Inside this issue . . .

- December Meeting
- President’s Message
- HF Propagation
- Solar News
- Say Hi to Juno
- The Art of Flight Prediction
- Announcements

The Saskatoon Amateur Radio Club is a great way to become acquainted with amateur radio. Our club has much to offer the beginner, as well as the seasoned veteran. Please join us at an upcoming meeting or for our Saturday breakfast, and discover the SARC.

Saskatoon Amateur Radio Club
c/o Western Development Museum
Saskatoon Branch
2610 Lorne Ave. S.
Saskatoon, Sask.
S7J 0S6

Club Email
ve5aa@rac.ca

Club Repeater
VE5SK 146.64-

Club Website
http://ve5aa.dyndns.org

Best Wishes for a Healthy & Happy 2014
The mission of Saskatoon Amateur Radio Club is to enjoy amateur radio through the development, promotion, and expansion of amateur radio in and around Saskatoon.

Executive

President
Garry Schwartz  VE5SG  2013-2015

Past President
James Cloney  VE5CNB

Vice-President
Sylvan Katz  VE5ZX  2013-2015

Treasurer
Terry Cutler  VE5TLC  2012-2014

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Ron Ford  VA5RJF  2013-2015

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Bob Tower  VA5BRT  2012-2014
Ken Bindle  VE5KRB  2012-2015
Mike Luciuk  VE5MIK  2012-2014
Ned Carroll  VE5NED  2012-2014

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Repeaters
Property and Assets
Training Coordinator
Public Service
Sick and Visiting
Field Day
Elmer
Trailer
Space Club
SARC Net
Feedline
Web-site
50/50 Draw
Little Bear Lake
Amateur Radio/Physics Research Station

Bruce, VE5BNC
Club Executive
Ron, VA5RJF
Club Executive
John, VE5SSJA
Ken, VE5KRB

Vacant

Mike, VE5MIK
Al, VE5MDC
John, VE5SSJA
Mike, VE5MIK
Bruce, VE5BNC
Terry, VE5TLC
Ken, VE5KRB

The Feedline is the official publication of the Saskatoon Amateur Radio Club. This is your newsletter! Amateur radio information of general interest, club member project descriptions and doings, radio applications to other activities, corrections, or suggestions are all welcome. Individual submissions make for variety! We need your input! Electronic submissions are preferred via email (MSWord, PDF or generic text). Email submissions may be sent to: mluciuk@sasktel.net or mluciuk@gmail.com

Next Club Meeting
January 11th
10:30 A.M.
Western Development Museum
Education Room
Lorne Avenue South
Breakfast after 9 AM at Boomtown Cafe before the meeting

COFFEE
Haywood’s Restaurant
Saturdays 9:00 AM
3016 Arlington Avenue
South of Alvin Buckwold School

Everyone is welcome. Hams, non-Hams, it doesn’t matter. We’re there to have good conversation with good friends.

Come on out and visit!

ARES
Saskatoon
NEXT MEETING
1st Tuesday of each Month
7:00 PM

Fire Department Staff Development
Centre on the Corner of 22nd Street and Avenue W

Call in: 146.640-

Any items for Swap ‘n Shop in the Feedline contact VE5MIK.
Contact Bruce, VE5BNC, to put the items on the club website.
Local Area Repeaters
VE5SK 146.640- Saskatoon, SARC
VE5XW 146.730- Rock Point
VA5LLR 145.390- Lizard Lake
VE5ZH 147.270- 2 MHz offset, Saskatoon, Auto Patch
VA5SV 145.330- (100) Ridge East of Saskatoon
VE5RPD 145.190- Elbow/Davidson
VE5CC 146.970- Sktn MARS Linked to VE5SKN, VE5DNA, & IRLP node 1360 Link code 502*/503*
VE5SKN 146.940- Sktn MARS. 100Hz tone on xmt only -Linked to VE5CC, VE5DNA and IRLP node 1360. -Link code 500*/501* ARES SAME wx Rcvr

APRS 144.390
VE5RHF Saskatoon DIGI VE5BNC-3 Saskatoon
IGATE & SATGATE VE5XW-1 Rock Point VE5HAN-4 Hanley DIGI

IRLP Node
1360 Hard linked to VE5CC UHF Hub (444.975 +5M) & available to VE5CC, VE5SKN and VE5DNA VHF repeaters when linked.

