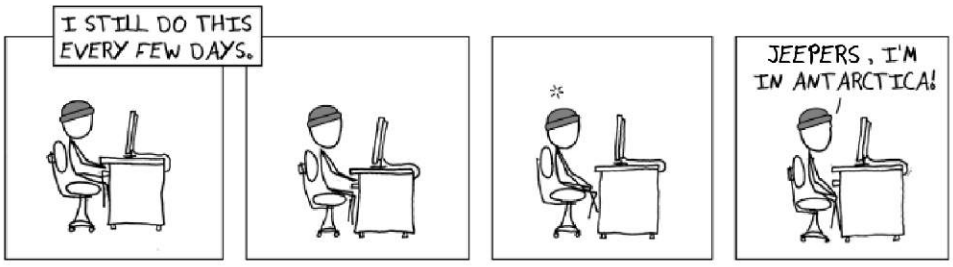
SANAE 50 Newsletter

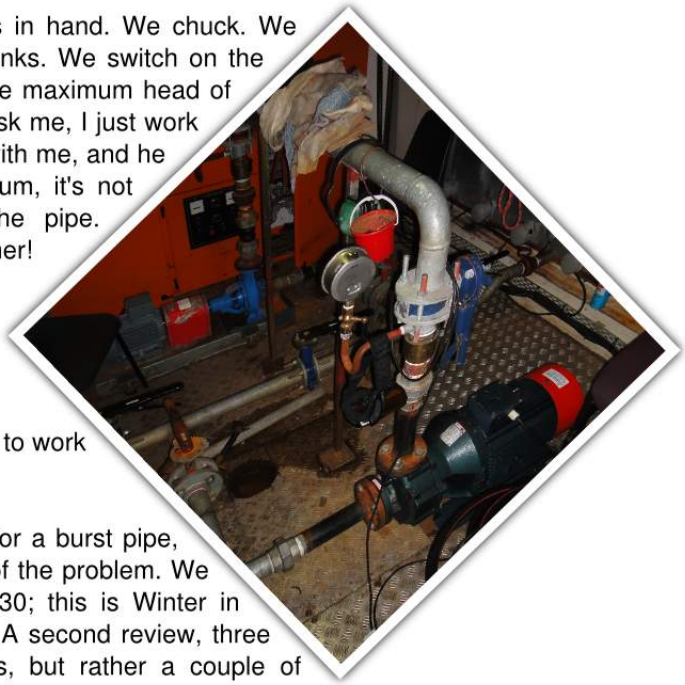
MAY 2011



Tumultuous events move individuals in various ways. In the event of the Smelly Line breaking, two people in this Base were moved to write lyricial laments. We offer these two descriptions of those few troubling days, in both English and Afrikaans.

Abi writes... It is a truth universally acknowledged that in telling a good story, one must set the scene. This specific scene begins on Thursday night, the 12th of May. Friday is traditionally the day when things break down here. Foolish, Fate-threatening murmurs were made on that careless night about the likelihood of some rather major disaster going down on this Friday. The 13th! Ha ha ha!

Come the morning in question. Tiki and I potter off down to the "smelly" to chuck in a couple of tonnes of snow and pump fresh water up to Base. The "smelly" is the snow smelter, situated some 200 metres from Base: a large buried tank with open chutes into which we daily shovel vast weights of snow in order to melt it and use the water. We need about 2000 litres of water a day: that is, 2000 kilogrammes of snow to be moved. The "smelly line" is the pipeline carrying the water from the smelly to the Base itself. The design, in theory, is simple, intelligent and elegant. The smelter is situated about 50 metres below the level of the base: the pipe runs uphill. Once water has been pumped up to Base, the water left in the pipelines runs back and leaves the pipe full of air, which will not freeze. As an added help, the entire line has three to five heater tapes running along it: these cables maintain a constant temperature of 70 degrees, thereby ensuring that the pipe itself should never drop below around 30 degrees. And THEN, as yet another precaution, all the piping is surrounded by thick insulation and cladding on top of that.



So, at the smelly again. There are the two of us, spades in hand. We chuck. We scramble down into the pump room next to the smelter tanks. We switch on the pump. We watch the pressure rise to 400 kPa, which is the maximum head of the pump and means it's not actually pumping (yes, don't ask me, I just work here. This was the mechanical engineer I had down there with me, and he said categorically that if a pump is working to its maximum, it's not working). We are forced to conclude - problem in the pipe. Somewhere, in 200 metres of pipe, there is a blockage. Bother!

Where in 200 metres this blockage is, is an unknown.

It shouldn't be possible.

We blame the Public Works Department. They were the last to work on the line.

We wander critically along the line back to Base, looking for a burst pipe, evidence of a leak, a sag: anything to indicate the source of the problem. We see nothing. Given that it is still before dawn – i.e. 11h30; this is Winter in Antarctica – our failure to see anything is not astonishing. A second review, three hours later, shows no plummets of ice or yawning gaps, but rather a couple of miniscule sags along the line, where possibly the slope encouraging the backflow of water after pumping has been fractionally compromised.

Weather sets in. It always does, in this place. By now it is pitch black again and there's a 35 knot wind. Washing machines and showers are summarily banned, and we leave Tiki to devise a plan of action for the morrow.

