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SAAFA - JOHANNESBURG JULY 2017

ADDENDUM TO JULY 2017 NEWSLETTER

PAUL LEE'S TALK ON ANTARCTICA (presented at the JUNE 2017 LUNCH)



Paul Lee presented a talk on 2011 A Year in Antarctica at the June 30 monthly meeting of the South African Airforce Association (SAAFA) Johannesburg branch. Describing himself as an adventurer, scientist, ecologist and philosopher, Paul demonstrated his work and passion come together through exploration ecology and the science of the environment.

Paul now works as an environmental consultant with Umvoto Africa (Pty) Ltd, undertaking climatological and environmental work, previous to which he overwintered in the Antarctic as the Team Leader and Senior Meteorologist for the South African 50th SANAP expedition. For recreation, Paul frequently takes time away from work to trek and climb the larger mountains of Africa and the Himalayas and to journey on rivers and seas by sail yacht and kayak.

A year in the Antarctic as Team Leader and senior meteorologist.

The talk explored the journey south, the reason and purpose for the expedition and Paul's personal experiences of overwintering on the most inhospitable continent on the planet, amidst storms, darkness, then finally experiencing the return of the sun. The ships, aircraft, accommodation bases and the unique island offshore Antarctica are portrayed by spectacular photographs of this astonishing world of ice and snow.

BRIEF RESUME OF SAAFA PRESENTATION The Historical Context

Hannes le Grange was the first South African to visit and overwinter in the Antarctic. He accompanied Sir Edmund Hillary and Sir Vivian Fuchs as the meteorological officer for the British Commonwealth Trans-Antarctic Expedition in 1958. In so doing, he took the South African flag to the South Pole for the first time. He returned a year later as leader of the first South African Antarctic Expedition in 1959, occupying a vacated Norwegian base which was to be named SANAE I. Yearly summer visits then continued, and the 36th expedition of 1997 became the first overwinter trip, while 2011 celebrated 50 years of annual visits to Dronning Maudland (Queen Maud Land of the Antarctic). To date, fewer than 600 South Africans have overwintered in Antarctica in our 50 year history on the continent.

The Journey South



The ocean crossing from Cape Town is approximately 4500 km and takes up to 12 days. The original, and now retired ship, was the SA Agulhas 1 of 111 meters with Gross Tonnage of 6,123 tons. It is now replaced by the new SA Agulhas 2 which is slightly longer and considerably heavier at 134 meters and 12,897 tons. Purpose built, she is more capable of penetrating deep winter ice. The South African National Antarctic Program (SANAP), extends its mandate beyond the Antarctica and is deeply committed to exploring and researching the Southern Ocean. Sailing the "Good-hope Line", which is an ocean passage following the zero meridian, these two ships have contributed to the knowledge and understanding of the role of cold seawater in stabilising carbon content on the planet and mitigating the impact of global heating. The crossing of the polar circle, the point at which the sun no longer rises in mid-winter was explained in the talk along with photographs of ritualistic swims for first time initiates. Sailing through some of the world's stormiest oceans take the ship from Cape Town through the roaring forties, the furious fifties and the screaming sixties until finally crossing the polar circle at 66.5 degrees south into the serene, frigid and calm waters of floating ice bergs.

Landing at the ice



Interesting facts on the Antarctic ice suggest that the shelf lies as deep as 2.5 km below surface and at its highest point on land the ice is almost 3 km thick, giving a total of up to 5 km of total thickness. If such an ice mass were to melt as a result of global warming, world sea levels would rise approximately 60 meters, inundating most coastal cities on the planet. As there are no proper harbour or offloading facilities, on arrival at the ice shelf, the SA Agulhas maintains engines on for several days, bow to the ice shelf, while offloading the base's supplies by crane and helicopter. The Russian built Kamov twin rotor helicopter, designed by Nikolai Kamov in 1929, proved a valuable resource in heavy air lifting, five tons in a single payload. The helicopter is designed with two coaxial rotors which rotate in opposite directions. As it has no tail rotor, all engine thrust can be dedicated to lift making it the ideal workhorse for the job.