Local & Regional Nets
Sask. WX 80m 1400Z 3735 Khz Alberta 80m 0130Z 3700 Khz
ARES (Sun.) 80m 1430Z 3753 Khz 80m YL Net 80m 0315Z 3755 Khz-Sundays
Aurora 40m 2330Z & 0200Z 7055 Khz B.C. 80m 0200Z 3727 Khz
Manitoba 80m 0000Z 3747 Khz
Montana Tfc 80m 0030Z 3910 Khz SARC Local 2m 0200Z 146.640-
Sask. 80m 0100Z 3735 Khz Prince Albert 2m 0330Z 147.150+

LITTLE BEAR LAKE
• The LBL telemetry address is dougf.no-ip.com/tlm/test2.txt • The 6 m. beacon address dougf.no-ip.com/va5mg

CONTESTS
• North American QSO Party CW 1800Z, Jan 11 to 0600Z, Jan 12
• ARRL January VHF Contest 1900Z, Jan 17 to 0359Z, Jan 19
• North American QSO Party SSB 1800Z, Jan 18 to 0600Z, Jan 19
• CQ 160-Meter Contest CW 2200Z, Jan 24 to 2159Z, Jan 26

For a full calendar of contests see: WA7BNM Contest Calendar

DXpeditions
• Cambodia XU7AEU Jan. 9 - 14 DXW.Net By M6CFW fm Phonm Penh; HF; SSB
• Burkina Faso XT2AW Jan.26 - Feb. 28 OPDX By DF2WO fm Ouagadougou; CW SSB; holiday style operation
• African Mobil DXpedition Mathias, DJ2HD, and Ulmar, DK1CE, will go for a mobile dxpedition through several countries in Southern Africa between December 14 and January 18 next year (including the DARC 10m Contest - January 14). They will be QRV as V5/DJ2HD and V5/DK1CE in CW, SSB, and RTTY; between December 22 and 24 as 7P8DJ and 7P8CE. They also plan to visit South Africa as and operate as ZS/homecalls and hope to activate one more country in the region. QSLs via homecall http://www.dj2hd.de/

For a full list of DXpeditions see: Announced DXpeditions

Be kind and respectful to your fellow hams. After all, without them, all you’d hear on the air is static.
It was a nice sized group that gathered at The Cave Restaurant for the Saskatoon Amateur Radio Club’s Christmas Banquet. Ken, VE5KRB was in charge during the evening and made sure a number of door prizes were handed out. Everyone ordered off the menu and after the meal was done it was time for the gift exchange. Definitely an enjoyable evening.

From the President’s Desk

“The time has come,” the Walrus said,
“To talk of many things:
Of shoes—and ships—and sealing wax--
Of cabbages—and kings--
And why the sea is boiling hot--
And whether pigs have wings.”

from Through the Looking—Glass and What Alice Found There, 1872
by Lewis Carroll

If you can remember that rhyme, you are probably dating yourself!

Seriously, a brief reflection at this time of year is appropriate. Some activities our club was involved with in some way were, and no reflection on their importance, Field Day, ham classes, Saskatchewan Marathon, Fireworks Festival, Santa Claus Parade, Little Bear Lake Research Station, maintenance and repair of various repeater sites, and the list can go on. The point is, there were many activities our members were pursuing, all of which enhance our personal and collective experience. So a big Thank You to our volunteers who devote their time to our hobby.

We can look forward to another great year in 2014. The Possible Dream will be gathering speed as more input comes to us as just what you expect our club is capable of doing. If you have not contributed your thoughts, please take a moment to tell us what you would like us to be doing this year and further into the future.