That was Friday. Saturday now, and the Plan of Action. The pump is set going and stopping and going again, while hardy members of the team try to locate exactly where to start repair work by listening with frozen ear pressed against the pipe to establish at what point the water stops flowing. We are fortunate in locating the blockage within two hours, and it is right next to the Base, and there are no false alarms or need to spend hours stripping unnecessary pieces of piping. We are further fortunate in that the afflicted pipe runs over an area accessible by dozer and is supported by very strong (if extremely narrow and exposed) scaffolding. We can reach the pipe, by ladder, by standing on the dozer roof and by clambering along the scaffolding. We are unfortunate in that this point was five metres above ground. And the wind is gusting up to 30 knots, which is NOT the time to be leaning haphazardly off of a ladder, or kneeling on two narrow little scaffolding struts, or even standing on a highly slippery dozer roof.

Saturday, therefore. Locate the blockage. Remove the cladding. Remove the insulation. Remove the piping. Identify a solid ice plug extending across two sections of pipe. Melt the ice. Consider replacing the piping. Pitch black, winds gusting, temperature in the minus twenties. So.

Adjourn.

Sunday. Bend pipe to ensure the slope from Base to smelly is uninterrupted. Replace pipe with maximum effort. Weld bracket to pipe and scaffolding to maintain aforementioned slope. Fix heater tapes. Attach heater tapes to pipe with cable ties, which distort so badly in the subzero conditions that you have to chew them in your mouth in order to get the required suppleness, and even then one in two break as you try to apply them - with two pairs of gloves on, hands frozen, having to tighten these things with a pair of pliers and then cut them short with a Stanley knife. Then, applying the insulation. Pre-moulded, hooray – except that what this really means is that they are hollow rounds that are so stiff that it takes two strong men all their time to wrestle these things into place... while balancing on the scaffolding, having to work nearly a metre below their perch. More cable ties. Then the iron cladding... . Weather sets in: pitch black, minus 20's, winds pushing 30 knots. Notice a trend here?

Monday. Nasty weather predicted, but it's wrong again, and we have much less wind than expected. There were these extraordinary pockets of mists and sudden dust-devils (OK, “snow”devils) whirling around. Half the horizon was pink with reflected sunlight. A large moon setting in the West, Venus glowing like anything in the North East – very beautiful, and officially our last day of sunrise. All rather special, and the last couple of hours' work to be done in winds of 4 knots and only a gentle minus 15. We felt strong, we felt good, our Mojo was right up there.

It never is just two hours of work. The dozer, an integral part of the plan – i.e. our moving work-platform – refused to start. Sudden gusts came through at 30+ knots, seriously inconveniencing anybody situated precariously five meters off the ground. But finally the whole process was complete. Just the last test: actually pump water through the pipe. We start. Pump pressures 300. 320. 330. No leaks. 340. Base on the radio: water arriving! Pipe line clear and functioning! Celebration! Pressure 350 - and the repaired joints pouring and spraying water: a huge leak. We stare accusingly at the poor little flange in question. All that work done, all the taping and insulating and cladding completed, and now it looks as if it may all have to come off again.

We at SANAE have a subtle technique that we use in emergencies like this. Translated from the techno-babble, it may be phrased as “If it's not working first time, you need to bliksem it harder”.
The No.19 spanners and the sledge hammers came out and that flange got tightened so thoroughly that if we ever need to get the pipe off again, we'll have to resort to an angle grinder. But it worked. We galloped off down to the Smelly, flung ourselves into a frenzy of snow-shovelling, and got 6 000 litres up to Base. For now, we shower. If the damned thing breaks again tomorrow, that's tomorrow's problem.

NEW! NEW!! NEW!!! The SANAE Page Three (oops – Page Four) Cover Girl!!

En nou vir iets heeltemal dieselfde...

Tiki skryf...Vir die wat nie weet nie, as dit by oorlewing kom hier op SANAE 4, dan is dit water, elektrisiteit, vermoë om brand te bestry en riolering wat vir ons absoluut onontbeerlik is. Ons hou hierdie goed met valkoë dop.

Ons sê al hoeka elke Vrydag vir mekaar: “Wonder wat hierdie naweek gaan breek...?” — mens moenie voorspellings maak nie — die duiwel word jou handlanger. Vrydag die 13de Mei (en ek is nié bygelowig nie) die oggend gebeur dit toe wel. Kry nie water opgepomp na die basis toe nie. Lees die drukmeter op die drukkant van die pomp — 400 kPa. Weet al as hierdie meter 400 lees, vloei daar niks water deur die pomp nie.

Enigste logiese afleiding is dat daar iewers ‘n punt in die pyplyn is waar die water nie verbykom nie. Hopelik is dit in die 'hangar' self want daar is dit warm, waai daar geen wind nie en kan die probleem chop-chop opgelos word.

Nadat ons alle kleppe, filters, ens. nagegaan het en gevind het dat alles in orde is, bly daar net die ongewilde afleiding oor — iewers sit daar ‘n blok ys in die pyp, en… dit is nié binne die basis nie, maar buite.

