



SANAE 48 NEWSLETTER

Editor: Alan Huang, Johann Jamneck

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Alan Huang
Willie Nel
Erick Minnie
Charl Van Aardt
Johann Jamneck
Keith Browne
Nole Green
Rory Meyer
Joanna Thirsk

Charl se Storie

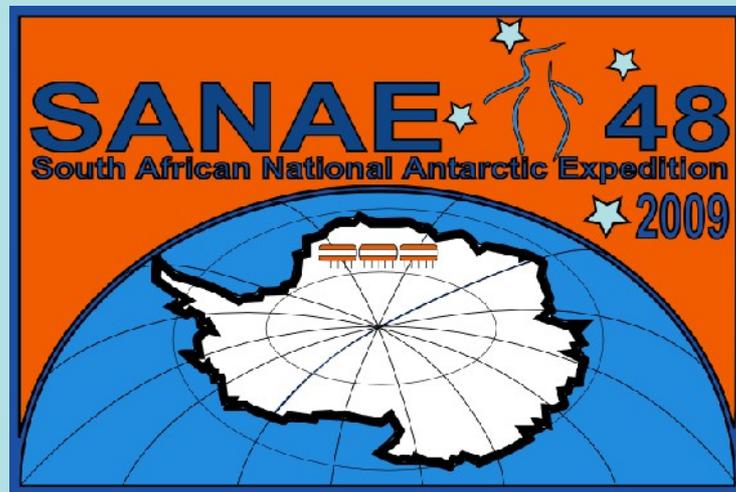
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A Word From The Team Leader

by Lötter Kock

Dear Family, Friends and all those interested in SANAE 48,

I would like to extend a warm welcome to take a peek into our thoughts and daily lives by means of this newsletter. This is our first issue (so hopefully it will be a collectors item in years to come) and a lot has happened since we left South Africa in December - here is a short summary of what we've been up to.

Departure and Voyage

First of all, thank you for all the family and friends giving us such a spirited farewell in the V&A waterfront, we truly appreciate the support and energy and I'm sure that it will help to carry us through this year.

Looking at the globe and from stories you hear, sailing to Antarctica really seems and sounds to be this almost impossible task – passing through the roaring forties, the furious fifties, getting stuck in the ice, the constant threats of icebergs, surviving the wrath of Neptune and one should not forget, overindulging yourself in three course meals three times a day! This might have been the case for previous voyages or just tall tales because to the naïve disappointment for many of us you could even have imagined we were sailing on the Gariep dam – the roaring forties was more like the flat forties and furious fifties the even flatter fifties. In leaving much later in the summer season we encounter almost no ice, and for the threat of icebergs – we have come a long way since the Titanic I tell you, state of the art radars

guides you safely through the sentinels guarding the ice continent. Now the wrath of Neptune, or rather the crossing the polar circle ceremony, is another story for another time. All I can reveal is that the temperature was not too far below freezing and the same goes for the water temperature! And I might add, the flour and eggs might have been used better for baking bread. All and all the voyage was very pleasant, almost too quickly over and I would like to thank the captain and crew for

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Photo 1: crossing ceremony

accommodating us over excited youngsters on the SA Agulhas.



Photo 2: ice berg (en route to Antarctica)





Takeover

After not more than two weeks all of us were finally at SANAE IV base, a record time I might add, ready and excited to jump in and start the work. Takeover is the period from when the ship arrives at Antarctica till it leaves again. During this time the base is an exciting, bustling anthill with close to ninety people trying to complete their work in about a month's time. They constituency comprises of DEAT officials, in charge of all logistic and coordinating basically everything, NDPW which is responsible for all upgrades and repairs to the base, scientists involved in a wide variety of projects (read more in later issues), two over-wintering teams, drivers and bulldozer operators (SANDF) responsible to bring the cargo from the ice shelf to the base and two chefs refuelling our bodies for the harsh conditions outside. For us, the over-wintering team members, it is truly a month of madness, all training must be done and in between all logistical tasks have to be completed – which leaves us with almost no time to acclimatise to the constant daylight and dry air, not even speaking about settling in. Needless to say, by the end of takeover we are quite ready for the 9 months of peace, alone in the most pristine, natural and peaceful environment probably on earth. Though also very sad to bid farewell to new and old friends, people with so much in common, your big family for the past month. It truly was an honour to be a part of this last takeover, personally I learnt so much and experienced things one may not experience in a lifetime, and I would like to thank everyone involved, not only for the

opportunity but also for the world of knowledge and life skills they taught us.

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Photo 3: takeover function



Photo 4: takeover function



Photo 5: VIP function





So what have we been up to since takeover then?

I wish I could say just resting but I'll be lying; Takeover usually ends with bang, in the sense that within a wink of an eye, everyone is gone and we can finally start to settle in and find our rhythm and ways to do things around the base. At the same time there is also a world's work to do in preparation for the winter.

Outside all the sleds have to taken to the winter depot area and put on 3 meter high mounds, all 23 of them, all vehicles have to be taken into the hanger of the base, it carries on and on. One feel that it will never end, one thing I have learnt here is that planning only goes that far because we are so dependant on the weather and things take twice as long as you plan, very frustrating at times.

Inside you have your normal responsibilities and then organising, packing, organising and repacking. But wait, I make it sound like that it is all work and no play which will be another lie. In between all of this work, which I might add is a new experience to most of us and loads of fun; I mean we are driving around in big D6 Caterpillar bulldozers; we also have time to explore the area around the base and have fun in the wind-scoop. You will hear much

more on this in next issues so please watch this space.



Photo 6: wind scoop

I would like to conclude this letter with our team motto, a though from our hearts and which we stand by: "We are here to experience and appreciate Antarctica to the fullest of our ability."

