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NEWSLETTER

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SUNSET

Antarctica certainly feels a lot like the cold and frozen South Pole we see on television. This harsh land cares not for our plans as warm and long days are less frequent. Storms and long nights are the norm, resulting in reactive measures prevailing as we push through the depot work outside.



Figure 1& 2: Fez and JC working hard outside.

As cold as it may get it is surely a joy to get to go outside after being shut in by the mighty polar storms. See how happy Innocent was:



Figure 3: Innocent enjoying a refreshing snow block

All is well inside SANA E IV base and one can be forgiven for forgetting that it's well below zero degrees outside. This comfort certainly makes it easier to celebrate birthdays as we did when Fez grew a year older on the 16th of April 2022. It was a wonderful day as we were treated to pizza and braai instead of the usual cake for the festivity.



Figure 4: Birthday man setting up his masterpiece

In this April issue of the newsletter we will get to know more about the birthday man as his star will shine bright this month.



Figure 5: Fez with his snowman

Tale of Mfezeko Rataza

1. How did you find out about this program?

I found out about this program in 2016 when I was working for CSIR(Council for Scientific and Industrial Research) helping with oceanographic research. I had also chat with some of the guys that were overwintering that year, that's how I learnt about the Antarctic programme.

2. What do you do here?

We are here in pursuit of scientific discovery; I'm one of two SANSA (South African National Space Agency) HF Radar and VLF engineers. I am responsible for managing over nine scientific instruments around SANAEIV (South African National Antarctic Expedition IV) base that gathers us the data that is used by scientist, students and researchers for their papers.

I have to make sure that the instruments are running, and recording good quality data. My role at SANEIV include maintenance, repair, development, service and monitor an array of 16 35-meter antenna, which act like a remote sensor looking into the highest layers of the Earth's atmosphere 300 km up, an area that is known as geospace or near-earth space and consists of the ionosphere (a dense layer of charged subatomic particles) and the magnetosphere (which is the magnetic field surrounding the planet caused by its spin). Our radar array is one of more than thirty similar installations located in the polar and mid-latitude regions involving 16 countries that together form an international scientific network of high-frequency (HF) radars known as SuperDARN project (Super Dual Auroral Radar Network).

This global set of "observatories" gathers information about the interactions between our geospace and cosmic radiation that bombards our planet all the time and processes this data to describe the characteristics of this radiation and its behaviour, which is collectively described as space weather. By combining the observations made from all over the planet we can accurately predict this weather and discover more about its nature, including how it affects the health of the planet in general.

Why is my job here important? Our HF radar array is situated in one of the best places on the planet to study the effects of space radiation because the earth's magnetic field funnels all of those charged particles directly to the polar regions and as a result they are at their most concentrated here. The reason we using HF radar are because the ionosphere bends or refract radiation and we can use it to look very far even over the horizon.

The principle on which the HF radar works is, it transmits rays and once the rays hit the ionosphere, the radio waves start getting bent or refract, so if you are in the polar region the magnetic field is more or less vertical. When you have a magnetic field trading a charged layer you get the charges clamping around the magnetic field by forming what

we call irregularities, these are waves in the plasma and the radar's primary target is field aligned plasma density irregularities. If these waves match the wavelength of the transmitted rays we get a reflection back to the radar. Those reflection carries out information that the scientist can use to determine if these reflectors are moving, which direction and their speed. This can tell us a lot about how much radiation is being produced by our nearest source of high levels of that radiation, namely the Sun, but it also tells us about sources of radiation that are further deeper into space. This is important because it can tell us a lot about the life-and-death cycles of faraway stars but it can also influence normal atmospheric weather which can allow better meteorological predictive models as well as helping to keep the world's satellite's out of harm's way from excessive exposure to high levels of high energy radiation which can damage their sensitive instrumentation. Also space weather can have a detrimental effect on our technology on earth, such as radio communication, mobile telecommunication, aircraft and GPS navigation to name a few. By understanding space weather we can mitigate the effect by predicting and issuing early warning to industries that use this technology.

3. What do you find most challenging about being in Antarctica?

The job involve learning about climbing techniques and rope work, because we have to go up these 30 meters antenna to service them whenever there is a breakage sometimes in very cold conditions (-15 degrees). Imagine trying to tighten a nut with your bear hands when frostbite start to occur after 2-3 minutes exposure.

4. How does your work add value to South African?

It promotes scientific awareness and research on the African continent because South Africa is the only African nation with a presence in Space science. It promotes African pride and it raises the international standard of our understanding of space.

5. Would you consider coming back?

We shall see

6. How do you spend your free time?

I spend most of my free time going to the gym, playing games with the team and reading. I love sport and I follow international football.

7. Who cooks the best food?

We have many good cooks; I'm very satisfied with the meals that we have.

8. What do you miss about being in SA?

I miss watching football and being around family.

9. How would you advice the kids in high school to do to get here?

Cultivate interest in science and focus on Science, Engineering and Technology subjects. Those subjects have a very broad application in many industries. Find what you love and stick with it.

10. Who is the most competitive?

Eric is the most competitive gamer and as for myself I'm a lover not a fighter.



Figure 6 & 7: Fez with His SANSA team by the Antennas

Thank you to Fez for the detail in his answers.

The long night beckons, what a sight it will be. That's all we have to share with you for this month but before we part let me leave you with this fun fact: I learnt this here Antarctica is actually a desert. Although it's covered by ice it's one of the driest continents on earth due to the lack of precipitation (rain or snow fall).

Goodbye

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