Al die mooi (en maklike) optredes ter oplossing word eers oorweeg en bespreek — pomp warm water op basis toe om die ys te smelt — logika sê egter dadelik — pomp ons warm water op, kan dit nie by die ys uitkom nie want ‘n lugkussing bou op wat die water verhoed om verder te beweeg — al sou die warm water ook die ys kon bereik, is daar geen kans dat dit die blok gaan smelt nie. Miskien smelt die eerste 30 mm van die ysblok en dan word die warmwater koud, en dit ys ook — so vererger jy net die probleem. Vir dieselfde geld kan jy nie kookwater ingooi om afdraande na die ysblok te loop nie. Dieselfde gaan gebeur. Jy gaan net met baie méér ys in die pyp eindig.

'Back to basics'…! Die stelsel werk so. Die basis sit bo-op die bult so 200m weg van die Smelly af. Van die Smelly af loop daar ‘n pyplyn bult-op basis toe om water te vervoer. Die pomp sit uiteraard by die Smelly self. Die pyplyn, termies geïsoleer, word met elektriese verhitterbande al op die pyp langs, warm gehou, of daar nou water gepomp word of nie. As die water klaar opgepomp is basis toe, maak ‘n klep onder by die Smelly oop sodat ál die water in die pyp kan terugloop Smelly toe. Sodoende bly die pyp “droog” en vries dit nie op nie. Ek loop die lyn deur en kry twee moontlike posisies waar water kon versamel het. Die een verdagte punt is by ‘n uitsettingslus waar die pyp in een been nie afdraande loop nie. Die ander kandidaat is daar waar daar gedurende Januarie herstelwerk gedoen is nadat die lyn in 2010 se winter omgewaai het en S49 dit tydelik herstel het. Die pyp hang deur — dit is met ‘n tou gehang wat mettertyd gerek het en die deursakking toegelaat het.

Nou-ja, ewe goedgelowig, sit ons eers weer die pomp aan in die hoop dat die probleem homself intussen uitgesorteer het, maar nee, die blok is nog daar. Van die lede het gelukkig die teen-woordigheid van gees om met hulle oor op die pyp te luister of hulle iets kan hoor terwyl die pomp loop. By die uitsettingslus hoor hulle water kabbel. Herhaal die proses - ja, nou is ons seker die blok is nie hier nie. Dan lê die probleem definitief by die deurhangende pyp, 5m bo die grond waar dit oor die pad na die basis toe gaan. Nie die gerieflikste plek om te werk nie, en as die wind by hierdie lae temperature (minus 27°C) waai, definitief nié die plek om te wees nie.

Ons het maar stadig aan die gang gekom - trek eers ‘n dozer (CAT D6) onder die lyn in - sy dak gee ons darem ‘n stewige platform om vanaf te werk - verwyder dan eers die plaatmetaalhulse óm die isolasie-materiaal, verwyder daarmee saam die voorgevormde poliuretaan pypisolasie en eers dán kan die flense losgebout word om ‘n lengte pyp te verwyder - als-en-als so 8 m pyp wat van isolasie en metaalhulse gestroop moet word. Bout twee stelle flense los en verwyder ‘n lengte pyp. Soliede ys weerskante van die flens bevestig dat ons die

probleem gekry het. Gebruik ‘n gasvlam en smelt die ys uit die lengte pyp wat verwyder is en ook uit die pyp wat nog in die lug agtergebly het. Bou dan weer die hele lot in tru-orde terug, prakseer dié keer ‘n staal hanger om die pyp in die lug te hou sodat dit nie weer kan deurhang nie, toets vir lekkasies en voila, ons pomp weer water basis toe en die beperking op stort en klere was, word opgehef.

Dit klink maklik en is inderdaad ook eenvoudig as mens hierdie joppie in Pretoria of Kaapstad sou doen. In Antarktika is dit egter ‘n perd van ‘n ander kleur. Ons het in aflos-spanne gewerk. Geen mens kan lank in ‘n vrieskas hou nie, laat staan nog werk uitvoer met handskoene aan en vingers wat verys. Met jou koue klere aan, lyk jy soos die Michelin-mannetjie - jy is lomp en jou bewegings is beperk. Die sneeubrille werk so vir vyf minute voor dit begin opwasem en met die beperkte lig is jy nog half blind ook - koplampies is nodig want die sonlose winterdae is reeds grootliks met ons.

Die herstelwerk wat in die somer uitgevoer was, was maar swak— onkunde blyk duidelik uit wat ons aantref - die verhitterbande is in die gleuf van die isolasie, al langs die pyp af waar die twee stukke isolasie bymekaarkom, ingedruk, nie eers in kontak met die pyp self nie, kan nog só in die somer werk, maar beslis NIE in die winter nie.

Die Maandag om 16:00 was ons klaar en pomp ons water. DRIE DAE se werk onder moeilike moeilike omstandighede. Ek haal my hoed af vir die span - elke lid het sy/haar bydrae gelewer en dit góéd gedoen - hierdie span sal dieselfde taak in ‘n OGGEND in Kaapstad kafdraf. Baie dankie, span. Julle is sterre….!!!