Kindest regards

Lötter

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Photo 7: preparation work before winter





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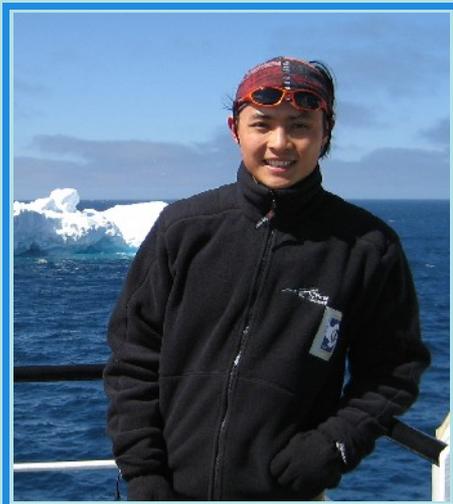
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Can not get enough of the outdoors – what better place to be then?

Alan (An-Lun) Huang



I was born in Taiwan but grew up in Pretoria. Ever since I was small, I've been living between the two worlds of Africa and Asia. As a result, I'm deeply in love with

traveling and always curious at what's on the other side of the ocean.

Whilst studying engineering at the University of Pretoria, I came across with a half-an hour guest speaker lecture on SANAE. This half-an hour lecture planted the seed of coming to Antarctica and SANAE. Needless to say, this dream has always been at the back of my head and never died. After finishing my studies and worked in the field of telecommunications for three years, I decided to pursue this dream and here I am, in Antarctica!

I'm the communications officer/electronics engineer responsible for SANAE's satellite, radio, local networks, computer and telephone systems.

Willie Nel



Willie Nel is from Marloth Park. Going from temperatures plus 50C to at SANAE IV minus 50C.





Erick Minnie



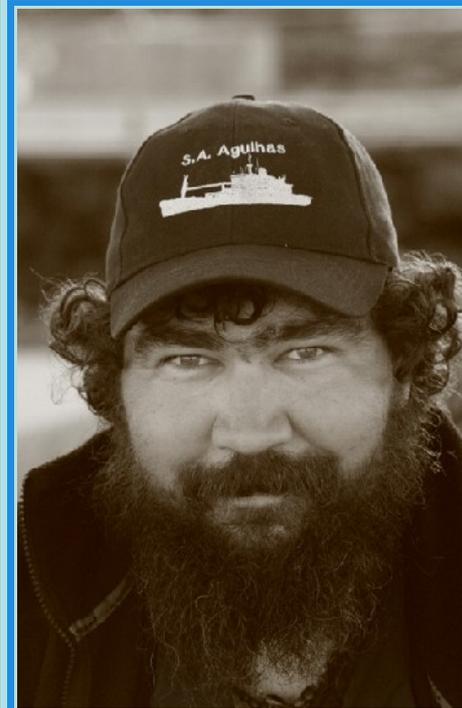
I started my studies in Computer Systems Engineering at the Vaal Triangle Technicon in Klerksdorp. 2 years later I decided to go for a full-blown B.Eng: Computer-Electronic Engineering qualification at the PU for CHE in Potchefstroom, and after 5 years I got the opportunity to go to Antarctica. It was more than pure luck, because so little people were interested to go and do what I had to do down there. So I first visited the continent and SANAE IV in the take-over of 2007-2008 where I had a brief introduction to what I was supposed to do in the following year. After I returned to the RSA, I met the love of my life, Mariné, whom I love very dearly and miss very terribly while I spend my year with a bunch of great team mates in SANAE 48. Everything I do, I do for Mariné and live my life for her, and so I got the chance of also doing my Master's in Electronic Engineering, ensuring a promising future for the both of us.

Mariné, I love you, and I miss you, and now it's not even a year before I come back to you my Love!

In the meantime, I concentrate on keeping things running for the Unit for Space Physics at the North-West University, including the neutron monitors we have here, as well as monitoring the magnetic field activity, aurora recordings,

riometer recordings and the monitoring of the local seismometer we have running for the CTBTO.

Charl van Aardt



Hi, ek is die een diesel mech vir S48 die jaar hier op SANAE en ex Marion 64. Dit is 'n groot droom wat waar geword het vir my en ek hoop die jaar sal net die beste ooit wees. Die voertuie is meestal my babas en ek hoop om soveel moontlik te leer van hierdie wit paradys wat ons huis is vir 'n jaar. As julle nog nie hier was nie, maak 'n plan om te kom. Julle sal nooit spyt wees nie!



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Johann Jamneck

"Born and raised on the highveld, Jo-burg to be exact. After matric I had the opportunity to experience four very social years at the University of the North-West before I became involved in the SANAP program. My year on Marion, the jewel of the southern Ocean, (M64) was the most profound and life altering experience so far for me as a young man, and as the old saying goes: "One good turn deserves another" so the logical thing was to sign up for another expedition. I have always had a fascination with the old "Terra incognita" so I was overwhelmed when the news arrived that I have been given the rare opportunity to lay eyes on the white continent. I have a healthy interest in all things wild and wonderful in this world of ours. Also keen on Photography and reading. I will be the meteorologist on SANAE during the S48 overwintering expedition of 2009."

Keith Browne



As a West-coast boy Keith matured roaming around the hills of Namaqualand as a magnificent specimen of human being, with an appreciation of vast open spaces and desert environments. After many years at Stellenbosch University being a professional student in electronic engineering, the call of the ultimate desert - Antarctica - became to strong and Keith responded by joining the SANAP program. Keith's main responsibility at SANAE IV is to nurture the SuperDARN radar, so that the radar continues to provide valuable scientific data to the international space physics community.





