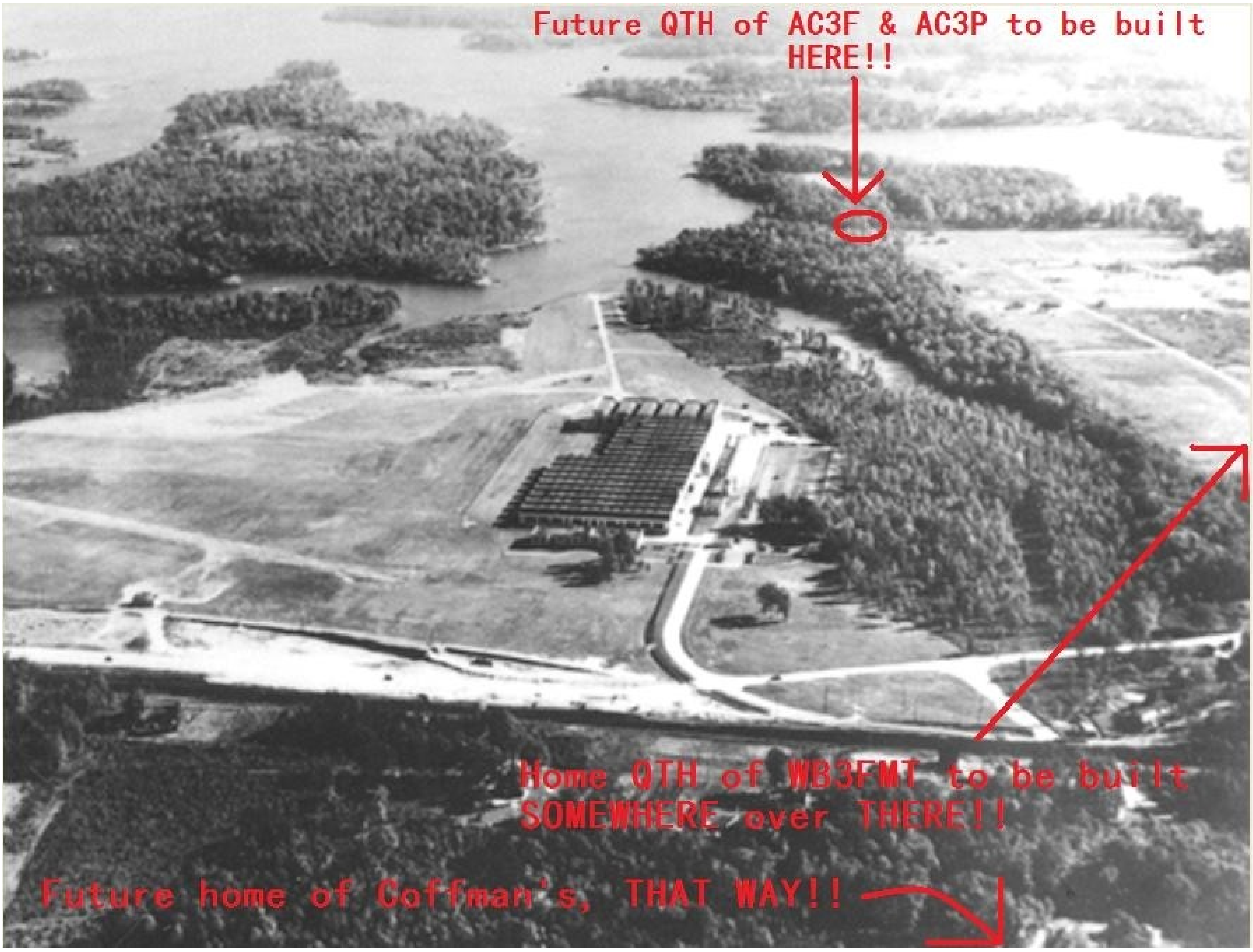
THE AERO AERIAL



Glen L Martin Co. ca 1938

The newsletter of the Aero Amateur Radio Club
Middle River, Md
Volume 8 Issue 4
April 2011

Editor Frank Stone AC3P

Officers			Committees	
Bob Landis	WA3SWA	President	Repeater	Phil Hock W3VRD
Bob Venanzi	ND3D	Vice-President	VE Testing	Pat Stone AC3F
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Pat Stone	AC3F	Corresponding Secretary	Webmaster	Al Alexander K3ROJ
Warren Hartman	W3JDF	Treasurer	Trustee	Frank Stone AC3P
Ron Distler	W3JEH	Property Mgr	Club Nets	Joe Miko WB3FMT

