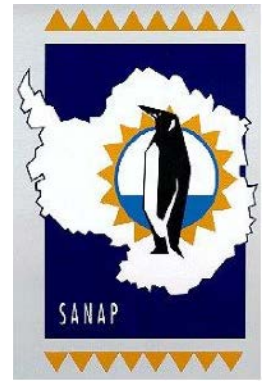




# 71° Below

SANAE 57 Newsletter  
July 2018



Greetings to all! Here is the latest newsletter, wildly late!! It has been a busy few weeks here, with a lot of outside work to be done now that the sun has returned and days are getting longer (although not much warmer yet!). In this edition you'll meet some more of the team and learn a bit more about some of the research at SANAE IV.

## Foster Mashele



From past ten years, I have been working in space technology industrial. I started as Satellite Operational Technician at SANSA Space Operations in Hartebeesthoek, District Krugersdorp then I was promoted to be Shift Lead Technician before I left for Antarctica. I was responsible for satellite tracking, telemetry and command also involved on the launch support when the satellite is been launched to the space for correct orbiting. Most Space Ops stations around the globe are 24/7 operational, same with SANSA Space Ops station is 24/7 operational as well, so I was working shifts, and that helped me a lot since I was able to further up my studies while working. I completed B Tech in Electrical Engineering from University of Johannesburg.

The first time I heard of SANAP programme was around 2013, SANSA Space Science were looking for volunteers for 2013-2014 summer take over, email was sent across the SANSA directory. I happened to applied, but after some research on the internet about Antarctica, what type of the place is, for example temperatures sometimes were dropping to -30 degree Celsius, being grew up in Limpopo province, northern part of South Africa where it's always summer throughout the year honestly I was not ready to come to Antarctica during that time, and fortunately I didn't make it for trip after I was interview. Fours later which was 2017 here is another Antarctica job advert, this time SANSA Space Science with Department of Environmental Affairs, were looking for over-wintering Electronics Engineers for 2018 expeditions. When I saw an email that was send across SANSA directory, I didn't bother by applying at first. Then two months later, the job was re-advertised, and that's when I decided to apply. The rest is history; today I'm here in most beautiful, hostile and isolated ice continent in the planet, Antarctica.

SANSA have two Engineers for every yearly expedition or overwintering namely Radar Engineer and Space Weather Engineer. I have been appointed as a Space Weather Engineer. I'm responsible for Very Low Frequency (VLF) systems, Magnetometer Instruments and Riometer systems.