"The Last Sunset" is an evocative phrase. The concept is foremost in the minds of most Polar sojourners: the day the Sun will disappear for the final time, leaving us to months of unceasing darkness. The words resonate with Cold, Deprivation, Gloom. The flip side of this, those months of unbroken light, most of us regard as merely a mild menace. Nobody speaks in thrilling tones and tense trepidation of how we're going to endure those Summer months of blazing night. But the endless dark hours of the Winter Day! This is exciting, challenging, fearful. So we awaited the moment with awe, we discussed with an eager expectation the likely impact on Base and on us of 24 hours darkness, we argued and debated constantly about exactly which day it would be.

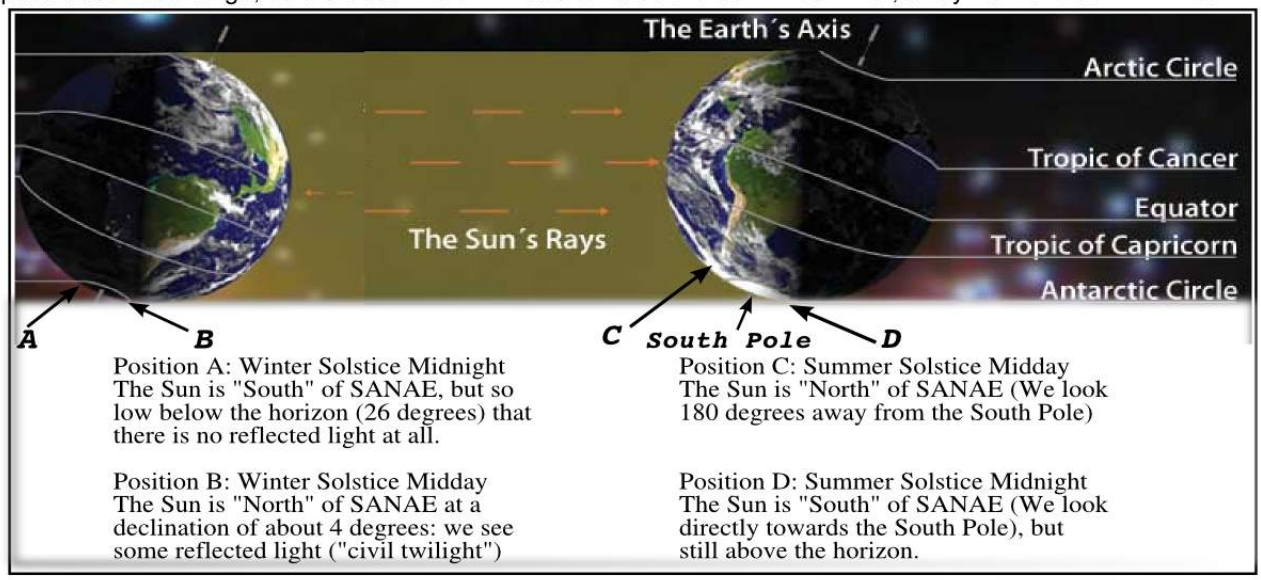
The Official Date of the last sunset rather depends on which official you're consulting. The Meteorological Office used the American Met. Service and had as D-Day the 15th of May. The Space Science team used Stellerium and stated firmly, 17th May. The Comms Office used the United States Naval Observatory and put its money on 16th May. In fact it was the 18th of May. Possibly. A quite unnecessary quantity of cloud obscuring the Northern borders of the horizon does somewhat undermine the veracity of this claim. We covered our bases by watching eagerly on every day from the 14th to the 20th (weather permitting). Even work on the Smelly line [see p. 2] was adjourned during those few minutes when the Sun slunk shyly along the extreme Northern horizon. Part of the reason for this "floating date" is the altitude of Vesleskarvet (850 m above Sea Level), and the surrounding topography (rising snow plains to North). Most predictions are worked out for the latitude at a flat sea level.

And once the Sun had finally set, and we sat back complacently to await the ensuing complete darkness? Boy, were we ever mistaken. The Polar regions are famous for having 24 hours of daylight and 24 hours of darkness at a stretch. For a three to four month period twice a year, the Sun either doesn't go down or doesn't come up. The closer to the Pole one is, the more marked and longer this effect. In fact at Vesles-karvet, 71 degrees South, we don't ever experience 24 hours of darkness. Although the Sun has set for the last time, there is still a significant amount of reflected light from just below the horizon throughout Winter. Dawn creeps into dusk with out a single ray of direct light, but it's a good, bright dawn-dusk that lasts for at least three hours. Although the entire Polar circle – that is, every-where South of 66 degrees latitude – experiences the complete absence of direct sunshine, the quality of light still visible varies. So on the 19th of May, one day after the "Last Sunset", there were squawks of dismay and suspicious glares directed Northwards when a firm glowing dawn assailed our

