was also postponed. The repeated failure to launch SumbandilaSAT strained diplomatic relations between South Africa and Russia. In 2008, reports even suggested that South Africa considered the cancellation of the launching agreement with Russia. However, the satellite has since been launched.

9.3 Multilateral relations

Subsequent to the launching of Sputnik-1 in 1957, the UN General Assembly established a committee on Outer Space which, in 1959, was redesignated as the permanent COPUOS. The mandate of COPUOS includes reviewing the scope of international co-operation in peaceful uses of outer space; devising programmes to be conducted under the UN's auspices; encouraging ongoing research, disseminating information on outer space matters; and studying legal challenges arising from the exploration of outer space. COPUOS performs its mandate through two standing Subcommittees, namely the Scientific and Technical Subcommittee and the Legal Subcommittee. Only 15 of COPOUS' current 67 member states are African, namely Algeria, Benin, Burkina Faso, Cameroon, Chad, Egypt, Kenya, Libya, Morocco, Niger, Nigeria, Senegal, Sierra Leone, South Africa and Sudan. This membership correlates with the small number of African states that have ratified or signed UN Treaties on Outer Space. Since 2005, South Africa actively participates in the sessions of COPUOS. At, for example, the 48th session, South Africa participated in the committees evaluating the implementation of UNISPACE III (the third UN Conference on the Exploration and
Peaceful Uses of Outer Space) which was held in 1999.

The need for international co-operation on environmental and scientific matters was emphasised by the 2002 World Summit on Sustainable Development (WSSD) hosted by South Africa. This need was reiterated by the G8's summit in Evian in June 2003 in its Declaration on Science and Technology for Sustainable Development. In response, a South African delegation joined representatives of 33 other states, the EU and 21 international organisations involved in earth observation (EO) at the Earth Observation Summit in Washington (US) in July 2003. The Summit established the GEO and issued a declaration that signified a political commitment by states to co-operate in this field. South Africa is one of only 13 African members of the GEO and was elected as one of the GEO co-chairs, along with the US, the EU and Japan. Successive GEO summits have since taken place (also in Cape Town in 2004) and have resulted in the establishment of a GEOSS. In February 2005, 60 countries endorsed the GEOSS Implementation Plan. South Africa was re-elected as one of the co-chairs at this summit. GEOSS is of particular significance for Africa's development as it aims to integrate global systems in order to improve decision-making in terms of its focus areas (disasters, health, energy, climate, water, weather ecosystems, agriculture and biodiversity). These areas resonate with some of the New Partnership for Africa's Development (NEPAD) sectoral priorities and objectives.

9.4 Education and research

The South African government has established joint space science and technology research programmes and is sponsoring various initiatives. It also participated in international educational exchanges. By 2009, according to the South African Minister of Science and Technology, the government's Youth into Science and Engineering programme has provided financial and educational support to 84 PhD and MSc students, 38 of whom are from African countries other than South Africa, and to 11 postdoctoral fellows.59

9.5 Conferences

South Africa uses conference diplomacy to enhance its space diplo-
macy. It has participated in and hosted several international conferences. For example, in 2001 South Africa hosted the conference that produced the *Convention on International Interests in Mobile Equipment* and, in 2007 it hosted the 2nd African Leadership Conference on Space Science and Technology for Sustainable Development.\(^60\)

### 9.6 Relations with African states and institutions

Several African states maintain a presence in space. Presently, there are six African-owned and state-operated satellites in orbit around the Earth, namely three Earth observation satellites and three communications satellites. Algeria, Nigeria, South Africa and Egypt are the only African states that have launched satellites. Of these, three are Egyptian, two are Nigerian and one is Algerian. South Africa has established bi-national and joint commissions on, amongst others, science and technology with African states such as Algeria, Egypt, Libya, Morocco, Nigeria and Tunisia.\(^61\)

Since September 2005, the South African DST provides free access for African organs of state and research institutions to products and services of the National Oceanics and Atmospheric Administration (NOAA), a US organisation, and the Moderate Resolution Imaging Space Spectro-Radiometer (MODIS). NASA launched a US satellite NOAA-18 in May 2005. The CSIR’s SAC supported NASA in the launch of this satellite, which will, amongst others, monitor radiation, the effect of ozone depletion, sea surface temperature and water profiles.\(^62\)