Land Travel



The 300 km cargo run to transport supplies over the land to the base crosses the Fimbul ice shelf and takes two days rising from sea level to 800 meters altitude. The heavily laden Challengers haul supplies for the next years overwintering team. 90 000 tons of polar diesel keep the generators running, food and victuals for a year and more if an emergency should arise, and at least 90 support staff of scientists and technical specialists who come down each summer and stay until the onset of winter in February. Whiteouts are a common occurrence on the long flat ice shelves and the drivers often steer only by the pointer of a GPS, while the windows are clogged with snow as if the vehicle is wrapped in cotton wool.

The Base



SANAE IV was built on top of a nunatak called Vesleskarvet, which is Norwegian for "little barren mountain". These nunataks are the top levels of large mountains that are mostly buried deep within the snow and ice sheet of the Antarctic. Previous SANAE bases, SANAE I, SANAE II and SANAE III were built closer to the coast on the Fimbul Ice Shelf near Blåskimen Island. With movement of the shelf all three earlier bases were lost as the shelf expanded and broke into the ocean. In addition to being in a more permanent position, the base is built on six-meter-high stilts allowing wind to freely blow through underneath and thereby limiting deposition and burial of the buildings by snowdrift which is blown off the 250 m high cliffs into the wind-scoop below the mountain. This unique design, by a South African team, is now incorporated into the British Antarctic Survey's Halley Research Station and Germany's Neumayer-Station III. SANAE IV consists of three linked module structures, each a double story and 44 m long by 14 m in width. Insulated by

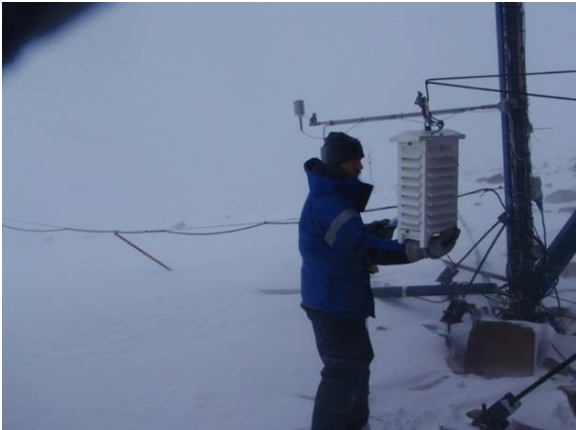
half meter thick walls and triple glazed windows, it can withstand the extremes of temperature and wind. It is expected that the station should far exceed the life of its predecessors

Life of the Met Officer



It is often questioned why the South African Weather Services (SAWS) should collect data from the Antarctic, what impact does this bring to bear on weather back at home in our country. SAWS contributes the data to the World Meteorological Organization (WMO), an intergovernmental organization with a membership of 191 Member States of which South Africa is one. The data is used for global forecasting and the more stations and global coverage the forecasting models use as an input, the more accurate the prediction becomes. Remote weather stations such as SANAE IV provide important outlier statistics. Gathering of data at SANAE takes place seven days a week, almost on an hourly basis. Most of the work is conducted remotely from inside the building, however frequent outings to the weather station for maintenance and calibration ensure the Met Officer is outdoors and in the elements. At a more local level, the Met Officer is regularly asked to assist aviation by providing current surface weather conditions, although he is not permitted to make an actual weather forecast. Naturally the members of the base team request information on wind speed and temperature to determine if it is safe to work outdoors. A Met Officer's life is busy and regulated ensuring the year goes by in haste.

Mid-winter extreme



The 2011 year experienced some harsh weather with a minimum recorded temperature of minus 36 degrees Celsius (September), and storms bringing winds up to 220 km/h (120 kt). Only once in the year did the temperature rise above zero and the highest recorded temperature for the year was in January at plus 4 degrees. The wind seldom abated and averaged year through at 40 km/h, blowing constantly from the south bringing snow drift and making outdoor work difficult and often dangerous when a Katabatic wind suddenly descended from the surrounding mountains causing a whiteout. Aside from climate research; the Antarctica is a perfect location for scientists to study space weather. Situated so close to the geo-magnetic South Pole, where all the Earth's magnetic field lines converge, this opens up a unique window into geo-space, which allows us to study the Earth's magnetosphere, ionosphere and other related space weather phenomena. The SANAE IV base hosts a wide suite of instruments, including magnetometers, riometers, GPS, VLF and HF Radar all reaching out to space through the magnetic window.