Nole Green



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Nole was born in Stellenbosch and grew up in Wellington, the heart of the Boland. After completed his Diesel Mechanic Trade Diploma at the Training Centre for Artisans, Bellville South, he joined the SANDF. He enjoyed 16 years of his life in the South African Army. He learnt of Antarctica, Marion Island and Gough Island expeditions when he was at the Army Battle School in Lohathla, Postmasburg. As a Warrant Officer in the S.A. Army, it was a difficult decision for him to quit his soldier career. But nevertheless, he couldn't believe his eyes when he explored the beauty of the wildlife and nature when got to Marion Island in April 2000 for his 1st over-wintering expedition. Since then the journey started. This is now his 6th over-wintering expedition (Three expeditions on Antarctica, two on Marion Island and one on Gough Island) and he is looking forward to his 6th snow bath on his birthday, the 27th of January 2010.

Rory Meyer



I'm in charge of the Hermanus Magnetic Observatory's magnetic sensors and GPS scintillation receiver. I also give the University of KwaZulu Natal a hand when their data collecting equipment gives trouble. The scientific data that this station gives on ionospheric and magnetic activity is well worth the effort taken getting here.

Despite being the youngest I was given the role of team crocodile wrestler, secondary soup maker, first team sauna goalie, DI measurement king, lime juice taster and the only person on team who can say GPS ionospheric scintillation with a straight face. Even with all these responsibilities I make time to go outside and enjoy the scenery often taking my camera with me.





Joanna Thirsk



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I was born in Johannesburg and matriculated from St Mary's School in 1999. As the daughter of an airline pilot I developed a firm love of travel from an early age. Seeking to combine my interests in both the humanities and science, I studied medicine at the University of Cape Town, graduating in 2005. Since then I have been working in various hospitals both in Johannesburg and Cape Town and have developed a special interest in emergency and wilderness medicine. I intend on eventually specialising as a paediatric emergency physician. Eager to use my profession to see more of the world, I wanted to join an expedition as a doctor and SANAE 48 presented the perfect opportunity. My interests include reading, music, travel, sailing and nature/the outdoors.

To find out more about me check out my profile on Facebook under "Jo Thirsk" or visit my blog: www.gonesouth.co.za





Charl se Storie

by Charl van Aardt

Almal wil nou 'n storie hê van my af. Nou goed, hier gaan ons. Dit was seker hier in standaard 4 of 5 rond wat ek die eerste keer iets gehoor het van Antarktika. Seker maar 'n Aardrykskunde onderwyser gewees wat ons daarvan vertel het. Mnr Kiesig of van Straten. Manne met dik brille. Nou watse plek is dit wou ek weet. Nee, se hulle toe, die plek is vol ys. Vol ys? Waar is dit? Die onderkant van die wereld, die Suidpool. Dit is erg koud daar ook se hulle. Kan nie wees nie. Daar in die Noord Vrystaat was die wereld vol mielies, nie ys nie en as dit wit geryp op 'n winters oggend was dit vir 'n laaitie darem maar die koudste plek op aarde.

Die gedagte het maar seker toe in die agterkop bly vassit want elke paar jaar hoor ek iets van die plek vol ys. Fast forward nou na 2006/7 en waar is ek? Op Marion eiland natuurlik. Dit was werklik soos 'n droom paradys, En ek was op pad Antarktika toe met 'n spoed.

23 Desember 2008 en ons staan op die SA Aghulas en waai vir die famielie en vriende want ons vertrek nou Antarktika toe. Ek gaan nou nie baie vertel van die vaart hiernatoe nie want dit was redelik stil en nie veel het gebeur nie. Al wat ek kan se is dat dit nie lekker is om 'n maand lank op 'n skip te sit nie. Die beste was om een oggend wakker te word en 'n ysberg te sien. Eers sulke klein blokkies ys en toe begin hulle groter word. Ons ariveer toe by die yswal, en toe begin die wag. Wag vir die weer om beter te word, wag vir die ys om te smelt wag in die

algemeen om basis toe te gaan. Weereens gaan ek nou nie als daaroor vertel nie want om alles neer te sit op papier wat in daai paar dae gebeur het gaan die Amasone se bome kos om papier te maak.

So kom ons toe by die basis aan. SANAE IV basis. Ons huis vir die volgende jaar of wat. Goed word so stuk vir stuk afgelaai van die skip af en die Challengers begin hardloop. Caterpillar Challengers. En dit is nou my babatjies. 4 Challengers, 4 D6 Caterpillar's en 'n D4 met 'n handjie agterop wat onshier op basis het. So, nou het julle my eerste storie. Volgende maand vertel ek julle van die basis en my karre!

Cheers vir eers.

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Radar Construction

by Keith Browne

On the 2 July I was told the radar antennas at SANAE had been blown over. This changed my job in an enormous fashion. Now instead of the small calibration project we would be rebuilding the antenna at SANAE. A monumental task, considering the little time there was to prepare and my total lack of experience in working at SANAE.

The radar at SANAE forms part of the SuperDARN radar project, where 17 radars spread over the Southern and Northern hemisphere in the high latitudes monitor the convection of the earth's magnetic field by monitoring coherent scatter from the earth's Ionosphere. The radar's are all of a very similar design operating over a frequency range between 8 to 20 MHz. The radar uses a phased array of 16 antennas to produce a narrow beam. The narrow beam is swept over the field of view of the radar to create a high resolution image of the changes in the magnetic field. The field of view is typically 52° with the beam width varying from 2° to 6° depending on the frequency the radar is operating from. The range of the radar is approximately 4000km effectively the radar scans two thirds of the Ionosphere above the Antarctic continent.