LOCAL AREA NETS

Day	Time	Frequency (MHz)	NET NAME
Daily	9 – 10 am	147.03	ORIOLE Net
Daily	5:30– 6 pm	3.820	Maryland Emergency Phone Net
Daily	6:30 – 7 pm	146.670	Baltimore Traffic Net
Daily	7 pm and 10 pm	3.643	Maryland/DC/Delaware Traffic Net
1st Tues	7:30 pm	145.330	Baltimore ARES Net
2nd Tues	7:30 pm	146.670	Baltimore County RACES Net
2nd Wed.	8 pm	28.445	AERO ARC Net
4th Wed	8 pm	147.240	AERO ARC Net
5th Wed.	8 pm	449.575	AERO ARC Net

The Aero Quantum Mechanics Net: Anytime any Frequency contact WB3FMT. The last one was on 449.575 MHz on Tuesday 8 pm on March 30t. Who knows where or when the next on may be?

Aero Net Reports

January

10 Meters: WB3FMT(NCS) AC3P W3JEH ND3D K3ROJ KA3SNY

2 Meters: WB3FMT(NCS) AC3P KB3QAX KB3VAE

February

10 Meters: WB3FMT(NCS) AC3P W3JEH KA3SNY

2 Meters: WB3FMT(NCS) AC3P/M AC3F KA3SNY

Station Activities

Congrats to Grandpa **ND3D** (yl or ym?). **KB3QAX** is exploring the 902 Mhz band. **AC3F** made a rare appearance on the 2 meter net. **WB3FMT** is learning Mandarin.

Repeater Antenna Down

Work Party Needed

A recent wind storm took out one of the antennas on the 2 meter repeater. Gusts of up to 60 miles per hour caused the support mast for the transmit antenna to collapse. Phil, W3VRD is looking for volunteers to help re-erect the antenna and to finally get those UPS batteries up to Kenwood. Please contact Phil for more information on date and time.

Public Service Opportunity

BRATS is looking for help with the upcoming MS Society Walk at Towson University on Sunday April 10th. Contact Bob WA3SWA to volunteer.

ABOUT THE AERO AMATUER RADIO CLUB

Meetings: First and Third Wednesdays at 7:30 pm at Coffman's Diner
(Middle River and Orem's Rd.)

Nets: See Local Area Net Schedule

Repeaters: W3PGA (147.24 MHz - / 449.575 MHz -)

WEBSITE: www.aeroarc.us

Radio Active Sun

by Joe Miko WB3FMT

We live 500 light seconds from an exploding star called the Sun. Don't panic our Sun's nuclear fusion is a controlled reaction just like hydrogen bombs, that is they convert hydrogen into helium, the formula is 4 hydrogen are fused into 1 helium atom plus excess energy. That excess energy is equal to 386 trillion trillion watts of energy, the bulk of it is gamma ray radiation. It takes about 200 thousand years for that energy to journey from the center of the sun to visible surfaces, at which time it is slowed down to visible light and radio waves. The Sun stays together because of hydrostatic equilibrium in which gravity of the Sun equals the radiation pressure this keeps the sun from blowing apart like a bomb. The sun is a small to average size star 865,000 miles in diameter which is about 109 times as wide as the Earth. It is a Yellow star about 5 billion years old and is expected to live another 5 billion years. So you can make plans for next Thursday.

We live within in a peaceful zone called the habitual zone a distance from our local star where most the water remains a liquid. This range runs from about 70 million to 120 million miles from the Sun. Just outside Venus's and inside Mars's orbits. This zone is one of the physical factors that promote life on this planet. One of the other physical factors helps promote life is that the Earth, is incased in a magnetic sphere, which is caused by the Earth's molting and rotating core. The rotation of the Earth's core acts as a generator and produces a magnetic field like a very large bar magnet. The Earth needs this magnetic field to protect the atmosphere, without it the solar wind would strip atmospheric gasses from the planet.

On earth we observe the sun on a daily basis and note changes, Beginning with the ancient Chinese who observed birds on the sun (early reporting of sunspots) to Galileo in the 1600's who first studied the sun with a telescope. Those black spots remained a mystery. But the numbers did not lie. After decades of observations it was noted that the sun goes though cycles. These sunspots cycles average about 11 years and this was based on over 400 years of daily record keeping. What astronomers found out was that when the number of sunspots increased the sun was more active. The sun emits radio waves across the electromagnetic spectrum; hams can monitor the sun in the 18-22 MHz frequency using AM mode. You will hear hums, crashes and wines all created by the sun. This is the routine noise produced by the sun. But, during the period of maximum sunspots cycle the radiation from the sunspots, solar flares and CME's can overload the Earth's protective magnetic layer and cause a radio disruption as well as electrical problems. This magnetic layer was first discovered during the early stages of space exploration.