Winter darkness



With the onset of winter, the sun dropped below the horizon in mid-May and remained absent for almost two months until late July. The plummeting temperatures seldom rose above minus 25 degrees and SANAE IV was shrouded in darkness, with only a thin twilight on the northern horizon at midday. With the darkness came the southern lights, the Australis aureoles which on certain days lit up the southern sky with patterns of green, blue and red light. The southern aurora, like its northern counterpart is produced when charged particles in the solar wind stream into the earth's magnetosphere and collide with atmospheric atoms. In so doing they excite the ions causing the emission of varying colours; the oxygen ions are responsible for the two main colours of green and red while nitrogen causes blue and deep red hues.

Mid Winter Campout



The winter experience would not have been complete without some fun and games and while camping out on a mid-winter night was a cold experience; it was not as cold as being thrown in an ice hole in your swimming costume and made to down a frosty beer on your birthday. This initiation process is tradition for all team members but unfortunately Paul's birthday happened to coincide with mid-winter, enhancing the experience!

Return of the Sun and Air flights



The first sunrise in mid-August also heralds in the reawakening of life at SANAE. The first birdlife in many months was seen to be soaring below the cliffs. Contact with the authorities back in South Africa became more frequent with planning towards the end of year arrival of the takeover team, while flight activities recommenced bringing early visitors to the base.

Airflights



Flights between Cape Town and the Russian base Nova run weekly through the summer months. (September to February). An Ilyushin Il-76 IL 76 TD, makes the seven hour South Atlantic crossing with scientists, technicians and sometimes even tourists, who cannot afford the time to take the ocean crossing (but can afford the hefty air ticket price), sometimes coming to the Antarctic for only a few days. This is a far cry from the early explorers like Scott and Shackleton who would have to dedicate at least three years for a round trip from the United Kingdom, stopping at either Cape Town or Christchurch along the way.

Ilyushin



The Ilyushin Il-76, a multi-purpose four-engine turboprop strategic airlifter designed by the Soviet Union's Ilyushin design bureau, is capable of a 6500 km range and careful weather forecasting is essential at the Point of No Return (PNR) to ensure that there are safe landing conditions at Nova.

Blue-ice wheeled landings have changed the nature of flying in the Antarctic, and this is a fairly recent development.

The first wheeled aircraft to land at Patriot Hills was a De Havilland Twin Otter, piloted by Giles Kershaw in 1986. He took with him a small group of aviation experts to locate a suitable runway for larger aircraft, and was quoted as saying,

“A bleaker place would be hard to imagine. The wind was cutting through our clothing. A few small bundles at our feet were all that stood between us and encroaching hypothermia. We pitched our tiny mountain dome tent but tent pegs were useless because the surface was like concrete. We laboriously screwed ice screws into the ground, one by one, and attached the guy ropes. All my life I had enjoyed the luxury of pyramid tents that felt safe in almost any wind. Now I was to live in a survival tent made for backpacking mountaineers who did not seek comfort.”

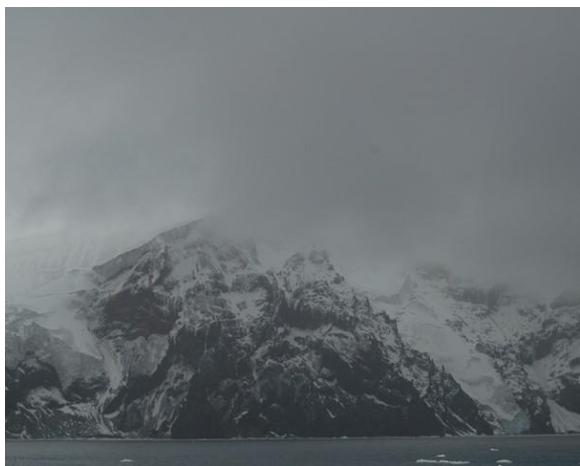
The following year, 1987, Captain Jim Smith landed a Douglas DC-4. Between 1989 and 1993 aircraft got larger with the DC-6, soon to be followed by the Lockheed Hercules L-382. Since 2000, the Ilyushin 76 TD started making its scheduled flights changing the once remote and isolated Antarctic into an easily reachable destination. Between bases and within the Antarctic, a group of dedicated ice pilots command Twin Otters, a Basler BT-67, (a DC-3 conversion), as well as several helicopters, moving personnel and equipment in minutes over distances that would have taken days, even months to cover overland. The flight between the Norwegian base Troll and SANAE takes some 20 minutes, the flight path is straight over the Jutulstraumen Glacier, or “Giant Stream”. Measuring 220 km it is one of the largest on the continent, with an ice stream speed of around 4 meters per day, it is heavily crevassed with chasms large enough to easily swallow an entire challenger.