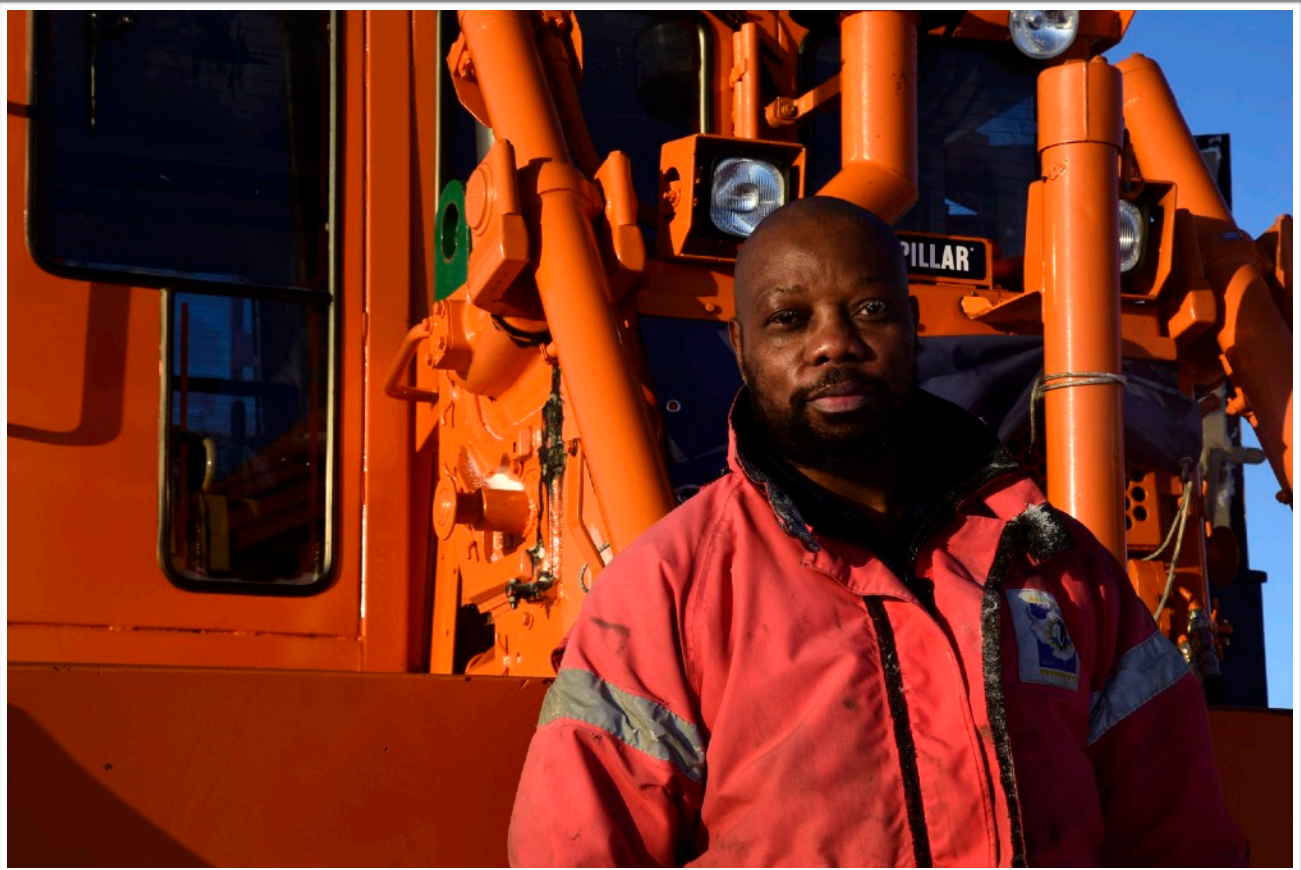
- The Very Low Frequency refers to the range 300 Hz - 30 kHz. We're talking about radio waves, like the AM/FM signals you get, just at an even lower frequency and these waves are useful scientifically because they largely reflect at the D region of the Earth's ionosphere (60-90 km altitude), and are thus efficiently guided in the Earth-ionosphere waveguide to global distances. On our planet, the most potent source of ELF/VLF waves is lightning, so a lot of what we do comes down to studying lightning and its various impacts on our Earth's environment, detectable even in Antarctica. We have two diamond shape loop antennas are facing North-South position and East-West position, that are used to receive this radio waves.
- The Magnetometer Instruments are used to measure the Earth's magnetic field that is constantly changing, when the sun emits charged particles that, on encountering the Earth's magnetic field, cause electric currents to flow in the ionosphere and magnetosphere. These electric currents disturb the magnetic field resulting temporary shift in the North Magnetic Pole's position and by constantly measuring the magnetic field, the Scientists are able observe how the field is changing over a period of years.
- The Riometer technique for examining electrons density enhancements in the ionosphere is based on the absorption of cosmic radio noise. Riometer measurements are usually made at Frequencies in the range of 20-50 MHz, the absorption of the radio energy at these frequencies are sensitive to change electron density in the ionospheric D and E regions. We have 64-Elements circular polarized dipole antennas that are used to receive the amount of absorption of the radio energy.

It's my daily responsibility for the systems maintenance, data collection or logging, data analysis, quality control, data archiving and dissemination of the data when it's required. Minimising the down time as much as possible though sometimes weather can be a challenge, most special for outside work.

Apart from all this responsibilities and expectations, I do have time to catch up with my family, phone call with my wife, and checking how my two daughters are doing.