The existence of this magnetic shield (magnetosphere) was confirmed by early space missions in 1958 and named after its discover Dr. James Van Allen. The Van Allen belts refer to the radiation belts surrounding Earth; however, similar radiation belts have been discovered around other planets. This radiation shield is only around planets that have a rotating liquid core. For neither example the Moon nor the planet Mars have this protective shield. The radiation protection missing on Mars which on Earth is provided by the magnetosphere this magnetic barrier acts as a shield that protects us from solar storms. The earth magnetic shield takes the brunt of space storms (i.e. Coronal mass ejections (CME's) and solar flares and cosmic rays).

These belts are beneficial in several ways to the Earth:

- The belts protect the upper atmosphere from being leached away by the solar winds. The solar wind is the constant flow of atomic particles from the Sun. The average speed of the solar wind measured at Earth is 400 km/sec (894,775 mph).
- Protect living organisms on the Earth from damaging Gamma ray radiation from space.
- Protects the atmosphere from intense solar radiation.

How do we know when something is going to happen on the Sun? There are a few things that man has learned since the invention of radio by Marconi in 1895.

Signs to look for:

- Where are we the current 11 year solar cycle?
- Daily activity on the Sun, solar wind, flares, CME's
- 10.7 cm solar flux
- Space Weather indexes, The alphabet of Space Weather
- Geomagnetic storm forecast
- Radio Propagation caused by Solar Sunspot Cycle Table xx

All of the items above do have an effect of radio communications used by hams and commercial users.

Solar Cycle Number 24 - We are currently in solar cycle 24. Per NASA sunspot cycle started on January 4, 2008 and is expected to peak in July 2013. (NASA Marshall Space Flight Center – Solar Physics) Figure 1. shows the yearly number of sunspots since the 1750's

Sunspots are temporary disturbances on the Sun's surface that appear dark. They appear dark because they are about 2,000 ° F. cooler the adjacent areas which are about 10,000°F. Sunspots are magnetic storms on the sun, they usually in pairs or groups of opposing polarity.

Scientists track solar cycles by counting sunspots, these are the dark spots that appear on the service of the Sun. They can range in size from less than 1,000 miles wide to larger that he planet Jupiter which is 88,000 miles wide. Sunspots are areas on the Sun where intense magnetic loops poke through the star's visible surface.

Counting sunspots is not as straightforward as it sounds. There are two official sunspot numbers in common use. The first, the daily "Boulder Sunspot Number," is computed by the NOAA Space Environment Center using a formula devised by Rudolph Wolf in 1848: $R=k\ (10g+s)$, where $\boldsymbol{R}$ is the sunspot number; $\boldsymbol{g}$ is the number of sunspot groups on the solar disk; $\boldsymbol{s}$ is the total number of individual spots in all the groups; and $\boldsymbol{k}$ is a variable scaling factor (usually <1) that accounts for observing conditions and the type of telescope (binoculars, space telescopes, etc.). Scientists combine data from lots of observatories -- each with its own k factor -- to arrive at a daily value.

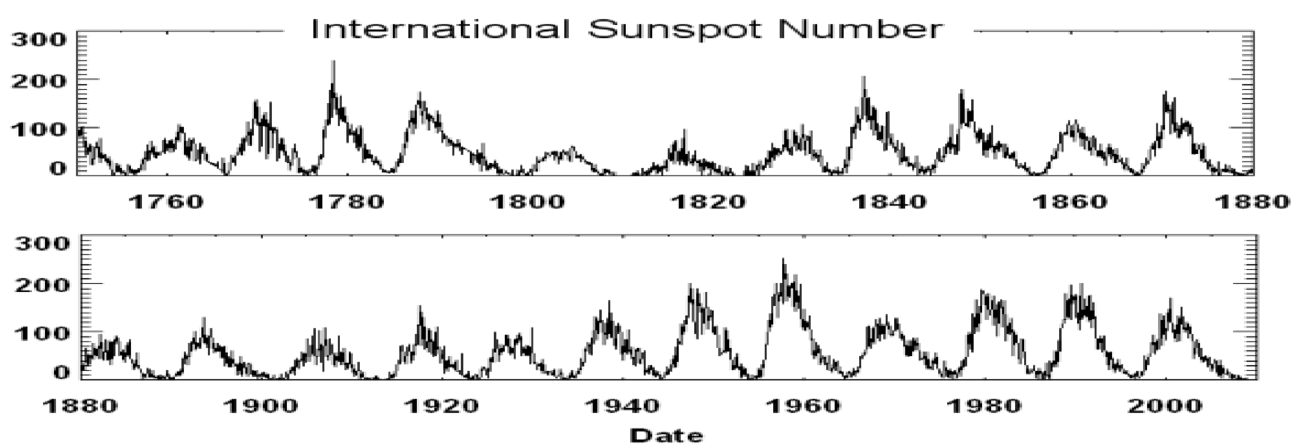


Figure1. Sunspot Numbers

As a rule of thumb, if you divide either of the official sunspot numbers by 15, you'll get the approximate number of individual sunspots visible on the solar disk if you look at the Sun by projecting its image on a paper plate with a small telescope. **Daily Sunspot numbers** can be found on the Space weather.com web site. Space Weather information is located on the left side of the display.