Cargo Runs and return of the SA Agulhas

The year passed by more rapidly than expected and soon the planning towards the arrival of the new 2012 team and the service personnel was keeping the 2011 team busy.

The Base had to be cleaned, all generators and vehicles serviced and in good order and the science programs prepared to be passed on to the next group. The days grew longer, and several cargo runs were required to move all the year's waste and return items back down to the ice shelf to be reloaded aboard ship and returned to South Africa. All waste is removed from the base in accordance with the Madrid Protocol and the Antarctic Treaty ensuring the environmental policies of the Antarctic are upheld. This includes the return of all sewage to South Africa! Sooner than expected the SA Agulhas was sailing south and the privilege of the peace and isolation the team experienced receded.

South Thule and South Georgia Islands



One of the meteorological officer's duties is to service the South Africa weather stations that are situated on some of the more remote islands close to the Antarctic. SAWS has stations on several islands, including Gough and Marion. South Thule, Island is part of the South Sandwich group of archipelago situated some 2 000 km east of Cape Horn in the open southern ocean. Thule is a Norwegian word for the "outermost edge of the world", and this volcanic outcrop is truly one of the more inhospitable and fascinating places with the dubious distinction of being the southernmost island to the Antarctic continent. The SA Agulhas took five days to reach the destination and hove to in Ferguson Bay, which, being the ring of a sunken volcano is remarkably sheltered from swell and wind. The service team are lowered into an inflatable to make a beach landing amidst ice, penguins, leopard seals and elephant seals. The former being so numerous that to walk between them

without treading on one and being pecked is all but impossible; the latter being so large, lethargic and bad tempered, that avoidance by a wide berth is best observed.

Elephant Seals and Penguins



We hiked our way to the remote weather station, changed the unit and undertook some maintenance. Interestingly, there is a ruined steel structure on the island which was once an Argentinian naval base, used during the Falklands war and then bombed to destruction by the RAF. The team did not stay long on the island in respect of the severe weather and the instruction of the ship's captain was to be swift so the supply vessel could move offshore into the safety of the deep sea.

Whalers at Grinvagen



South Georgia is inhabited having been the home to several whalers and sealers during the early 1900s. A visit to the British research station in Grytviken was undertaken to deliver a series of weather buoys. The settlement of Grytviken, again a Norwegian word for "three legged pot" is situated beneath the 1000 meter peaks leading to the interior of the island, the same mountains that Shackleton and his team were forced to hike over in the heroic rescue epic of the Endurance.

Shackeltons Grave



Grytviken is still to this day a museum for the whaling and sealing era and the bay is scattered with shipwrecks of rusted whalers, still with harpoon guns protruding from the bows.

By early February the ship had to return to the Antarctica ice shelf to collect the returning overwintering team and all other personnel who were left at SANAE during the ship's island run. End February was the onset of winter and by mid-March the bays

Return Journey



offshore the ice shelf would be unpassable due to frozen ice until October. So, a hasty retreat was essential. The crossing and return to Cape Town passed swiftly as the weather warmed, culminating in the arrival in Table Bay in mid-March to a blasting South Easter wind and a heat wave.

The hustle and bustle of traffic, shops, cell phones, car keys and freeways was a culture shock leading to an understanding of why men like Scott and Shackleton returned again and again.