Two South African earth observation satellite systems (MODIS and Landsat) were inaugurated in 2004. Images and remote sensing data received from these systems assist African decision-makers in the fields of risk management, land use, crop yield monitoring, food security, grazing patterns and land degradation. One of the first applications of this technology was the development of an advanced fire warning system for the Southern African Development Community (SADC), namely the Advanced Fire Information System (AFIS). South Africa currently provides SADC governments, non-governmental organisations and research institutions with free access to Landsat images. These images are used in managing and decision-making in the fields of agriculture, forestry, natural resources, and geological
and hydrological applications. South Africa is also involved in Safari 2000, a survey of pollutants over the SADC region, that involves scientists from the SADC region and other international organisations.\footnote{63}

South African scientists working at SALT have regular contact with astronomers from Ethiopia, Kenya, Mauritius, Nigeria, Uganda and Zambia "to build awareness of SALT as an African facility". The SAAO cooperates with African scientists in the Working Group on Space Sciences in Africa, an organisation with 130 members from 25 African countries.\footnote{64}

South Africa's Wide Area Satellite Monitoring Information System (WAMIS) is a regional monitoring system that forms part of the country's national disaster management policy. WAMIS supports sustainable development in Southern Africa by providing data on disaster management, early warning systems, renewable resources, environmental monitoring, research and development.\footnote{65}

\textbf{10. CONCLUSION}

A former South African Minister of Science and Technology, Mangena, has unequivocally stated the country's space ambitions: "The core driver of this vision is the creation of a global astronomy hub on the African continent, one of several initiatives aimed at accelerating our transition from resource-based to knowledge-based economies".\footnote{66}

South Africa's co-operation in space affairs such as EO, remote sensing and satellite communications has reduced some of its vulnerabilities with regard to natural disasters and has generated economic opportunities. This article has outlined and analysed some aspects pertaining to South Africa's space interests, its national space facilities, programmes, industry and policies, and its space diplomacy. It is evident that the aforesaid provides a solid foundation to continue and expand its interests in this field. However, South Africa has re-entered the space arena at a time of considerable flux in the global arena as public and private actors are increasingly competing in this area, developing countries are upsetting the balance of space power, and signs of the continued militarisation of space are evident.

As a developing country, South Africa has some space facil-
ities that mostly originate from an earlier era. A shift in the government's stance on space science and technology is evident since 1994. Initially, it was regarded as politically correct to dismantle the country's space programmes and facilities as these were directly linked to the previous government. Thabo Mbeki's preference for international affairs opened the door for a renewed interest and involvement in this area. Not only have South African scientists continued with their work, but the country's international co-operation in major projects has increased significantly.

Domestically, a wide-ranging and inclusive policy process was followed to formulate an NSP, which includes the establishment of the South African National Space Agency. In order for the country to expand its space interests, the following, amongst others, need to be taken into account:

— Space science and technology is costly and should be applied to enhance human security and development.

— The NSP requires that governmental departments and agencies co-operate to implement the policy.

— South Africa needs to train space scientists to keep up with international standards.

— Apart from space scientists, South Africa requires skilled diplomats to represent the country's interests at multilateral fora and negotiations. Moreover, the country also requires scholars in International Space Law. The University of the Witwatersrand is the only South African institution offering courses in the latter.

— South Africa needs to sign and ratify all relevant treaties such as the 1974 Convention on the Registration of Objects Launched into Outer Space (the Registration Convention) and, despite the fact that it is not involved in any moon-related activities, the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (the Moon Agreement).

— Efforts should be made to develop a viable private space industry to attract much-needed foreign direct investment.

— South Africa needs to refine its space diplomacy. Although it has taken a leading role in some international organisations, it needs to expand its diplomatic efforts in this area. Space diplo-
macy can contribute to the country's international power and prestige, but can also be undertaken to enhance South Africa's national interests.

— Consideration needs to be given to the development of a space-based military capability.

Notwithstanding these issues, the South African government is clear on its space ambitions. South Africa remains scientifically and politically active in a number of important international initiatives related to space science and technology. Rapid technological developments and the increased commercialisation of space require a pro-active approach by South Africa. It remains to be seen which diplomatic course the country will follow under President Zuma. More importantly, it remains to be seen whether the South African government will be able to implement its ambitious NSP in such a manner that it becomes more than a mere politically-prestigious project. Preferably, it should represent a new dawn, rather than being a fiscal and political black hole.

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