

BIRDS AND THE BEES

THEMIS, SKYHOOK & WATERHOLE

Still Figuring Things Out Fifty Years Later

Friday signalled the first sunspot of the sun's latest eleven year cycle or as scientists have creatively dubbed it 'Solar Cycle 24'. What this means is that for the next five or six years, solar storms and sunspots will generally increase on the sun. Solar storms shoot cosmic rays that take about three days to reach the Earth and smash into our magnetic field. The energy created by these collisions creates aurora borealis (and australis, for our southern readers).

This is good news for Churchillians because we like Aurora Borealis and while we have still had some pretty awesome northern lights this year, the best and brightest are yet to come. My first two winters in Churchill (2002 and 2003) were peak seasons, and pretty packed with northern lights (ah, the good ol' pre-nervous breakdown days... insert wistful sigh).

This new solar cycle also brings a new era of Auroral research. NASA's THEMIS (Time History of Events and Macroscale Interactions during Substorms) project is a series of five identical micro-satellites launched about one year ago. They are equipped to measure 'ions, electrons and electromagnetic radiation' (oh my!). The project, complemented by ground cameras, involves scientists from US, Canada, Western Europe, Russia and Japan. Weather stations, including Churchill, will be launching research

balloons throughout the month of April as part of this project.

Over the past year, THEMIS has measured the development of substorms, one of which held the same energy as a 5.5 magnitude earthquake.

The THEMIS team discovered that Aurora travelled twice as fast as previously thought possible and over much greater distances, covering fifteen degrees of longitude in less than one minute. In fact, the storm itself covered 400 miles in one minute.

All of this energy travels to earth along 'magnetic ropes' connecting our upper atmosphere to the sun. These ropes are large, some about as wide as Earth, and short-lived, forming in the magnetosphere, about 70,000 kilometres above us, for only a few minutes. They are basically strands of magnetic fields twisted together. It is along these ropes, as they form and 'unravel', that the solar wind is able to travel from the sun to the earth, eventually creating Aurora.

This February, THEMIS satellites will be positioned along the sun-Earth axis and hope to observe the origin of solar substorms.

So, this is a whole new era of auroral research, 3D mapping of the aurora but it was only fifty years ago when we knew very little about the causes of northern lights. And, of course, this is where Churchill comes into the picture.

The first scientific expedition to film and study aurora came to Churchill in 1937, backed by the Carnegie Institute of Washington. They launched balloons with recording equipment hoping to achieve a height of 100,000 feet.

Ten years later, the American army launched the first Nike-Cajun rocket in Churchill. By 1954, the Canadian Army fired their first rockets and three years later, the Churchill Rocket Research Range was constructed as part of the International Geophysical Year (IGY). Almost 100 rockets launched throughout IGY including the first research rocket to pierce the 'F-Zone', a region 120 miles above the ground. The first Canadian scientific payload launched November 8, 1958. The range was closed soon after but then reopened less than a year later. It was in that year that the first Canadian-designed and built (in Winnipeg) Black Brant rocket came into use.

Basically, the military was studying the upper atmosphere and aurora as part of the weapons race. So while Russia's 1947 claims that the United States was testing V-bombs in Churchill was met with derision there was some element of truth to it. Aurora affects radio transmissions and in the coming cold war era of long range missiles, the military needed to be sure that their guided missiles and radar would work if and when they were needed!

Over the years, a wide range of studies were undertaken, mostly carried on Nike-Cajun, the Aerobee or Black

Brant sounding rockets or weather balloons.

In 1959, Project Skyhook launched a huge balloon, 344 feet long with a 6,000,000 cubic foot capacity. It carried over 170lbs of scientific equipment from the University of Minnesota, studying the ionosphere on its twelve hour flight. Four years later, powerful magnets mounted under balloons helped University of Chicago researchers find the first clues to the origin of cosmic rays.

In 1980, 'Project Waterhole' created a water vapour chemical reaction that poked a 'hole' in the northern lights. Three years later, a rocket launch 'created' aurora above Churchill and 1989 saw artificial clouds visible from 'as far away as Los Alamos, New Mexico' created by rocket launch experiments. After that, most activity was moved to Poker Flats Range in Alaska. Bristol and the Canadian Space Agency launched one final rocket at a cost of \$1.5 million, as part of the Akjuit Aerospace's drive to reopen the range.