The radar was built at SANAE at the end of the construction of the base and has been operating since 1997. During this time the antennas have been plagued with problems. In short the log periodic design of the original antennas is not suitable to the high wind environment that exists at SANAE. The original masts did not survive the first year and were replaced by strengthened masts a year later. In that year the booms were damaged and subsequently replaced by strengthened booms. Since 2000 no major damage has occurred to the masts, although regular replacement of the antenna elements has been required after storms, a tedious task at the best of times made worse by the freezing conditions.

During a storm with winds of up to 185km/h a rock anchor for a stay rope, on one of the antennas broke. In the carnage that followed the falling antenna damaged the adjacent antenna's stay wire causing it to fall. The ensuing domino effect flattened 15 of the 16 antennas.

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Photo 8: old antennas



Photo 9: Flattened antennas





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Back in South Africa there was a scurrying to set in motion the reconstruction of the antennas. The radar at SANAE provides important data for the Southern Hemisphere component of the SuperDarn project. It was decided to change the design of the antennas to the new design adopted for the SuperDARN radar. The Twin Terminate Folded Dipole (TTFD) antenna.

The TTFD design is a wire antenna with a very low wind cross section making it ideal for the windy site at SANAE. The design was adopted by the SuperDARN group for its low-cost construction while offering similar performance to the old log-periodic design. After funding for the new antenna was secured tasks were dished out to the radar team. Llewellyn the radar engineer based at SANAE would clear the site of the old antennas and much of the debris, while myself and the staff at the HMO (Hermanus Magnetic Observatory) would complete the design and manufacture as many of the components as possible. Time was short, with Aghulas leaving for the relief voyage in 6 months time.

Luckily, by the time the Aghulas left Cape Town all the materials needed were aboard and we were ready to rebuild the radar. To assist with the building a number of the students at the HMO were roped in to act as manpower for them the adventure to Antarctica would see them toil for many hours outside in

the inhospitable environment.

After an uneventful voyage on the Aghulas we arrived at the ice-shelf. The first hurdle was getting the new masts to SANAE. The 16, 18m long masts were shipped in two crates each containing 16, 9m sections. 9m is just too long to be comfortably transported on the sleds. Even with the masts crated some special packing material was required to support the masts on the sled. The drivers of the land train taking the sleds to SANAE warned us that the masts would probably be damaged on the rough trip to SANAE.

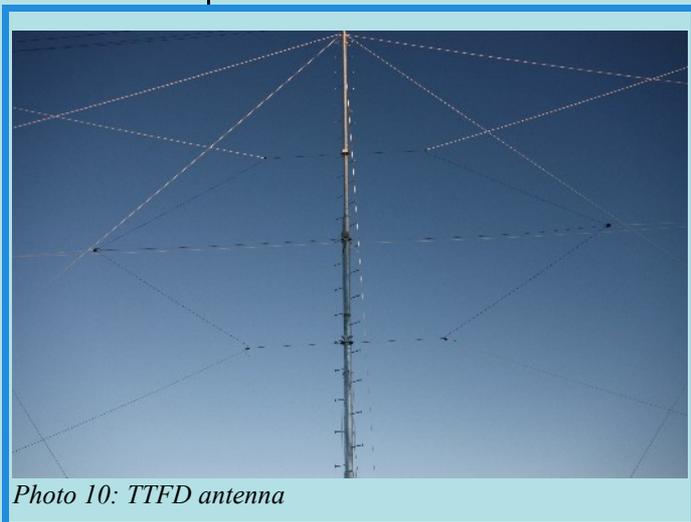


Photo 10: TTFD antenna

The masts left for SANAE and the rest of us waited on the ship for good weather to be flown to the base by helicopter.

I arrived at the base, a couple of days after the rest of Team RADAR, they had already begun work on the site. I received a horrible shock when I saw the site.





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The mental picture that I had taken from old photos of the radar was of a rocky area with shallow snow around the site. The debris of the old antennas had changed all that. The debris had caused the snow to build up around the site, covering everything in a thick layer of snow which had already begun the transformation into ice and was quite hard. The plan was to use the base pipes from the old masts. Repairing the base pipes by cutting off the damaged portion and welding in the new mast on top. The extra snow that accumulated meant that now most these base pipes were under between 1 and 2 meters of snow. There was no other option but to dig them all out. In Antarctica this can be a relatively futile task, one little snow storm and all your hard work would be undone. With some luck and many sore bodies we dug out each base to a point where our NDPW (National Department of Public Works) welder Wessie could get into the holes with enough comfort to start the reconstruction.

The construction of a mast is as follows: The old base a pipe of 300mm in diameter, which was sunk up to 3m deep into the rock and ice mixture that forms the ground on the site. The old base pipes were repaired by cutting off the damaged section. A machined pipe starter section was then welded in place in the base pipe extending the base pipe and providing anchor points for the stay ropes and a mating section for the mast to be slipped over. On top of the starter section the mast would be welded in place. Before this however the two sections mast would first be joined and then cut shorter to ensure that the tops of

the masts would all end up 17m high, an important detail to ensure that the radar formed accurate beams. Each mast has 8 stay ropes, 4 on the top and 4 in the middle. The ropes are attached to the mast before it is raised and used to stabilize the mast while it was erected. While Wessie was welding in the starter sections, the rest of the team cleared as much of the debris as possible and cleared holes around the bases as Wessie needed them.



Photo 11: Wessie welding in Starter sections

Once the starter sections were all in place the arduous task of assembling the masts began. This required the whole of TEAM RADAR to lift up a section of the mast and carry it placing it on a sled that was used as a work bench.





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The lower sections were first placed on the sled followed by the upper section. The masts were welded together and trimmed, then in groups of three they were placed on the starter sections and the stays tied down.