We know that during the peak sunspot activities radio activity is enhanced based on which band you are using see Chart 4 for Ham Bands vs. Solar Minimum /Maximum with skip layer information.

Daily activity on the Sun, solar wind, flares, CME's - The **solar wind** streams off of the Sun in all directions at speeds of about 400 km/s (about 1 million miles per hour). The source of the solar wind is the Sun's hot corona. The temperature of the corona is so high that the Sun's gravity cannot hold on to it. The solar wind speeds range from a high of 800 km/s to a low of 300 km/s). These wind speed variations buffet the Earth's magnetic field and can produce storms in the Earth's magnetosphere. The solar wind data (velocity and proton density) is presented on spaceweather.com are updated every 10 minutes. They are derived from real-time satellite information. This satellite is located between the earth and the sun and provides about a 1 hour advance warning of geomagnetic activity. **Solar Wind speed and density** can be found on the Space weather.com web site. Space Weather information is located on the left side of the display.

Solar flares are tremendous explosions on the surface of the Sun. In a matter of just a few minutes they heat material to many millions of degrees and release as much energy as a billion megatons of TNT. They occur near sunspots between areas of oppositely directed magnetic fields.

Flares release energy in many forms - electro-magnetic (Gamma rays and X-rays), energetic particles (protons and electrons), and mass flows. Flares are characterized by their brightness in X-rays (X-Ray flux). The biggest flares are X-Class flares. M-Class flares have a tenth the energy and C-Class flares have a tenth of the X-ray flux seen in M-Class flares. Although solar flares can be visible in white light, they are often more readily noticed via their bright X-ray and ultraviolet emissions. **Solar Flare information** can be found on the Space weather.com web site. Space Weather information is located on the left side of the display.

Coronal mass ejections (CME) often accompany solar flares, though scientists are still trying to determine exactly how the two phenomena are related. Solar flares burst forth from the intense magnetic fields in the vicinity of active regions on the Sun. Solar flares are most common during times of peak solar activity, the "solar max" years of the sunspot cycle. CMEs are huge bubbles of gas threaded with magnetic field lines that are ejected from the Sun over the course of several hours. Although the Sun's corona has been observed during total eclipses of the Sun for thousands of years, the existence of coronal mass ejections was unrealized until the space age. Also CME's are often associated with solar flares and prominence eruptions (Prominences are dense clouds of material suspended above the surface of the Sun by loops of magnetic field) but they can also occur in the absence of either of these processes. The frequency of CMEs varies with the sunspot cycle. **CME information** can be found on the Space weather.com web site. Space Weather information is located on the left side of the display.

10.7 cm solar flux - Probably the best available index of solar activity, at least covering the last six decades or so, is the *10.7-cmflux, or F10.7.* This index is an objective measurement of the integrated emission at the 10.7-cu wavelength (a frequency of 2.8 GHz) from all sources present on the solar disk. It has been measured daily for nearly 60 years and is now used worldwide as a primary index of solar activity. The 10.7 cm solar flux ***(F 10.7)*** is expressed in solar-flux units (1 sfu = $10^{'22}$ W-m-2^Hz-1). The 10.7-cm flux can be measured in all weather conditions and requires no interpretation. The quiet Sun produces a flux of 64 sfu. This becomes a low level baseline. Solar activity can dramatically affect our lives. Magnetic storms due to solar activity induce currents in communications and power transmission systems having long-distance wires, disrupting their Operation for hours. The power blackouts in Quebec were caused a large flare on March 10, 1989.

Increased X-ray emissions from flares cause enhanced ionization of Earth's atmosphere at D-region heights (about 60 miles), producing blackouts of shortwave communications. **10.7 cm solar flux in sfu's** can be found on the Space weather.com web site. Space Weather information is located on the left side of the display.

Space Weather indexes, The alphabet of Space Weather - (G, S, R; C, M, X; Kp) – Space Weather indexes are based on a number of criteria's, Geomagnetic, Solar Radiation Storms, Radio Blackout, Solar Flares.