The life at the base is fine and fun, even if we encounter challenges as Team, and we work together to overcome them. On the 26<sup>th</sup> July 2018, we had our first sun rise, after two months without seeing the sun and the experience was overwhelming. I have learned lots of things like cooking, which I used to disliked and baking. I enjoy most baking sourdough bread, thanks to Dr Will for the lessons. I have no regret with my decision of coming here; I'm better person than I was. Na khensa-(Thank you)!!!!!!!!!!!!!!

# John Skelete



Real Life Story: Johnsonian Manian Manyatsa Skelete

## [The First Moment of...The Seventies](#)

I was sure when The nineties would come to an end. They would end on December 31, 1999, at the stroke of midnight. I was a young boy at that moment, and my little sister Dionysiana and I were helping my Mom baby-sit for my Aunt Yolanda, who lived across tiny Agate Street from us. It was a big deal, as the decade would be changing, something I had never experienced, as I was too young the last time this happened.

## [What Is am I Thinking: A Career in the Military](#)

Physical training was the toughest thing ever in my military career, especial parachuting. Here I am referring to static parachuting, however I enjoyed doing so and graduated to free falling thereafter which was history making for military personnel as it was the requirement for the special Force units and I succeeded.

I went on to pursue my Technical Training, Urban warfare, Bush craft, Antiaircraft weapons, Foreign weapons, Guerrilla warfare, Methods of instructions, Junior leader and pathfinders which was unusual for technical personnel but worth doing it. I learnt to be responsibly, good leadership and diplomacy.

## [The Ten Second Lesson: Being Part of SANAP Program](#)

I joint the SANAP Program at the early age, as some says I have DEA's tag behind my ear which is a joke. I enjoyed all my expeditions both Marion Island/Prince Edward and SANAE. Being part of the program is a privilege and dream come true. Through the program I have learnt and still learning to survive, to be maturity, responsibly, courageous and caring. I have learnt to understand& appreciate team dynamic, cohesion and team participant. One has to accept to live in an uncivilized remote area with different people from different backgrounds, not to mention different views, which is a learn curve for all of us as we embarked on learning from one another's

cultures. I am a diesel mechanic at SANAE for 2017/2019. My responsibilities is to ensure that the power generation are taken care off. As we all know that electricity is source of life at SANAE, without it nothing operating. I enjoy my work as I understand what I am doing and I do it to the best of my ability. I love sharing ideas, through my skills, knowledge, expertise and experience this makes my daily task even more easier to carry out.

### [A Night to Remember](#)

Tonight is Monday evening, the first day of daylight savings time. My son KIM was born, January13,2013 that was the moment my heart fillet with joy. What I miss back home is being with him and seeing him growing up and off course I miss my toys. I cannot wait to go back home and integrate into the society and start living normal life again.

### [A Search for Truth](#)

I once read that between truth and the search for truth, opt for the second. I believe that sometimes, no matter how hard we search to find the truth, in the end, sometimes it just doesn't matter. I do a lot of research on my own about people, the work I am doing and off course the world I am living in. I writes a lot about life as I am traveller and I enjoy interacting with difference people. I have always believed that travel teaches you without a scorecard. It enriches you gently. When you step out to see the world – meet people, get acquainted with different cultures, taste new cuisines or simply breathe in an unfamiliar city – you learn a lot! It happens naturally – you don't have to try too hard. It's all about losing yourself into the arms of a new environment. You have to first shrug off the 'safe' and 'tried and tested' syndrome and delve into the unexplored with a free spirit.

Travel has taught me a lot. It has taught me so much that I am even keener to learn more through it. Let me share 10 things that I have learned from my travels so far.

Travel has opened my eyes to small, ordinary things of life- things that are undervalued, but have great significance. Now I am more conscious towards waiters, chauffeurs, florists, vendors and any random person whom I come across on my vacations. I have a deeper sense of respect for them, because they are the ones who make our travels smooth for us. I often make it a point to interact with people, and that makes my travel experience even more rewarding.

Now I have a much better perspective of life. I have come out of my shell where all I knew was my family, my relationships, my job, my struggles and my life. Travel has opened new doors for me – I can

### [Mission Space](#)

For the first 16 plus years of my life, I never got to appreciate life. Well, now I do and my mission space is to be successful in what I do and one day I will look back and say I have done it. "My goals may seem impossibly far-fetched when really they're not.

