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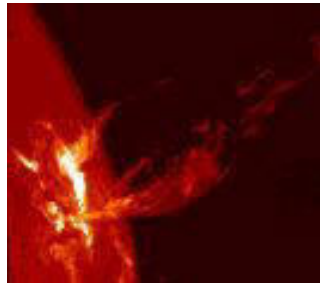
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NOTE! On January 1, 2000 I retired from "for profit" space weather forecasting. As of Thursday April 28, 2005 I've decided to retire from "not for profit" space weather forecasting too. Therefore I will no longer produce propagation outlooks. However I will leave it up as an archive reference.



2005

KN4LF DAILY LF/MF/HF FREQUENCY RADIO PROPAGATION OUTLOOK

Current Time:

18:39:12 UTC 06:39:12 PM EDT

[KN4LF LF/MF/HF FREQUENCY RADIO PROPAGATION THEORY NOTES](#)
[Layman Level Explanations Of Seemingly Mysterious LF/MF/HF Propagation Occurrences](#)

[KN4LF SOLAR SPACE WEATHER GEOMAGNETIC PROPAGATION ARCHIVE HOME](#)

Standard Disclaimer-

Note! I use "RAW" and error prone public domain data from the NOAA Space Environment Center, as well as other U.S. government organizations, to produce my "not for profit" propagation forecast outlooks. This data is gathered and made public by the U.S. Government using taxpayer \$\$\$\$. However the forecast outlooks that I produce from the "RAW" public domain data, is my personal intellectual property. Therefore the propagation outlooks contained herein is copyrighted © 1988-2005 by Thomas F. Giella, KN4LF. Reproduction of information herein is allowed as long as proper credit is given. Also space weather forecasting is still an inexact science. The discussions, forecasts and outlooks are not official but for educational purposes only and are subject to human error and acts of God, therefore no guarantee or warranty implied.

Note! For those that would like to chat with me about solar, space weather and

[geomagnetic goings on I'm on Yahoo IM and my ID is thomasgiella.](#)

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-016

<http://www.kn4lf.com/kn4lf5.htm> <http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Thursday 04/21/2005 At 2200 UTC Valid 04/22-28/2005

DISCUSSION-

Overall the past seven day period was quiet. However due to a high velocity solar wind stream emanating from recurrent northern hemisphere geoeffective coronal hole #158, we have seen a brief period of minor geomagnetic storming today. Today has seen 3 hours of minor geomagnetic storming (Kp-5) and 12 hours of active geomagnetic (Kp-4) conditions.

Due to the continued low daily sunspot count we experienced reduced MUF's that negatively impacted 10, 12 and 15 meters. But there were some Sporadic E (Es) openings on 6, 10 and 12 meters.

In the northern hemisphere MUF's were also reduced due to seasonal chemical changes in the F layer of the ionosphere.

There was minor night time signal absorption on the MF AM broadcast band, 160 and 120 meters on high latitude propagation paths.

There was minor night time signal absorption on the LF band and minor day time enhanced propagation conditions on high latitude paths.

At times intense lightning QRN hampered receive conditions on 160, 80, 40, 30 and 20 meters.

With the daily sunspot number and vaguely related solar flux on the decline and also due to seasonal chemical changes in the F layer we will not see any appreciable east-west F layer propagation in the Northern Hemisphere on 10, 12 and 15 meters due to lower MUF's.

However trans-equatorial HF propagation between South America and Europe will occur, as well between southern Africa to central Asia and Australia to central Asia.

I expect minor night time signal absorption on the MF AM broadcast band, 160 and 120 meters on high latitude propagation paths to continue.

I expect minor night time signal absorption on the LF band and minor day time

enhanced propagation conditions on high latitude paths to continue.

Occasionally high lightning QRN levels will continue to plague amateur and SWL radio operations on 160-20 meters thanks to the continuing weak El Nino, mainly in eastern Oceania and North and South America, including the Caribbean.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

04/22-23/2005 Kp 4-5.