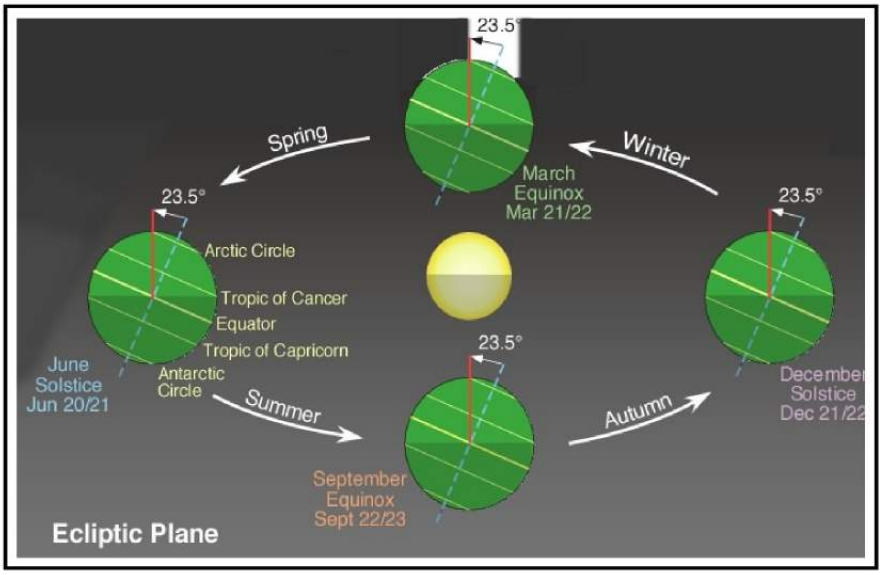
over-dramatising imaginations. So much for 24 hours pitchy-black. True, not a single sun-beam made it across the horizon, but we still felt cheated at the lack of night.

A little research and less desire for sensational extremes might have forewarned us. Life is simple in South Africa. The Sun rises in the East; the Sun sets in the West. This is the rule. In Winter it rises later and sets earlier. In Summer it rises earlier and sets later. We can always predict reasonably accurately where the Sun will be in the sky at any given time. But life is complex in Antarctica. The Summer sun sets – when and if it bothers to set – in the South. The Winter Sun rises – when and if it bothers to rise – in the North. For the rest of the time it potters about the sky in a strange roundabout trajectory which delivers constant surprises. Working this trajectory out by first Principles, even with the aid of string, apples and tins of baked beans, doesn't quite cut it. Eventually in desperation one hits the Google button.

The earth rotates about its own axis; this axis is inclined at an angle of 23.something degrees to the perpendicular (the exact value varies yearly: the current figure is about 23.56 degrees). The orientation of this axis in space does not change, so the South Pole will face towards the Sun in Summer; away from the Sun in Winter.



At this point it becomes simplest to visualise the Sun as moving around our skies rather than us moving around the Sun. The Sun shifts across the sky from South to North as we move from Summer to Winter: it is directly overhead the Tropic of Capricorn (23.44 degrees South) on the Summer Solstice (22 December), crosses directly above the Equator on the Autumn Equinox (21 March) and is directly above its Northern-most point, the Tropic of Cancer (23.44 degrees North), on 21 June. At its Northern-most point it is too far North for us to see directly; it is always below the horizon. At 90 degrees South (the South Pole), the Sun is 23.44 degrees below the horizon at its apex (midday) and completely invisible. At 71 degrees South (SANAE IV Base) it is 3.44 degrees below the horizon at midday, with a great deal of reflected light visible for at least three hours of the day.



This reflected light is classified by the declination of the Sun below the horizon: "twilight" is not just twilight, but Civil, Nautical or Astronimical twilight depending on the Sun's declination. The classification is as follows:

Civil Twilight: between six and 0.833 degrees – all objects are clearly visible but fine detail is lost;
Nautical twilight: between 12 and six degrees below the horizon: the horizon can be seen and major stars and planets are visible, and
Astronomical Twilight: Between 18 and 12 degrees below the horizon. It is dark enough to see stars up to the sixth magnitude only.

The Day-length chart alongside for 69 degrees South demonstrates the fact that even South of the Antarctic Circle Mid-Winter's Day is not totally dark. The Sun's declination below the horizon is not great enough to pass from astronomical twilight to full darkness.

As shown in Figures One, Two and Three below, the trajectory of the Sun changes remarkably not only with season but with increasing latitude South. In South Africa (33 degrees S) we are used to the Sun moving above us or a bit to the North and disappearing completely at night for a good few hours. The average Winter-Summer range of daylight is 11 – 15 hours. As we move more South, this range becomes more extreme. Mid-Winter light and Mid-Summer light vary dramatically.

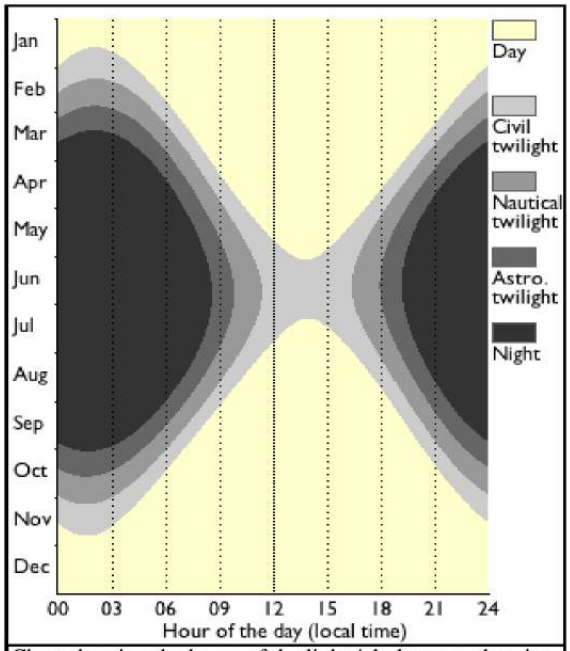


Chart showing the hours of daylight / darkness and various stages of twilight at 69 degrees latitude South