At this time I would like to express my hope that 2014 would be a great year for each one of our readers. May you find happiness and prosperity dogging every step you take.

Garry
A brief run down on solar physics

- The sun emits massive amounts of electromagnetic ionising radiation (UV/soft X rays)
- Put simplistically, the more sunspots, the more UV. Flux can be as low as 65 or as high as 274 (2001)
- We measure the solar output at 2,800 MHz (10.7cm) to give us a “solar flux” figure
- The sun also emits massive clouds of charged particles via solar flares and coronal mass ejections/coronal holes
- These can head towards the earth, where the particles can be channelled towards the poles
- This is more likely when the Interplanetary Magnetic Field ($B_z$) points “south”
- The K index shows the three-hourly effect of these particles impacting the geomagnetic field
- The A index is an average of this over 24 hours.
- If your signals follow a polar path that cuts through the auroral zone(s) (eg G<>VE7 long or short path) and the K index is high you will have problems.

- To measure this see the gauge at www.solarcycle24.com
- $B_z$ going south and an increased solar wind speed (450km/s+) are generally bad news for HF
What about the ionosphere?

- **F-region**: The region used to propagate signals in the HF spectrum, notably 1.8MHz – 30MHz range.

- **E-region**: 95-150km, contains mostly $O_{2}^{+}$ ions. The region used to propagate signals in the lower HF spectrum, notably 1.8MHz – 7MHz.

- **D-region**: 75-95 kilometres up, relatively weak ionisation due to its position at the bottom. For our purposes this is an absorption region, cutting down signals on 1.8 – 7MHz.

What does an ionogram tell us?

- The maximum usable frequency over a 100km path (5.2MHz) - 3000km path (14.9 MHz)
- The $f_{0}F_{2}$ critical (straight up) frequency (4.625MHz)
- The $f_{0}E$ critical frequency (2.91MHz)
- The $f_{0}E_{s}$ Sporadic E critical frequency (2.9MHz)
- And much more

Source: http://www.ukssdc.ac.uk/
Putting it all together:

![Graph showing MUF, FOT, and LUF over mid-path local time.]

The MUF also increases – the FOT gives the highest “probability” for the contact you want to make.

**So what do we need to consider when operating?**

- Solar flux levels
- Geomagnetic disturbance (A and K index)
- Direction signals need to travel
- Time of day/ time of year
- East-west/ North South/ Polar?
- Frequencies/Bands open
- Path – long/short, hops over sea/land

**Putting it all together**

- Higher solar flux levels are generally good for HF
- High K and A indices are generally bad – results in absorption and breakdown of the F region.
- A Chilton ionogram/ Solar Flux /K index/ Solar wind speed and IMF will give you a real-time indication of what bands you should concentrate on.
- Spring/Autumn/Winter is better than Summer as the ionospheric composition is “better” and the MUF is higher during the day. Night MUFs are higher in summer.
- The opposite is true in the southern hemisphere
- Spring/Autumn good for trans-equatorial contacts
- As the sun gets higher D layer absorption grows, but the MUF rises, so follow the MUF up during the day and down at night.
Scientists tell us that current solar activity is "stranger than at any time in more than a century." Recent weird weather on a global scale may have been caused by the 'fickle' sun.

The sun is producing barely half the normal number of sunspots usually seen at the peak of an 11-year cycle of activity called the 'solar maximum.' Scientists are 'dumbfounded!'

David Hathaway, the head of the solar physics group at NASA's Marshall Space Flight Center in Huntsville, Ala., recently stated, "I would say that the current peak in sunspots is the weakest in at least 200 years."

Based on historical records, astronomers say that the sun should be producing sunspots broader than the size of the earth causing problems like short-circuiting satellites, smothering cellular signals and damaging electrical systems. But, this is not happening, a scientific 'mystery' of sorts.