04/24/2005 Kp 3-4.

04/25-28/2005 Kp 0-3.

During the period quiet (Kp 0-2) geomagnetic conditions "WILL OCCUR".

During the period unsettled to active (Kp 3-4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp 5) geomagnetic storming "IS PROBABLE".

During the period moderate (Kp 6) geomagnetic storming is "POSSIBLE".

During the period strong to extreme (Kp-7 9) geomagnetic storming "WILL NOT OCCUR".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "LOW".

The chance of daylight side SID radio blackouts from solar flares is "LOW".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "LOW".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH", #'s 158, 159, 160.

Daily solar flux levels should range between 80-70.

No geoeffective (Earth Facing) sunspot groups currently contain a beta-gamma twisted magnetic signature capable producing M and X class solar flares.

The chance of a small C class solar flare is MEDIUM".

The chance of a large M class solar flare is "LOW".

The chance of a huge X class solar flare is "LOW".

Propagation Forecast Scales-

LOW- 25%

MEDIUM- 50%

HIGH- 75%

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Fair to poor.

Nighttime- Poor to fair for ham signals, fair to good for broadcast signals.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low: 0-25 degrees

Mid: 25-60 degrees

High: 60-90 degrees

Low Latitude- Good.

Mid Latitude- Good.

High Latitude- Good to fair.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect POOR TO FAIR "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

***Expect POOR TO FAIR "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.**

+Expect GOOD TO FAIR "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100.

-Expect POOR TO FAIR "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect GOOD TO FAIR "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

***Expect POOR TO FAIR conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be FAIR.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be POOR to FAIR.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be POOR to FAIR.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR to GOOD.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR to GOOD.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in excess of 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere "high latitude" propagation conditions in excess of approximately 3200 miles should be FAIR.

Equatorial region to Southern Hemisphere "high latitude" propagation conditions in excess of 3200 miles should be FAIR.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9
Fair- S4-6
Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA
(See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

<https://thunderstorm.vaisala.com/tux/jsp/explorer/explorer.jsp>

http://www.nrlmry.navy.mil/nexsat_pages/mosaic/CONUS/focus_regions/Full/Overview/li

During the 7 day outlook period there will be "HIGH TO MODERATE" lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect "HIGH TO MODERATE" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "MODERATE TO LOW" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH TO MODERATE" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH TO MODERATE" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE TO LOW" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 04/15-21/2005**Sunspot Groups-**

No sunspot group contained a beta-gamma or delta twisted magnetic signature that produced M or X class solar flares.

Solar Flux Readings- 85.4-77.0. My forecast was for 90-75

SEC Sunspot Number- 61-39

Solar Wind Speed- 550-322

Solar Flares- C-3 M-0 X-0

Averaged Daily Background X-Ray Flux- A5.5- A2.5

Dst Index- -55 to +14

Elevated Energetic Protons >10 MeV (10+o)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 2, #'S 157, 158

No polar cap absorption on high latitude propagation paths occurred due to excessive energetic protons >10 Mev (10+0).

The Ap index has been at quiet to minor geomagnetic levels, with a range of 3-48.

The Kp index has been at quiet to minor geomagnetic storming levels, with a range of 1 to 5.

The Boulder mid latitude K index has been at quiet to minor geomagnetic storming levels, with a range of 0 to 5.

The high latitude K index has been at quiet to moderate geomagnetic storming levels, with a range of 0 to 6.

TODAY'S PROPAGATION LESSON –

20.) Sudden Stratospheric Warming (STRATWARM ALERT)-

Sudden stratospheric warming is a major temperature change of the winter time polar and middle atmosphere from the Tropopause (where the troposphere transitions into the stratosphere) to the base (D-layer) of the ionosphere, lasting for many days at a time and characterized by a warming of the stratospheric temperature by some tens of degrees (temperature inversion), in unison with adjacent tropospheric cooling.