Photo 12: Man-handling the mast sections

Erecting the masts was a difficult job. First the mast is raised with a crane a lifted over the starter section, then lowered till the mast made a correct fit on the base. The hassle though was that the masts were galvanized. A thick layer of galvanizing on the inside of the pipe meant that the inside of the mast at the joint with the starter section had to be ground down to fit. This entailed fitting the mast to the starter and if it didn't fit lifting the mast off grinding fitting and grinding until the mast slipped over the starter section.

All of this made worse by wind blown the mast out of position while we were trying to lower it and by ice forming on the starter sections, clogging up the pipe as it was slid on.

During the stormy weather we were having while the masts were being erected when work outside was impossible, as much work as possible was completed inside the base. For instance all the ropes for

the stays and supporting the antennas were cut, the elements for the antennas were manufactured and the loads and baluns were prepared for mounting on the masts.



Photo 13: Grinding out the Galvanizing



Photo 14: Patrick assembling antenna elements





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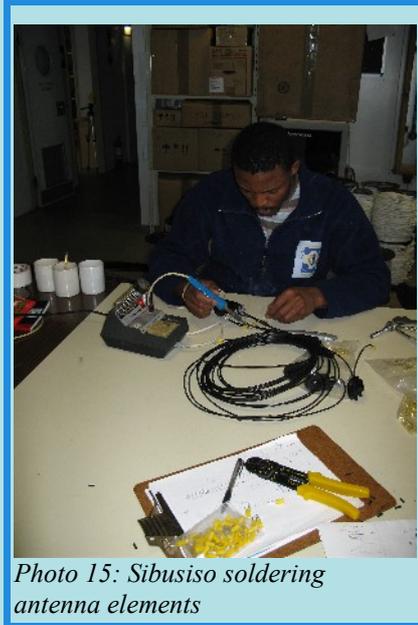


Photo 15: Sibusiso soldering antenna elements

With the major work in erecting the mast done the big clean-up started. All remaining bits of the old antenna had to be removed. This task was made more interesting by the fact that most of these bits of debris were partially buried under the snow. So with much dozer work and manual digging, hauling, pulling and grunting most of the previous antennas was retrieved and loaded into a container ready for shipping back to South Africa.



Photo 16: Clearing the debris

Erecting the antennas involved climbing up the mast attaching the loads and balun to the masts. While this was being done the rest of the team assembled the trunking for the feeder cables. Then the reflector was put up. Using the man-basket on the crane the reflector wires were lifted up and clipped into place.



Photo 17: Putting up the reflectors

All that remained then was putting up the elements of the antenna. For this a call went out to all people interested in climbing up the masts to come and help put up the elements. Time was short the relief voyage was almost over and there was still much work to do before the radar could be switched on. In one day the element for 7 of the antennas were raise and attached to the loads and baluns.





Sadly bad weather moved in in the last 4 days of the relief voyage no more work was done on the radar. With the workforce drastically reduced progress slowed. Stringing up the antennas and final connecting took some time, some frost nip and many trips up and down the masts.

During the final work on the antennas two large storms occurred with wind gusts up to 70 knots. After the storms I was relieved to find that the antennas had suffered no damage. So far the new design has proven resilient to the windy conditions.

On the 1 April 2009 the radar was switched on again, 9 months after the previous antennas were destroyed.

This feat owes much to the time and support of many people. I would like to thank the NRF for the financial support for the new antennas, DEAT for the logistical support, The staff at the HMO for designing the masts and supporting the ordering and manufacturing of the components, Wessie and the dedicated guys from TEAM RADAR Zolile, Patrick, Kenneth Sibusiso Sadha, Lindsay and Lewellyn



Photo 18: Team Radar

A word from the team leader

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Nole Green
Rory Meyer
Joanna Thirsk

Charl se Storie

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Once I had a dream, and this is it... "Bright light, white night"

Below Freezing: Surviving Extreme Cold

Sponsors





Weather Statistics

by Johann Jamneck

WEATHER STATS: January 2009

	Maximum		Minimum		Average
Pressure	892.2	3 rd Jan	866.8	29 th Jan	883.3
Temperature	-2	27 th Jan	-14.1	27 th Jan	-7.7°C
Humidity	100%	6 th Jan	18%	12 th Jan	72%
Wind Gust	32.6 m/s	19 th Jan			
	117 km/h				

WEATHER STATS: February 2009

	Maximum		Minimum		Average
Pressure	896.5	2 nd Feb	861.4	20 th Feb	882.4
Temperature	-2.7	5 th Feb	-21.8	18 th Feb	-12.1°C
Humidity	95%	22 th Feb	27%	3 rd and 12 th Feb	6200%
Wind Gust	27.3 m/s	22 th Feb			
	98.2 km/h				

WEATHER STATS: March 2009

	Maximum		Minimum		Average
Pressure	892.8 hPa	20 th	857.4 hPa	16 th	880.2 hPa
Temperature	-7.1° C	3 rd	-25.9° C	30 th	-14.9°C
Humidity	95%	5 th	22%	20 th	67%
Wind Gust	37.2 m/s	16 th			
	134 km				

WEATHER STATS: April 2009

	Maximum		Minimum		Average
Pressure	908.7 hPa	30 th	864.8hPa	10 th	883.6 hPa
Temperature	-10.1° C	30 th	-31.7° C	30 th	-18.9 °C
Humidity	91%	5 th and 28 th	21%	26 th	71%
Wind Gust	40 m/s	28 th			
	144 km				

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Once I had a dream, and this is it...

"Bright light, white night"

by Johann Jamneck

"And so begins another journey in my life, what the Master Magician will reveal this time is an enigma, these sort of adventures really takes you through the highs and lows of reality as not many a fellow will ever know about. Building character is a strange sort of business. Just when you think you have got the way or the knack the whole board game changes and in these places, so the people too..."