"There is no scientist alive who has seen a peaking solar cycle as weak as this one," according to Andres Munoz-Jaramillo, a professor at the Harvard Smithsonian Center for Astrophysics in Cambridge, Mass.

To complicate this "solar riddle," the sun is likewise undergoing one of its oddest 'magnetic reversals' in recorded history.

Normally, the sun's magnetic north and south poles change polarity every 11 years or so with the highs of sunspot activity.

During a magnetic field reversal, the sun's polar magnetic field weakens, drops to zero, and then emerges again with a stronger opposite polarity.

But, during the current weak cycle, the sun's magnetic poles are "out of sync," according to solar scientists. The sun's north magnetic pole reversed polarity more than a year ago and now has the same polarity as the South Pole, quite 'unusual' to say the least. Scientists are puzzled as to why the South Pole hasn't reversed polarity.

Our sun now seems quite 'feeble' at the current peak of solar activity, especially when compared to the Halloween solar storm in 2003, near the peak of the last solar maximum. That huge storm was the largest of the modern era. It crippled a critical Japanese satellite and sent astronauts aboard the International Space Station "scrambling for radiation shelter." Oil and gas drilling operations were shut down in Alaska and GPS navigation was disrupted.

As our next solar cycle heads towards a 'solar minimum' in the years between 2014 and 2020, sunspot activity should decrease and our planet's outer atmosphere will cool and contract. This will also give the earth a chance to cool off. Winter seasons should see more snow and colder temperatures, especially in the Northern Hemisphere. Frosts will likely occur later in the spring season and earlier in the autumn period.
Ham Radio Operators Call NASA’s Jupiter Spacecraft

In a first of its kind message for interplanetary spacecraft, thousands of amateur radio operators around the world were able to say ‘Hi’ to NASA’s Juno Spacecraft as it swung past Earth on its way to Jupiter.

In the “Say Hi to Juno” project, all licensed amateur radio operators were invited to participate by visiting a website and following posted instructions.

“The idea was to coordinate the efforts of amateur radio operators all over the world, and send a message in Morse Code that could be received by the University of Iowa-designed-and-built instrument on the Juno spacecraft,” Donald Kirchner, University of Iowa research engineer on Juno and one of the coordinators of the project said.

“We know that over a thousand participated, and probably many more than that,” said Kirchner.

Juno did not return the greeting or even decode the message itself.

After the amateur radio operators’ messages were sent, the Juno team evaluated the Waves instrument data containing the messages after the October 9 flyby.

The message was visible early in the event when the spacecraft was still over 37,000 km from earth.

Kirchner noted that although previous space missions - Galileo on its way to Jupiter and Cassini while headed for Saturn - were able to detect shortwave radio transmissions during their Earth encounters, it was not possible to decode intelligent information using the data from those spacecraft.

“We believe this was the first intelligent information to be transmitted to a passing interplanetary space instrument, as simple as the message may seem,” Bill Kurth, UI research scientist and lead investigator for the Waves instrument said.

The “say Hi” project was made possible by the fact that Juno passed within 350 miles of the Earth’s surface on October 9 in a maneuver to gain momentum for its July 2016 encounter with Jupiter.

Plans call for Juno to orbit Jupiter 33 times. Among a variety of investigations, Juno will explore Jupiter’s northern and southern lights by flying directly through the electrical current systems that generate them.

See the video at:

Thanks to Bruce, VE5BNC, for suggesting this article.
Back in September, the Low Orbit Helium Assisted Navigator (LOHAN) team sent a mighty orb aloft on a test flight of our magnificent Vulture 2 spaceplane's rocket motor igniter.

The mission was a textbook operation, with the the payload eventually returning to terra firma within a few hundred metres of the awaiting team, at a spot predicted by the impressive Cambridge University Space Flight Landing Predictor.

Since 2008, when Rob Anderson first wrote the predictor, it's been continually updated to improve performance, and now offers anyone wanting to send a balloon aloft the chance of seeing very quickly indeed just where it'll burst and where they should head to recover their precious load.