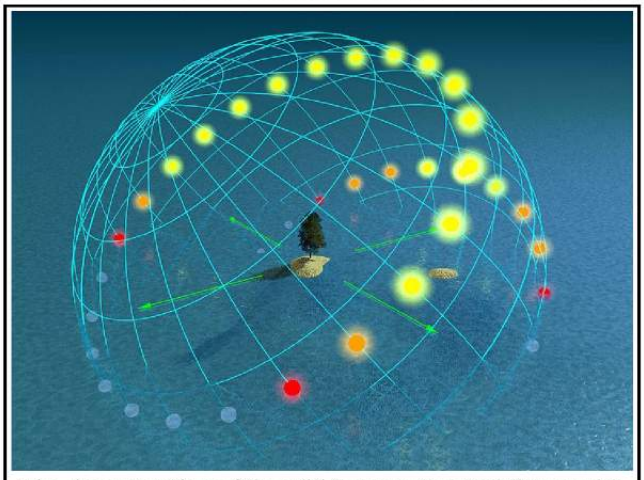


Fig. One: Rotation of the MidSummer Sun and (lower) the MidWinter Sun as seen at 50 degrees. The variation of day length is much greater than in South Africa at 33 degrees.

At 50 degrees in Summer midnight is no longer dark. The Mid-Summer Sun reaches a maximum declination of 16.56 degrees below the Southern horizon and there is always some faint reflected light: the so-called “Grey nights” (astronomical twilight). At 60 degrees S, the Sun is only 6.56 degrees below the horizon: the “White nights” (civil twilight). At 71 degrees South, it is above the horizon by 3.44 degrees, and we sleep with our pillows over our heads to block out the light. The first "sunset" is in late January in the extreme South.

So we watch the months pass by with the Sun's rays always sneaking in at a new and unexpected direction. The first sunrise should be in the North-East, in late July. But should it appear in the South-West, we are past being surprised...

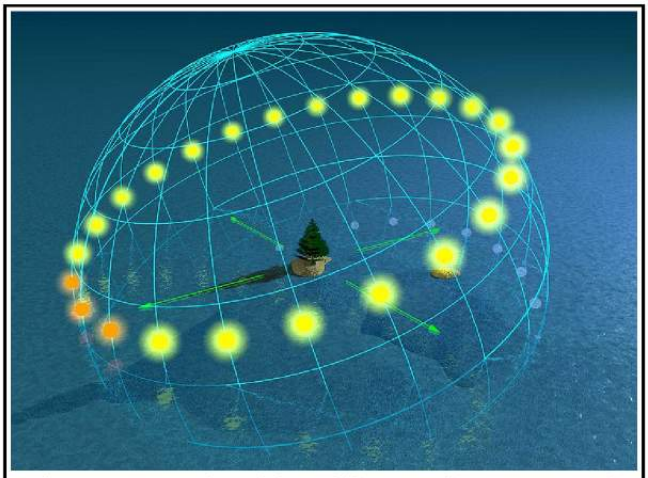


Fig. Two: Rotation of the MidSummer Sun as seen at 70 degrees. SANAE lies at 71.40. The MidWinter Sun is below the horizon but still gives light - the "astronomical twilight".

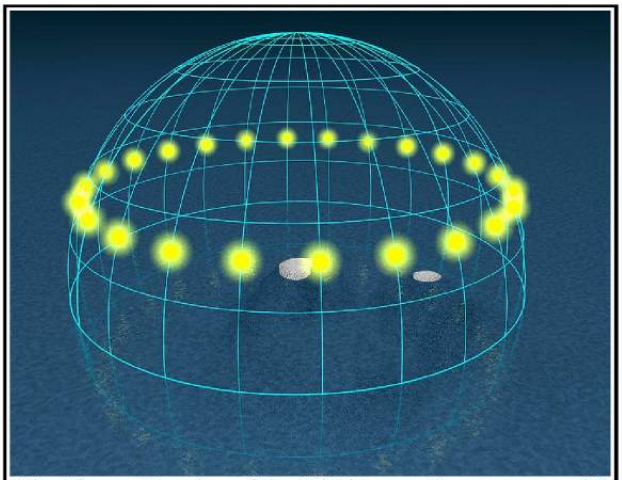


Fig. Three: Rotation of the MidSummer Sun as seen at 90 degrees at the South Pole. The MidWinter Sun is well below the horizon, and for months not even reflected light is seen.

Champagne Breakfast SANAE style! - by Beatrice

It is Saturday evening and the team is gathered around the dinner table, almost all with a glass of wine in reach. The weather prediction for Sunday does not look great but what can we do to break the normal going about of Sunday. Ideas are thrown around and it is agreed that if there is alcohol at the event, that the majority of the team will not mind what we do. Easily agreed - a champagne breakfast is in order. Each person quickly states what responsibilities and treats they will arrange and the plan is in action.