National Oceanic and Atmospheric Administration (NOAA) Space Weather Scales

The NOAA Space Weather Scales were introduced as a way to communicate to the general public the current and future space weather conditions and their possible effects on people and systems. The scales describe the environmental disturbances for three event types: geomagnetic storms, solar radiation storms, and radio blackouts. The scales have numbered levels that convey severity. They list possible effects at each level. Chart 1, shows the NOAA Geomagnetic Storm Scale.

Geomagnetic Storms – Are disturbances in the geomagnetic field caused by gusts in the solar wind that blows by Earth. The ranges go from G5 (Highest) to G1 (Lowest). Each scale lists the possible effects on Electrical Power Systems, Spacecraft operations and Other systems (such as pipelines, radio communication and others).

NOAA Space Weather Scale Geomagnetic Storms

Scale	Severity	Effects	Kp Value
G5	Extreme	Power systems: widespread voltage control problems and protective system problems can occur; some grid systems may experience complete collapse or blackouts. Transformers may experience damage. Spacecraft operations: may experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites. Other systems: pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.)**.	Kp=9
G4	Severe	Power systems: possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. Spacecraft operations: may experience surface charging and tracking problems, corrections may be needed for orientation problems. Other systems: induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.)**.	Kp =8
G3	Strong	Power systems: voltage corrections may be required; false alarms triggered on some protection devices. Spacecraft operations: surface charging may occur on satellite components, drag may	Kp=7

		increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. Other systems: intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.) **	
G2	Moderate	Power systems: high-latitude power systems may experience voltage alarms; long-duration storms may cause transformer damage. Spacecraft operations: corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. Other systems: HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.)**.	Kp=6
G1	Minor	Power systems: weak power grid fluctuations can occur. Spacecraft operations: minor impact on satellite operations possible. Other systems: migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine) **.	KP=5

** For specific locations around the globe, use geomagnetic latitude to determine likely sightings (see www.sec.noaa.gov/Aurora)

Chart 1. NOAA Geomagnetic Storm Scale

This scale also includes the Kp Index (which is an indicator of the intensity of Aurora and where they can be seen). Cornell University scientists have determined geographic points for the southern edges of auroral displays. The curves represent four values of the planetary index (Kp). As this index increases, the aurora's southern edge moves southward. The larger the Kp number the further south an aurora can be seen. Just a note the geomagnetic location of a city is not same as its latitude. Latitude is taken from the physical location of the North Pole (just under the North Star Polaris). The Earth's magnetic pole is located in northern Canada at 80.1°N and 72.3°W, Therefore the magnetic latitude of Baltimore, Maryland is 49° with its actual latitude being 39°17' N. Figure 2. Shows the Kp Index for Auroras.

The K-index is therefore updated every three hours and the information is made available to our customers as soon as possible. The K-index is also necessarily tied to a specific geomagnetic observatory. For locations where there are no observatories, one can only estimate what the local K-index would be by looking at data from the nearest observatory, but this would be subject to some errors from time to time because geomagnetic activity is not always spatially homogenous. Another item of interest is that the location of the aurora usually changes geomagnetic latitude as the intensity of the geomagnetic storm changes. The location of the aurora often takes on an 'oval-like' shape and is appropriately called the auroral oval. A useful map of the approximate location of the auroral oval as a function of the Kp-index was published in the June 1968 copy Sky & Telescope (see page 348). The Kp index is derived through by an algorithm that essentially averages the K-indices from several stations. Note that as a storm becomes more intense, the edge of the auroral boundary typically moves to lower latitudes.

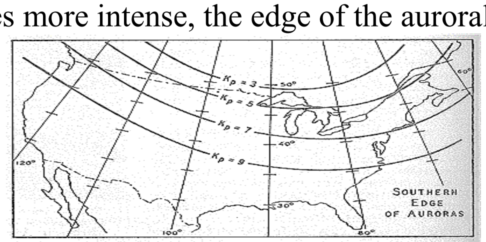


Figure 2. Kp Indexr for Auroras

Solar Radiation Storms are caused by the elevated levels of radiation that occur when the numbers of energetic particles increase. Solar radiation storms are swarms of electrons, protons and heavy ions accelerated to high speed by explosions on the sun. Here on Earth we are protected from these particles by our planet's atmosphere and magnetic field. Astronauts in Earth orbit are fairly safe, too; Earth's magnetic field extends out far enough to shield them. The danger begins when astronauts leave this protective cocoon. The Moon and Mars, for instance, have no global magnetic fields, and "astronauts working on the surface of those worlds could be at risk," states NASA.