After we left Cape town on that very ominous day in December, drizzle and real manky weather accompanying our departure I wrote the above words in my dairy, little did I know what I was in for...

Since the great age of exploration man always had a fascination with the south, "does a great unknown southern continent really exist, to balance out the landmass of the northern hemisphere", like the ancient Greeks believed, and if true, what would it look like and what would be found there? Most men saw it as stories of ancient times with not much truth or value in it and most of them didn't even give it much thought. "Who cares what the bottom of the world looks like?" Yet, for some men the allure of the south was just too much, and so started the last chapter in the great age of exploration, to go where no man has gone before, with visions of glory, honour and reward in their mind's eye. What they found on their southern journeys was cold, discomfort and hardships, and sometimes not even

dry land...

Luckily my own southern journey turned out not so bad, in fact quite well, here I found Oom John's food, adventure, friends and the love of all things wild and wonderful, I found a wonderland full of contrasts, static, yet always moving, strikingly harsh, yet filled with tranquil peace, inviting, yet so unforgiving, clear as a bell yet muted by an unknown ever present mystery. Coming down to Antarctica is an extremely rare privilege and nothing in the world can prepare you for what you are about to experience. You can't go outside on most days, at least not for a long time but when the weather is good and your outside, the scenery is breathtaking and you lose yourself in the beauty of this white land, unclaimed and untamed. Just to be able to experience that, I say is worth sitting here for year. There is nothing here but that in itself is what makes this place unique and special. It can be the most pristine and charming place the one day and the next Mother Nature lets all hell loose. I sometimes sit and wonder as I gaze out over the ice plain, feeling the icy wind in my spine watching a storm rage in the distance over some nunatak (exposed ridge or mountain top), and wonder what great crime this land committed to be punished like this, where God lets all his anger and frustrations go.

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The place is strange in a way that I struggle to describe, you feel so in tune with yourself here, it touch with yourself, your longing, fears, hopes and dreams, so vivid!

On the not so serious side of things, "the frozen chosen" has had a really lovely time on the ice so far, when we are not working... and the weather plays along we go to the wind scoop. I'm very proud to say than I now can snowboard very far and very fast in a very straight line, that is to say if the contrast is not bad and I'm able to see the sastrugis on the slope. I have been down in a crevasse and almost died of exhaustion climbing back up. I have been on a week-end camping trip, I have been on a day trip, had a braai and "dop" on the ice, and took some nice photos in very demanding conditions. It all adds to the bigger experience of being here, that is the good times that you will remember, but it is the times when you can barely see through your snow goggles, your

the shocking cold, feeling the dry air burning in your throat, your whole beard full of icicles. Those are times that when you think back you love the most dearly because you know you will only find it here and nowhere else.

Perhaps the biggest contrast and irony of everything, that really gets to people, has them mystified and baffled, leaves them confused is the fact that this frozen, lifeless and utterly deserted place finds a way and warms people's hearts, melts their emotions and resides along with all things we cherish and hold dear.

The coldest place in the world has found a warm place in my heart. What I have seen here only leads me to one conclusion, that the Lord is great and wonderful; forever may it remain so in my heart and spirit.

That is it for now till the next issue. Strength and honour!



hands having sensation is something of the past, and when it finally comes back from the heat of your armpits it feels as if your hands are burning on hot plates, you shiver constantly because of





Below Freezing: Surviving Extreme Cold

"Keep cool, but do not freeze." - From a mayonnaise jar, but also makes a good overwinter rule.

By Dr. Joanna Thirsk

It is a humbling experience to travel down here and begin to realise how feeble and ill-equipped we, as human beings, really are when faced with the extreme elements that define the



Antarctic continent, our new home. And as winter sets in, one is made even more aware of this fact as temperatures plummet and wind speeds buffet the base. Humans are essentially tropical animals and are not equipped to deal with even mild cold. We need a core temperature between 35-39°C to function normally. A naked human will start to feel cold if the ambient temperature merely drops below 25°C. In this article, I will provide some interesting facts on what happens to our bodies when we



confront the cold as well as the very real dangers of our freezing environment and what can happen if proper prevention is not exercised.

How do we become cold?

We lose heat via conduction, convection, radiation and evaporation. Thus in order to protect ourselves we need insulation (conduction), protection

from the wind (convection), clothing to limit radiative loss and a good wicking base layer to wick away perspiration (evaporation).

How do we survive life in the freezer?

A variety of mechanisms are needed to keep us warm. Most importantly are our behavioural adaptations such as wearing appropriate clothing and building shelters which makes us the most adaptable of animals. Successful survival also requires that we burn appropriate food to generate sufficient body heat and it has been said that hunger and hypothermia march hand in hand. The increase in calorie requirements can be dramatic in severe cold. Shivering and the diversion of blood from the skin surface by constriction of blood vessels are physiological responses we use to conserve heat and will be outlined shortly.

What is the lowest temperature that can be endured?

This is difficult to say as this depends on the duration, extent and medium of exposure as well as endogenous factors such as age, body fat and presence of illness or injury. A well nourished adult can maintain their core temperature in still air at just above freezing wearing only light clothing because of the physiological responses mentioned above.

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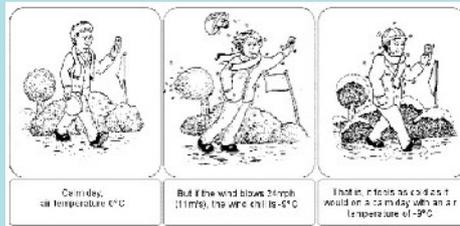
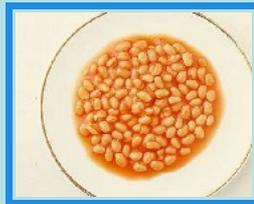
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In moving air and wet conditions, the picture changes entirely and if one's extremities fall below freezing then frostbite occurs. Conductive heat loss is 25-35 times faster in water than in air.