Break them down into steps and see how I accomplish great things.

I can easily reach from A to B.

I can manage from B to C.

I can then make it from C to D.

And so eventually, I will find my way from A to Z.

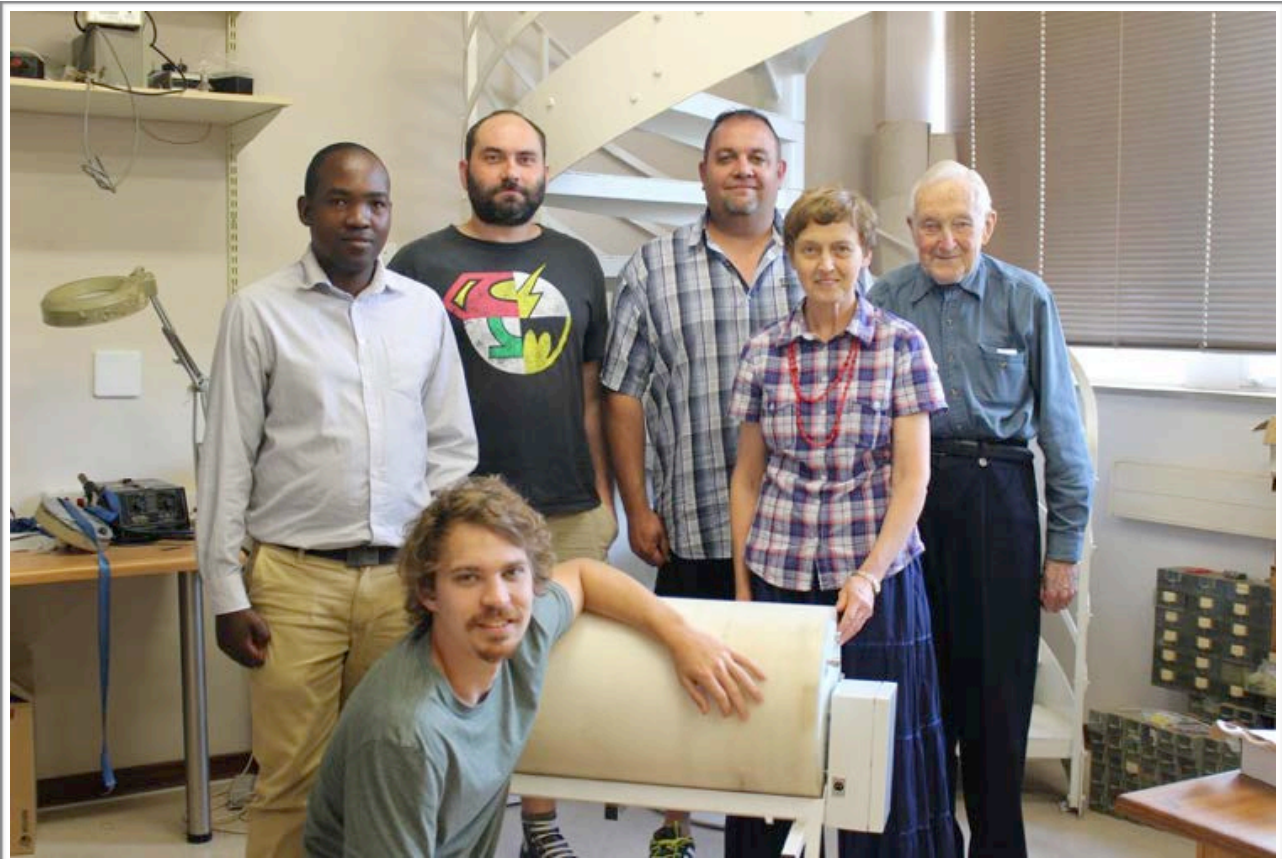


# Research at SANAE

The intention of this article is to give a brief summary of the research done by North West University's (NWU) Centre for Space Research (CSR) in Antarctica, why this research is relevant or interesting, how I fit into the picture and what my role will be during the year.