Solar Radiation Storms – Are caused by swarms of electrons, protons and heavy ions accelerated to high speed by explosions on the sun. The range for Solar Storm ranges from S5 (Highest) to S1 (Lowest). Each scale list the possible effects on Biological, Satellite operations and Other systems (such, radio communication and others). Chart 2 NOAA Solar Radiation Storms.

NOAA Space Weather Scale Solar Radiation Storms

Scale	Severity	Effects
S5	Extreme	Biological: unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. *** Satellite operations: satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage to solar panels possible. Other systems: complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult
S4	Severe	Biological: unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.*** Satellite operations: may experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. Other systems: blackout of HF radio communications through the polar regions and increased navigation errors over several days is likely.
S3	Strong	Biological: radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.*** Satellite operations: single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely. Other systems: degraded HF radio propagation through the polar regions and navigation position errors likely.
S2	Moderate	Biological: passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk.*** Satellite operations: infrequent single-event upsets possible. Other systems: effects on HF propagation through the polar regions, and navigation at polar cap locations possibly affected.
S1	Minor	Biological: none. Satellite operations: none. Other systems: minor impacts on HF radio in the polar regions.

*** Flux levels are 5 minute averages. ** These events can last more than one day. *** High energy particle measurements (>100 MeV) are a better indicator of radiation risk to passenger and crews. Pregnant women are particularly susceptible.**

Chart 2. Solar Radiation Storms

Radio Blackouts: Are disturbances of the ionosphere caused by X-ray emissions from the Sun. The range for Radio Blackouts ranges from R5 (Highest) to R1 (Lowest). Each scale list the possible effects on Biological, Satellite operations and Other systems (such, radio communication and others). Chart 3. NOAA Radio Blackouts.

NOAA Space Weather Scale Radio Blackouts

Scale	Severity	Effects	Peak X-ray Flux
R5	Extreme	HF Radio: Complete HF (high frequency**) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector. Navigation: Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.	X20 ($2x10^{-3}$)
R4	Severe	HF Radio: HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time. Navigation: Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.	X10 (10^{-3})
R3	Strong	HF Radio: Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth. Navigation: Low-frequency navigation signals degraded for about an hour.	X1 (10^{-4})
R2	Moderate	HF Radio: Limited blackout of HF radio communication on sunlit side, loss of radio contact for tens of minutes. Navigation: Degradation of low-frequency navigation signals for tens of minutes.	M5 ($5x10^{-5}$)
R1	Minor	HF Radio: Weak or minor degradation of HF radio communication on sunlit side, occasional loss of radio contact. Navigation: Low-frequency navigation signals degraded for brief intervals.	M1 (10^{-5})

** Other frequencies may also be affected by these conditions.

Chart 3. NOAA Radio Blackouts.

Radio propagation is normally enhanced during the time of Solar Maximum, the major disruption occur during Extreme and Severe solar activities such as flairs and CME's. Chart 4 provided information from the ARRL Handbook on propagation information for the various ham bands.

Radio Propagation caused by Solar Sunspot Cycle

Band – Freq. Day Time Range	Atmospheric Region (D,E,F) Day	Night	Solar Minimum	Solar Maximum	Notes
160 m 90 miles	Extreme daytime	Night time	None	None	Winter evening's

1.8-2.0MHz	D absorption	via F2 layer			best.
80 m 250 miles 3.5 – 4.0 MHz	Less than 160m	Night time via F2 layer	None	None	Best in winter
60 m < 500 miles 5.330.5	Less absorption on D layer		May be open for worldwide DX	None	5 channels USB 50wERP only
40 m 500 miles 7.0 – 7.3 MHz	Less absorption on D layer		May be open for worldwide DX	None	Good for all seasons
30 m 1,900 miles 10. – 10.15MHz	Open via F2	Up to 12,000 miles at night	Degraded during solar minimum	None	Good for long distance communications
20 m 14.0 -14.35MHz	F2 propagation		None	Only open during daylight hours.	Atmospheric noise not a problem.
17 m 18.068 – 18.168MHz	F2 propagation		None	Only open during daylight hours.	
15 m 21.0 -21.450 MHz	F2, E early summer, mid winter		None	Prime DX band	Day time only
12 m 24.89 – 24.99 MHz	E		Day time during low cycles	Well after sunset during maximums	Late spring thru summer
10 m 190-1,400 miles 28.0 – 29.7 MHz	F2, E skip			Low power maximum distances	
6 m 190 miles 50 – 54MHz	Tropospheric scatter			Worldwide DX is possible	Auroral and meteor scatter
2 m 1,400miles 144 – 148 MHz	Transequatorial spread	E layer Aurora	None	None	Auroral and meteor scatter
135 cm 1,400miles	Transequatorial spread	E layer Aurora but < 2m	None	None	Auroral and meteor scatter

222 – 225 MHz					
70 cm 950 miles 420 – 450 MHz	Some E layer	E layer Aurora but < 2m	None	None	Auroral and meteor scatter
33 cm 190miles 902-928 MHz	Tropospheric ducting	E layer Aurora but < 70cm	None	None	Auroral and meteor scatter

For additional information one can search the NASA web sites for Solar activities and also look at the Space Weather information listed daily on the astronomy web site “spaceweather.com”.