The wind chill factor

This refers to the cooling effect of moving air and gives the effective temperature at a certain wind speed. Paul Siple, an American, coined this term after doing experiments in Antarctica in 1941. He measured how long it took water to freeze in baked beans tins in different strengths of wind and at different temperatures. Antarctica is the coldest and windiest continent so wind chill plays a huge role in our perception of the cold. In fact 40% of our heat is lost if wind speed exceeds only 3km/hr!



What happens when we start getting cold?

We become useless....

Functionality becomes impaired when we get cold. A typical example is the way in which one's fingers cannot perform simple tasks when they become cold. Nerves and muscles slow down when they are cold. Manual dexterity plummets under only 12°C air temperature and touch sensitivity starts disappearing

under 8°C.

We pee....

Urine production increases when we get cold as the volume of the circulatory system is decreased and therefore blood pressure starts to increase. Thus the body responds by getting rid of fluid - the so called "cold diuresis."

We eat....

Cold stimulates the appetite and increased food intake leads to a higher metabolic rate and enhanced heat production. Eskimos have a basal metabolic rate 33 percent higher than Europeans and eat a very high protein diet.

We look sunburnt....

I mentioned previously that our skin's blood vessels constrict to preserve heat but why then do we all look so ruddy and healthy after an outside excursion (it's not the alcohol!)? When skin temperature falls below 10°C the surface blood vessels dilate and then alternate with periods of constriction so one doesn't lose heat but at the same time the skin still receives blood flow.



This doesn't continue forever and eventually the skin drops to the outside temperature and one is at risk of frostnip/frostbite.





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We get "horripiled"....

Horripilation is the scientific word for getting goose flesh. In humans, unlike our hairy counterparts, the contraction of the small muscles attached to our hair follicles has no effect on insulating us as we have so little hair.

We shake and move about....

Muscular contraction when we shiver produces heat as a by-product. Shivering actually increases the production of heat 5-fold. Heat is also produced through voluntary exercise

Then we start losing body parts.....

When the body starts losing more heat than it can make to keep the body temperature at 37°C then the ears, nose, fingers and toes (and cheeks) receive less blood flow and so become cooler. If those parts were to be kept at body temperature they would need extra blood flow and because of the high surface area to volume ratio the heat loss would cool the blood substantially and on its return to the core would decrease the body temperature further. In situations of extreme cold and prolonged exposure frostnip and frostbite occur. The end result of this is to ensure that one doesn't die of hypothermia.

Frostnip

The skin turns white and sensation is lost as there is no blood flow. At this stage, it is correctable but if nothing is done about it frostbite

will ensue. One may not be aware of it on oneself and so your buddy may need to warn you of it. The surface layer of skin freezes and upon warming the skin can turn red and may eventually slough off as in what happens in a case of sunburn but no permanent damage results.



Frostbite

Superficial

Here the skin and underlying tissues' temperature falls below freezing point and ice crystals form within skin cells and tissue fluids killing them. The freezing point of human tissue is -0.5°C. On rewarming, the skin swells, blisters form and eventually the skin turns blue-purple and then black and hard. This can be very painful. In a case of superficial frostbite, new skin grows underneath the damage and the dead layer may slough off.

(Please note all frostbite photos below are NOT taken from SANAE 48 team members.)

What do you get when you cross a snowman with a vampire ?
A: Frostbite





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Deep

Here the deeper layers of muscle, bone and tendons are affected and permanent damage results which may eventually need amputation.



Hypothermia

This occurs when core temperature (the temperature deep in the chest and abdomen) falls below 35°C and happens when the body is unable to stay warm despite shivering and constricting blood flow to extremities. The metabolism slows, thus at a temperature of 20°C only

Some notes on rewarming...

Some interesting points arise during treatment/rewarming. Treatment of hypothermia is not merely a matter of getting the patient warm. Without going into too many details on treatment, I will just mention a few peculiar features pertaining to resuscitation in the hypothermic situation.

Afterdrop

Firstly the interesting phenomenon known as afterdrop comes into play which fascinated the rest of the team when I first told them about it. Although I think it was more due to the ascribed name which sounds similar to a term one might use to describe a hangover - "afterdop"! When cold arms and legs are rewarmed, their blood vessels quickly dilate and the cold blood gets dumped back into the body's core and the core temperature goes down yet further with this rush of cool blood entering it.

Classifications of Hypothermia	Clinical Presentation
Mild (>35°C)	violent shivering, numb hands, reduced dexterity, tiredness
Moderate (30-34°C)	onset of progressive mental confusion and disorientation, below 32-30°C shivering stops and there is loss of consciousness at 30°C
Severe (<30°C)	<28°C rigidity, heart rate/breathing slow to almost undetectable, icy, pale skin, stiff limbs, can develop cardiac arrhythmias if handled roughly, pupils dilated and unreactive - SEEM DEAD...BUT NOBODY IS DEAD UNTIL WARM AND DEAD! <25°C spontaneous ventricular fibrillation; and cardiac arrest at 20°C

20% of oxygen that would have been required at normal body temperature is needed. Thus the person enters a state known as the "metabolic icebox" where he/she appears to be dead.





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Afterdrop is experienced to a small degree every time we enter the base after being outside and may result in you feeling colder than you did outside! In basic terms, this means the safest way to heat up would be to warm your core in a hot bath with your legs and arms hanging out rather than by warming your hands against the nearest heater, although the concept of afterdrop is not nearly as important to consider here as it would be in moderate-severe hypothermic states.