Half past ten on Sunday the team members emerge from their rooms one by one. Cold juice and Champagne are placed on the table. Renier is preparing his secret ingredient (ready mix) poppy seed muffins. Eggs are being boiled while the fresh bread is about to come out of the oven. It smells great, the sort of smell that reminds one off your mother's kitchen. It is Mother's Day today and although not everyone on the team really celebrates Mother's Day I privately dedicate the event to all our mothers that love us unconditionally.

I miss my mother and will phone her tonight. I arranged flowers to be delivered to her as well as my sister's homes. I am sure they will be very surprised. It would have been nice to give my mom a hug though.

Paul mixes the Whisky into the Marmalade and the bacon smell is starting to overwhelm the air, it is time to enjoy the feast. It was indeed a feast. The conversations around the breakfast table were entertaining and interesting. Before we even noticed the morning passed and only the fond memories were left.

Help, my nose has frozen to my camera.

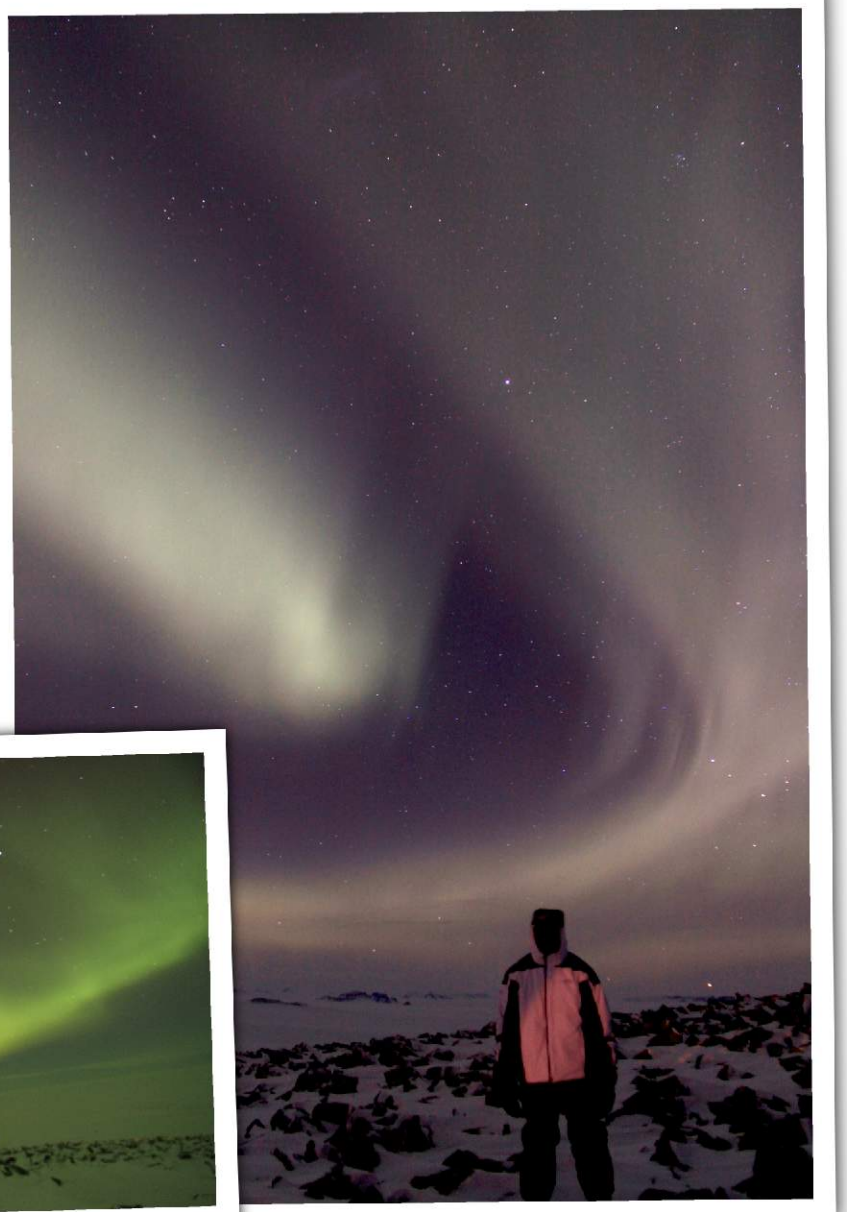
I have always heard of this thing, this nebulous display of light. But as these things go: you never quite understand until you see it yourself. We've had a few auroras before, but those were always rather vague and distant. Hanging in the sky above some distant horizon. Quite pretty, but nothing that would move you emotionally. You get jaded quite soon: "Ag, I'll skip tonight, tomorrow will be better." So you soon settle into a routine.