New Exam Format

On April 1st the VE team is switching VECs. After 10 years as an ARRL team, our VE's will be joining the
ACME Test System. As a result applicants taking tests will see a new test format.

Here is an example of a typical test queation.

ARRL Format:

4. What is impedance?

A. The opposition to the flow of current in an AC circuit

B. The electric charge stored by a capacitor

C. The force of repulsion between two similar electric fields

D. The inverse of resistance

ACME Format:

4. What is impedance?

Eanie. The opposition to the flow of current in an AC circuit

Meanie. The electric charge stored by a capacitor

Mienie. The force of repulsion between two similar electric fields

Moe. The inverse of resistance

From the Skies over Mt. Essex

SKY Events for April 2011

April 3rd - New Moon and Saturn is at opposition.

April 6th – Jupiter in conjunction with the Sun.

April 7th – Moon is 1.9° South of Pleiades (M45) at 6 a.m. EDT.

April 9th – Mercury in inferior conjunction.

April 11th – First Quarter Moon

April 17th – Saturn is 8° North of the Moon at 4 a.m.

April 17th - Full Moon "Pink Moon" Native American tribes or "Planter's Moon" the Colonial Americans.

April 19th – Mercury is 0.8° North of Mars at 4 a.m.

April 22nd – Venus is 0.9° of Uranus at 3 p.m. EDT. Lyrid meteor shower peaks at 7 p.m. EDT.

April 24th - Last Quarter Moon.

April 27th – Moon passes 6° North of Uranus at midnight.

April 30th – Moon passes 7° North of Venus at 7 p.m. EDT.

Planet Lookout

Mercury – Reappears in the dawn sky during the 2nd half of the month.

Venus – Brilliant in Eastern sky at dawn -3.5 magnitude.

Mars – In eastern sky at dawn + 1.1 magnitude.

Jupiter- Visible in morning by months ends -2.1 magnitude.

Saturn- At +0.4 magnitude in the East at dusk.

No Fooling Partly Sunny or Partly Cloudy?

It all depends on the type of clouds and the amount of cloud coverage. There are 10 families of clouds. And these are broken in to 4 groups based on their altitude; High Clouds, Middle Clouds; Low Clouds and Clouds of Great Vertical Development. Each group of clouds has multiple sub-sets but for brevity I will list the major ones. High level clouds are called "Cirrus' meaning curl of hair or wispy are at an altitude of 16,500 – 50,000 feet. Middle level clouds are called "Alto" cumulus meaning middle is at an altitude of 6,500 – 16,000feet. These clouds are grayish not white. Low level clouds are called "Nimbostratus" meaning cloud and are at an altitude of ground (fog) – 6,500 feet. These clouds are grayish to dark gray. Clouds of great vertical development are "Cumulonimbus" thunder storm clouds with the anvil-shaped top. There altitude ranges from ground level to 70,000 feet.

The National Weather Service (NWS) has procedures on how to determine whether it is cloudy or not. It can be found in their "Zone Forecast Guidelines and Procedures". The NWS divides the sky in to 8th, 1/8 = 22 ½° (remember the sky is 180 ° from horizon to horizon) or 12.5% of the sky. And cloud cover is the amount of opaque meaning an observer cannot see through the clouds; the sun, moon, stars and blue sky are hidden.

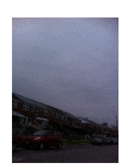
Day	Night or Day	Predominant Sky Condition
Cloudy	Cloudy	8/8 cloud cover
Mostly Cloudy	Mostly Cloudy	5/8 – 7/8 clouds
Considerable Cloudiness	Considerable Cloudiness	
Partly Sunny	Partly Cloudy	3/8 – 4/8 clouds
Scattered Clouds	Scattered Clouds	
Fair	Fair	< 3/8 clouds
Mostly Sunny	Mostly Clear	1/8 – 2/8 clouds
Sunny	Clear	0/8 clouds