While rockets are no longer fired from the range, research into the ionosphere continues on a limited basis by Environment Canada and through projects including an all-sky camera operating out of the Churchill Northern Studies Centre.

- prepared by Kelsey Eliasson
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BIRDS AND THE BEES

MISBEHAVIN' RAVEN

In the beginning, the world was in complete darkness. That is until Raven used his cunning to devise a plan to steal the light and release it to the world...

There was a chief who held all of the light of the world in a box in his home. Raven learned about this, and so one day he waited by the river for the man's daughter to come and fetch water. When she arrived, he transformed himself into a single hemlock needle, and dropped himself into the stream. As the old man's daughter dipped her water basket into the river and drank, the needle slid down her throat.

He grew in her belly for a long time until he was born as a baby boy. As a child he was told to stay away from the treasure box. But his grandfather loved him very much, and eventually gave in to his pleas of holding the light, just for a second. The old man opened the box and threw the ball of light toward his grandson, and as he did so, Raven reemerged, beak open to catch the light. He burst through the smoke hole in the roof of the house and escaped into the darkness with his stolen treasure.

Known as the 'Trickster' in First Nations mythology, ravens figure prominently in such legends as these in North America, and in northern European folklore as well.

A most common sight around Churchill, ravens (*Corvus corax*) are some of the most widespread birds throughout the northern hemisphere worldwide. They are among the few non-migratory birds of Churchill, and winter throughout the southern arctic.

They prefer rugged landscapes, like our



scrubby forests and rocky coastline, and town ensures such accomplished omnivorous scavengers a pretty decent food source year round. In the spring time there is a constant supply of eggs and small birds to prey upon along the coast, and they also feed on berries and bugs, which we have plenty of as well.

Looking like overgrown crows, ravens have shiny black feathers, with an iridescent purple blue sheen. At three pounds, they are the largest of the songbirds, up to two feet high with a four foot wingspan. Females and young look like males, but are slightly smaller. The young are slightly duller in color.

Their heads are larger and more triangular than a crow's, and houses their brains, amongst the largest in any bird species. They have been known to outsmart plenty of angry trappers, and also to lure predators to prey, ensuring a meal or two of carrion for themselves.

Their bills are more robust than a crow's, and they have shaggy throat feathers, absent in their crow cousins. In flight, crows flap almost non-stop, while ravens, with their wings set flat out to their sides, glide and soar like hawks. Ravens have fanned, wedge-shaped tails, unlike crows.

Similar to crows, in the winter ravens will often feed and travel in loose flocks (a group of ravens is an 'unkindness'), and spend their nights in communal roosts. Around Churchill we find roosts at L5, in the trees across from the dump, and in trees near the old metal dump, to name a few. It is a pretty neat sight to see dozens of ravens flying in at dusk from all directions, no doubt to talk over the events of the day.

Ravens reach sexual maturity at three years of age, and prefer monogamy. They may be the first arctic bird to nest in spring, with breeding and egg laying occurring between now and late May. Nests are 3-4ft across, made up

of sticks and twigs and bones, with a soft center of fur and lichens and moss and hair. They nest in cliffs or high up in evergreen trees, (well, as high as our scrubby little trees can take them anyway), and will use the same nest year after year, adding to it each spring.

The female lays four to seven dull bluish green eggs, blotched with olive brown. The male feeds her for the three weeks or so that she incubates. Both parents feed the young, who leave the nest after about a month and a half, though some may stay with the parents longer.

Ravens are rarely seen and not heard. They are capable of up to 30 different sounds, ranging from coos to cackles to croaks. They can mimic other birds' calls, and have been known to reproduce the calls of a lost partner.

Anybody who has seen them knows they are aerial acrobats, riding even the strongest winds along the Hudson Bay coast, tumbling, diving and play fighting through the air.

Their nasty habit of getting into garbage and crops, and their affinity for small livestock and eggs has led to their persecution by humans. And though they can outsmart the smartest of humans, their scavenging habits make them frequent victims of baited traps and poisoned carcasses.

Prepared by Carmen Spiech, with the help of www.wikipedia.org, www.firstpeople.us, Snyder's Arctic Birds of Canada (1957), and the Audubon and Peterson's Field Guides.

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