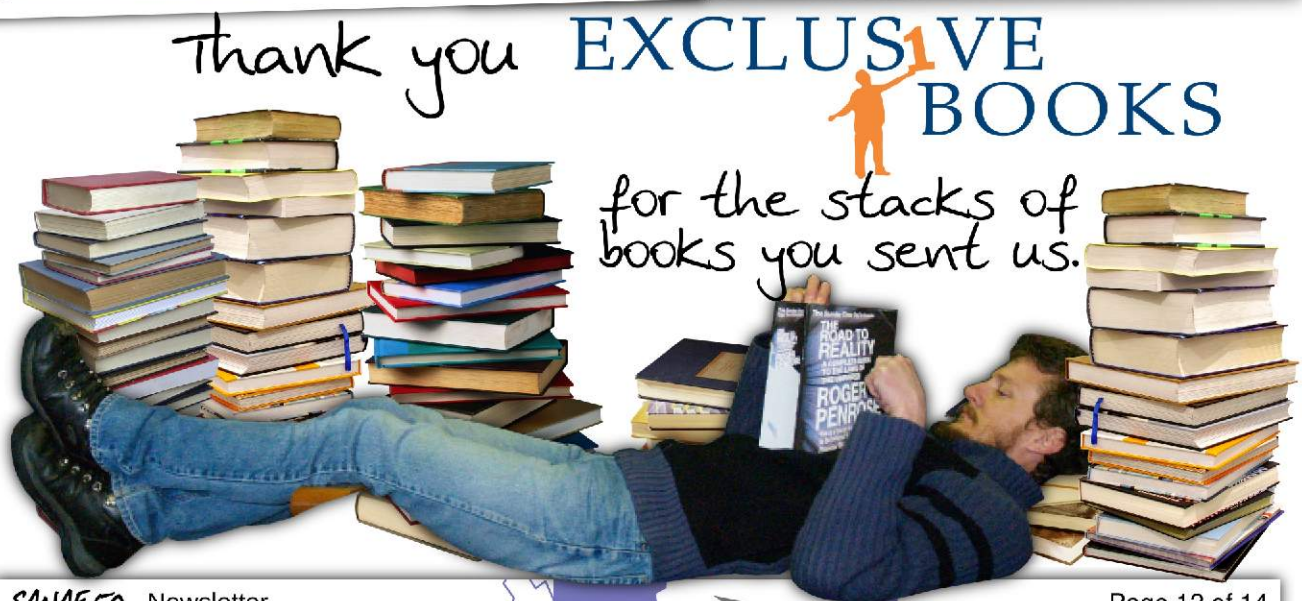
The aurora "alarm" goes off at some odd hour of the night. Then the scientist(s) responsible start stirring. Actually no: they are more like a veritable strike team. They leap out of bed, charge down the corridor and then dissappear into their lab. Then after they determined that this is a "big enough" event, they start to wake up everyone who wants to see the aurora. I usually poke my head through the roof hatch in A-block to see whether it could be worthwile. Then I walk down to the dressing rooms to go kit up in cold weather gear. Grab a camera and a tripod, and stick my head out the door.

Last night, however, there was nothing routine about what we saw. It began like before as fuzzy, quite faint smears of light. The only difference was THIS time it was over the peaks in the south, over the eastern horizon, directly over-head, pretty much everywhere you could point to in the sky. You could even see it over the well-lit diesel bunker in the north. (Not normal at all.) Cameras out, lens cap off, shoot shoot shoot.

Then, as if sensing the excitement, the skies open up, and everywhere ribbons of light ignite. You would be pointing your camera to one light-curtain in the sky, and you would notice two more in a completely opposite corner to where you were looking. Overhead there were radiating beams of light. About 30 mins into the event, Ruan remarked: "This is what we came to see." No-one answered, but I think everyone agreed.

At about 03h00 with the last arc of light fading and the mercury sitting at -27 deg C, we started back in. Our hands (and cameras) were "frozen", but we had got our shots. The aurora would still go on until about 06h00 that morning, but we were done. 50 years on, this would now be our memory of auroras at SANAE. -jh





Climate Stats: May 2011

Pressure

Maximum	891.0 hPa
Average Maximum	883.1 hPa
Average	878.8 hPa
Average Minimum	876.8 hPa
Minimum	872.1 hPa

Temperature

Maximum	-10.7 °C
Average Maximum	-16.8 °C
Average	-19.8 °C
Average Minimum	-22.8 °C
Minimum	-30.3 °C

Humidity

Maximum	95 %
Average	61 %
Minimum	11 %

Wind

Maximum Gust	44.2 m/s (159 km/h)

Sunshine

Average Day Length	1:48 hrs

SANAE 50 team members:

Abigail Paton - Doctor

Alan Daniels - Diesel Mech (Generators)

Beatrice van Eden - Scientist (Spaceweather)

Gerard de Jong - Electrical Engineer

Johan Hoffman - Radio Tech (Dep. Teamleader)

Kevin van Eden - Scientist (Spaceweather)

Paul Lee - Meteorologist (Teamleader)

Renier Fuchs - Scientist (Particle Physics)

Ruan Nel - Scientist (HF Radar)

S'celo Ndwalane - Diesel Mech (Vehicles)

Tiki Jordaan - Mechanical Engineer

Series of the Month:

Sorry, nothing this month

Movie of the Month:

Sorry, nothing this month

Quote of the Month:

We are quite boring this month. - Johan