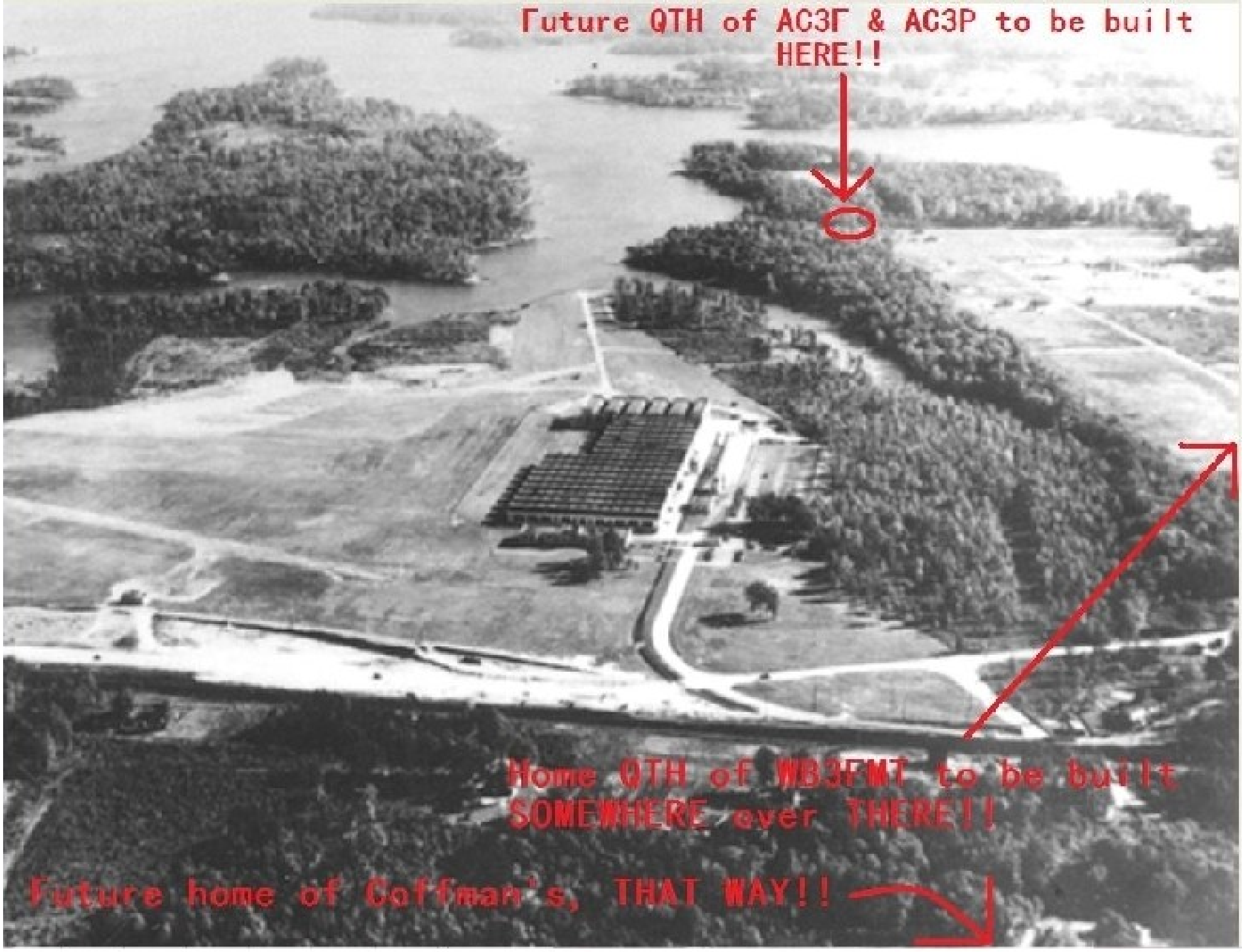
In terms of average sky cover:

Cloudy 90% - 100%
Mostly Cloudy 70% - 80%
Partly Cloudy 30% - 60%
Partly Sunny; Mostly Clear; Mostly Sunny 10% – 30%
Clear or sunny 0% – 10%

Fair is less than 40% cloud cover with no precipitation or weather extremes expected.







April 2011

					1	2
3	4	5	Meeting Coffman's 7:30 pm 6	7	8	York Hamfest Springrove Pa. www.yorkhamfest.org 9
MS Walk Towson U contact WA3SWA 10	11	12	10 Meter Net 28.445 Mhz 8 pm 13	14	15	16
ARRL Rookie Roundup SSB 17	18	19	Meeting Coffman's 7:30 pm 20	21	22	23
24	25	26	2 Meter Net 147.24 Mhz 8 pm 27	28	29	Hagerstown Hamfest www.w3cwc.org 30