Here's a prediction from Friday 13 December (.kmz here), showing that a launch from Area 51 in Nevada, with ascent and descent rates of 5m/s and a burst altitude of 30,000m would travel pretty well due east into Utah, where the remains of the balloon could be swiftly recovered by black helicopter squads bearing memory erasure ray guns for anyone unfortunate to have witnessed the landing:

It's clever stuff, but how does it work? We had a chat with Daniel Richman, who earlier this year followed in the footsteps of Rob Anderson, Fergus Noble, Ed Moore, Jon Sowman, Adam Greig in upgrading the predictor.

Daniel explained:

The US's National Oceanic and Atmospheric Administration (NOAA) provides (freely) wind forecasts, containing a huge amount of information, but crucially, (horizontal) wind velocity at various levels in the atmosphere. To a close enough approximation, the balloon will move at the same speed as the wind.

Combined with a simple model of how fast the balloon will rise, and how fast it will fall after it has burst, we take the position of the balloon at a certain time, the speed of the wind, and calculate where it will be a short time later using secondary school level maths ("SUVA\(T\)"); though the proper name for this is "solving an ordinary differential equation using the Euler method".

There are a couple of other subtleties: for example, instead of the wind data being provided at certain altitudes, it is provided at certain pressures, and then the actual altitudes of those pressure layers at each point on the Earth is provided separately. So we have to first work out the air pressure corresponding to the altitude of the balloon, and then look up the wind velocity at that pressure level. I assume this is to do with how the forecasting works.

Furthermore, since the velocities are provided at every half-degree of latitude/longitude, we have to interpolate to guess the wind velocity at the position of the balloon. Also there are some little details to do with converting distances in meters to changes in latitude and longitude and so forth.

The current "one-shot" prediction facility, such as the Area 51 example above, went live in 2010, and provided the data for our ill-fated playmonaut's encounter with the English Channel last December.

According to Daniel, the problem was with the NOAA servers:

For a while we had been using the OpeNDAP servers of the NOAA. Basically, the OpeNDAP server is some Java thing that the NOAA give their forecast data to, and then you can ask it for "all the data in this latitude/longitude range", which is neat, since it keeps the amount of data we have to download low. Although we are of course very grateful to the free data provided by the NOAA, these servers were becoming - for whatever reason - a bit slow and unstable. Alternatives were investigated, and we found that we could just download the underlying data from a NOAA FTP server.
Going straight to the FTP server has its downsides, as Daniel elaborated when explaining the 2013 predictor update:

Now have to download ~6-7GB, but the server that the predictor now runs on has lots of disk space and gigabit internet, so this isn't really a problem.

I wrote the new code to download and decompress (the downloaded files are in the GRIB2 format; the compression method itself is actually a variant of JPEG) this data in advance; it runs every six hours to download the new forecast from the NOAA.

The download takes about an hour, and is mainly limited by the fact that it takes about an hour for the NOAA to upload it to their FTP servers.

The download in advance means that when you push 'Run prediction', instead of waiting a minute for data to download, it starts instantly. Furthermore, we decompress the data into a 18GB binary file (referenced in my original email) purely because this means it's very quick and easy for the predictor to access the data (essentially, the binary file is a giant 5 dimensional array of double precision floats, "double dataset_array_t[65][47][3][361][720]").

By quick, I mean that the calculating stage itself now takes between 20 milliseconds and 2 seconds (depending on whether the wind data has to be read from disk or is stored in the page cache) instead of tens of seconds to load it from several files.

The long-term aim for the predictor is "to rewrite the underlying prediction code - the bit that does the actual calculation - to add features like predictions for balloons that achieve float, and so forth".

The "floater" option will certainly prove useful for LOHAN team members Dave Akerman and Anthony Stirk, who have a penchant for drifting across European airspace on long-range missions.

Back at LOHAN headquarters meanwhile, as well as one-shot predictions, we've been availing ourselves of all this hard work to examine seasonal wind conditions for the eventual launch of our Vulture 2.