Handle with care

Another fascinating point to note is the gentle handling of the severely hypothermic patient. Any procedure like the insertion of a



drip or CPR may cause the heart to go into the abnormal rhythm of ventricular fibrillation which provides no perfusion of blood to the body. The usual treatment of such a rhythm is to "shock" the heart and this may in fact not work in the hypothermic patient until he is rewarmed.

Rewarming frozen tissue

In terms of local cold injury, it is important to note that injury occurs on rewarming. Fluid seeps out of leaky blood vessels and sludging of the cells left behind decreases the blood flow and causes more cells to die. It is for this reason that if there is a chance the body part will freeze again it is best to keep it frozen until definitive care is reached.



A quick note on the clothing we use (more on this in the next newsletter)

Clothing needs to keep the body warm, allow for the dissipation of sweat, be comfortable and allow for flexibility of adjustment. In modern times, we use the "layer method."



Photo 19: We use a foundation/base layer: synthetic layer, soft, dry comfortable and able to wick away perspiration quickly.





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Photo 20: Next is the insulating layer/s: adjusted according to conditions in several lightweight layers to trap air and create insulation. Wool, polypropylene fleece are used and zips and draw cords allow for varying ventilation



Photo 21: Outer shell layer: Needs to be windproof +/- waterproof and may also have extra insulation within it such as down



Photo 22: Hands, fingers and toes..... "When your feet are cold, cover your head." -Inuit saying

The head can lose up to 20% of the body's heat and so putting on a beanie can be a very simple method of warming oneself up. Hands and feet are always in danger due to the reasons discussed previously. The layer method is also used on these body parts. Gloves and boots can become very cumbersome when its cold. With winter upon us, we are wearing mittens instead of gloves and putting on our "pampoenskoene"- Onitsukas with thick plastic soles, felt insulation, insoles and nylon outers.



Photo 23: Some facial hair always helps





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Photo 24: 4. And the bits in between.... Wrists, ankles and neck are easily forgotten about but can lose lots of heat carrying blood between the well insulated core and extremities. So wear long boots, mittens and a scarf, beanie muff or balaclava



Q: How do you keep from getting cold feet?
A: Don't go around BRRfooted!

Prevention of Cold Injury

To Stay Warm Remember The Word C-O-L-D

C - Cleanliness and Care: Feet, Socks, and clothing are warmer when clean. Constant foot care is imperative.

O - Overheating: Prevent overheating by adjusting your clothing to the job being

performed.

L - Loose and Layered: Loose-fitting clothing insures good circulation and insulation. Clothing in layers assures air spaces which hold body heat. Again, allows the person to adjust the number of layers to the temperature and activity being performed.

D - Dampness: Any wet garment is a cold garment, just as tight-fitting garments are cold producing garments. Keep clothing dry.

Did you know?

The average general population's mortality rate is 15% higher on a winter's day than a summer day. However, when a cold snap hits a normally warm city the mortality rate will be much higher than the same temperature at a colder city



because of prior adaptation. Watch this space....SANAE 48 will be walking around in t-shirts next take-over while the new team will be in their freezer suits! It is also no myth that a regime of regular icy baths assists in adaptation to a cold environment.





Women are least at risk of hypothermia because of a higher gradient of temperature from skin to body core but are more likely to suffer from frostbite. Think of the old adage - cold hands, warm heart. Of course their extra subcutaneous fat, compared to men, also plays a role in insulation. Children are more likely to survive hypothermia as they cool down quicker with their large surface area to volume ratio and enter the more stable 3rd stage of hypothermia quicker thus protecting their brains during cardiac arrest.

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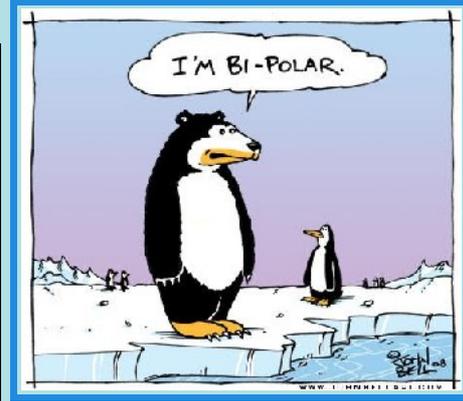


Photo 25: tanning on the ice shelf (SA Agulhas in the background)

The lowest core temperature recorded for an individual who survived accidental hypothermia is 13.7°C.

The lowest temperature ever recorded anywhere on earth, -89.2 C was on July 21st 1983 at the Russian base, Vostok on the Antarctic icecap.

The highest energy expenditure (11,650 calories/day) recorded in man occurred on Ranulph Fiennes and Dr. Mike Stroud's trans-Antarctic crossing due to severe cold and extreme physical exertion. Compare this with the 2000 - 2500 calories/day that is more than sufficient for our normal sedentary lifestyles!



Polar bears finally migrate to Antarctica





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Cartoon: "Polar bears finally migrating to Antarctica"

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Cartoon

"Snowman/Global Warming"

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Frostbite photographs

Life in the freezer- Cold: Homeostasis, Prevention, Exposure and Injuries, 2007. Powerpoint Presentation by Dr. Ross HOFMEYR.

Rest of photographs

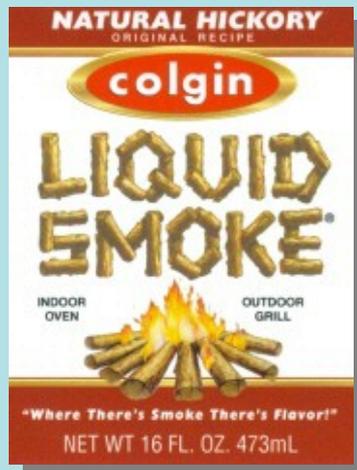
Taken by Dr. Joanna Thirsk





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