## History

The NWU is one of two South African Universities with long term scientific research in Antarctica. NWU has been involved with SANAE since 1964, taking the first observations of cosmic radiation at the base. A second set of neutron monitors were installed in 1971 and both sets are still running.



NWU team members from left: Godfrey Mosotho (PhD student), Du Toit Strauss (researcher), Corrie Diedericks (laboratory manager), Helena Kruger (researcher) and Pieter Stoker (emeritus professor). In front is Cobus van der Merwe (SANAE 57 expedition member), holding one of the cosmic ray detectors.

## Cosmic Radiation

The first thing to understand is that we are constantly bombarded by cosmic radiation that originates in outer space. These galactic events, like supernova, occur outside the heliosphere of our solar system sending these high energy particles, mostly protons, travelling through space.

Cosmic rays are affected by magnetic field. The Earth's magnetic field is one of the reasons we are able to exist on this planet. The energy associated with cosmic rays determine its magnetic cut-off rigidity. Therefore stronger magnetic fields will require higher energy levels to penetrate. The magnetic field is strongest at the equator and weakest at the poles. We can therefore expect to see more cosmic radiation events at the poles than at lines of latitude closer to the equator. Hence we have equipment installed at SANAE IV.

The second important thing to understand is the effect atmospheric depth has on cosmic radiation. Cosmic rays hitting the atmosphere are called primary cosmic rays. The primary rays collide with particles in the atmosphere. These collisions cause secondary particles as byproducts. The byproduct can be broken up into nucleonic components (neutrons and protons), hard components (muons) and soft components (electrons). The secondary particles then cause similar reactions when colliding with the next particle. Therefore creating what is called an "air shower". Since we have these "showers" which cause the particles to lose energy with each collision, the intensity of the cosmic ray at the Earth's surface is a function of atmospheric pressure.

The research done at CSR focuses on monitoring the nucleonic byproducts caused by cosmic radiation. Since these neutrons carry no charge, they will not react with matter by means of Columbic forces (Coulombs law; the force of attraction or repulsion is directly proportional to the charge on the particles and inversely proportional to the distance between the two charges). Another method must therefore be implemented to detect the presence of neutral charge particles.

The solution is to measure the reaction a collisions has on other atoms and molecules. A tube filled with an easily ionisable gas is kept at a high potential (2800V). The high-energy neutron passes through the tube and collides with the gas molecules. The molecule is hit with enough energy to release electrons from its valence structure, leaving a positively charged ion and an electron. The electric field created by the large potential prevents the ion and electron to recombine and pulls each one to its opposite polarity. The electrons reaching the anode will generate a pulse proportional to the energy level of the particle it collided with. These pulses are then recorded as events.

What am I doing here?

In a professional capacity my position as electrical engineer is to upgrade the old hardware and to automate the data acquisition and storage procedures. Since the initial installation in 1964, there have been upgrades to the hardware in the early 2000's. These are the systems currently running. Significant improvements in technology have brought us to the next generation of neutron monitor detection hardware. Previous systems only monitored pulses above a specified minimum amplitude. The new hardware will be able to register the profile of each pulse generated by the tubes and give us much better insight into the effectiveness and sensitivity of the tubes. The data will be sent back to NWU daily where they will monitor the tubes remotely. The data also gets uploaded onto the international neutron monitor database.

The reason I took the job is mainly for the adventure. I am a young enthusiastic individual who would jump at any opportunity to broaden my horizons and see what the world has to offer. I am determined to successfully complete my assignment here at SANAE IV and to use this as a stepping stone to more on to new adventures and challenges.

## **Weather News**

The weather this month was pretty stormy! We did see the sun for the first time but on the day the temperature was  $-49^{\circ}\text{C}$  (apparent temperature) which made the short walk we took outside pretty challenging!

Maximum temperature:	$-11.9^{\circ}\text{C}$
Minimum temperature:	$-36.0^{\circ}\text{C}$
Average temperature:	$-24^{\circ}\text{C}$
Strongest wind gust:	41.8m/s (150.5 km/hr or 81.2 knots)

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