Our intended launch is at 40°25'20.49"N, 5°18'0.27"W, and we'd rather like the balloon to pass within gliding distance of the Vulture 2's landing site* at 40°45'15.06"N, 5°25'3.90"W, or at the very least stay within our designated operational areas (dark blue primary, light blue extended secondary):

Here are some predictions from between April and October (.kmz here)...

...which become a bit clearer when broken down:
As you can see, the predictor demonstrated that September is the best month for the job, confirming our research on historical wind data showing predominantly south-westerly winds for pretty much the whole month.

Of course, should the wind direction not play ball, we can always shift the launch location to optimise the balloon's flight path, and with the improved predictor, we're confident it'll perform as expected.®

Further LOHAN resources:

- New to LOHAN? Try this mission summary for enlightenment.
- You can find full LOHAN coverage right here.
- Join the expert LOHAN debate down at Reg forums.
- All the LOHAN and Paper Aircraft Released Into Space (PARIS) vids live on YouTube.
- For our SPB photo archive, proceed directly to Flickr.
- We sometimes indulge in light consensual tweeting, as you can see here.

So, what does this mean for those of us flying balloons?

Let's go back to SABRE-1. For our first flights, all I had for prediction data was the historical radiosonde measurements, at best up to the last 24 hours. I used the data sets from three sites, Stony Plain, Alberta, Glasgow Montana and Flin Flon Manitoba. I first took the most recent readings from Stony Plain. Assuming that a similar weather system would be here 24 hours later these readings were the best estimate of the tomorrow's conditions. The data was manually imported into Excel and reformatted. This reformatted data was imported into a program called BalloonTrack which generated a table of positions, direction, altitudes and speeds over time. The resulting data was imported into a program called GPS Visualizer which generated a KML files that was then imported into Google Earth, producing a prediction map. This process was repeated for the Glasgow and Flin Flon data. The whole process took over an hour each time I wanted to update our prediction and was very susceptible to human error.

In 2010 a web based predictor based on BalloonTrack was developed by Near Space Ventures (http://nearspaceventures.com/w3Baltrak/readyget.pl), a ballooning group in Kansas. Last year the Cambridge University site came online. I use both of these sites for our predictions. Each uses slightly different algorithms so the resulting prediction is a bit different. By using the two sites together I can run a prediction as often as I like with different parameters such as burst altitude and ascent and decent rates. These prediction take about 5 minutes to produce one from both sites. When I want to posting the prediction to our web site adds another 10 minutes. In the end I can produce much more accurate predictions and share them with the world in a fraction of the time it used to take to produce just one.

You can see the final results including how close the final fight came to the prediction for SABRE-20 at http://ve5aa.dyndns.org/balloon/sabre_20.html

Bruce

VE5BNC
SARC 2013 Meeting Dates
January 11, 2014  February 8, 2014  March 8, 2013

The Saskatoon Amateur Radio Club hosts classes every year for those wanting to get their amateur radio license. For more information, contact us at ve5aa@rac.ca

2014 Amateur Radio Basic Classes will be held
Date: January 11, 2014
Time: 9:00 AM to 12:00 Noon
Location: WDM - 2610 Lorne Ave. S.

Cost is $100.00 for adults & $75.00 for those under 18.

Registration includes:
- Course Study Guide
- Online help
- All other study materials
- Supplies for class project

Great ham radio things to look forward to in 2014
- Meetings, meetings, meetings
- The Possible Dream
- Sharing ham radio knowledge with others
- Great breakfasts
- Good DX conditions
- SARC 2m net
- Ham Radio classes
- A short winter
- Lots of sunshine
- Contesting fun
- RAC Winter Contest
- MS Walk volunteering
- Saskatchewan Marathon
- Canada Day contest
- Field Day
- Canada Day
- Fireworks!
- Hamfests
- A great summer
- Building projects
- Family

Happy New Year