Another way to explain stratospheric warming is a major disturbance of the winter polar middle atmosphere from the Tropopause to D-region which is at the base of the Mesosphere resulting from a breakdown of the polar vortex into two circulation cells. Air trapped in the vortexes is mixed by the new meridional flow and is exposed to sunlight. Solar Lyman alpha ionizes the nitric oxide gasses resulting in an increase in electron density and producing strong MF and HF absorption.

A little related Troposphere Meteorology:

Interrelated with the splitting and shifting of the Arctic Circumpolar Vortex, is a Troposphere level negative North Atlantic Oscillation (NAO) and Pacific-North America Anomaly (PNA), mid and upper air height anomaly pattern. This equates to a large high pressure ridge in Western North America extending northward all the way into the Yukon region of Canada and a deep trough in the Eastern North America, from the eastern U.S. extending down into the Yucatan region of Mexico, with a second ridge in the western North Atlantic Ocean. This pattern is also called a dual blocking ridge and taps Siberian Arctic air, sending it across the North Pole into the eastern 2/3's of Canada and the U.S. providing for very cold surface temperatures.

As the stratosphere lies below the ionosphere, which is at mesosphere and thermosphere height, you would not expect to see stratospheric warming effect medium frequency propagation in any way BUT medium frequency signals do propagate off of temperature inversions and moisture discontinuities and a temperature inversion is involved with stratospheric warming. So it's probable that a medium frequency signal could do any number of things when scattering off of a temperature inversion, at any height. Unfortunately though some otherwise very knowledgeable Physicists stubbornly resist this concept.

You can almost always correlate the coldest weather occurrences with poor medium frequency propagation conditions.

Also Stratospheric Warming (STRATWARM) has a negative effect on medium frequency propagation, due to increasing medium frequency radio wave absorption by the D layer, via upward propagating Internal Buoyancy/Gravity Waves (IBGW's).

This phenomenon also occurs in southern hemisphere winter but is less pronounced.

[Click Here For The U. Of Berlin Germany Stratospheric Research Group Layer](#)

For more information go to KN4LF LF/MF/HF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

*****Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.**

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is to low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.

4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.

5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.

6.) Energetic protons no greater then 10 MeV (10+0) for 160/120 meters and no greater then (10-1) on MF AM broadcast band.

7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less then B9 for MF broadcast band but A9 or less is best.

8.) No current STRATWARM alert.

9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.

10.) A -

50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9

G4 = Severe Storm - Kp = 8

G3 = Strong Storm - Kp = 7

G2 = Moderate Storm - Kp = 6

G1 = Minor Storm - Kp = 5

Active - Kp = 4

Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-015

<http://www.kn4lf.com/kn4lf5.htm> <http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Thursday 04/14/2005 At 1700 UTC Valid 04/15-21/2005

DISCUSSION-

In my last outlook I forecasted a low probability of significant geomagnetic storming commencing on 04/12/2005, due to a high velocity solar wind stream emanating from recurrent northern hemisphere coronal hole #157.

Well the geomagnetic storming did commence on that date BUT was much stronger than I expected, so I consider that part of my forecast in error. The period 04/12-14/2005 saw 3 hours of moderate geomagnetic storming (Kp-6), 12 hours of minor geomagnetic storming (Kp-5) and 30 hours of active geomagnetic (Kp-4) conditions.

Due to the continued low daily sunspot count we experienced reduced MUF's that negatively impacted 10, 12 and 15 meters. But there were some Sporadic E (Es) openings on 6, 10 and 12 meters.

In the northern hemisphere MUF's were also reduced due to seasonal chemical changes in the F layer of the ionosphere.

There was major night time signal absorption on the MF AM broadcast band, 160 and

120 meters on high latitude propagation paths.

There was moderate night time signal absorption on the LF band and minor day time enhanced propagation conditions on high latitude paths.

At times intense lightning QRN hampered receive conditions on 160, 80, 40, 30 and 20 meters.

With the daily sunspot number and vaguely related solar flux on the decline and also due to seasonal chemical changes in the F layer we will not see any appreciable east-west F layer propagation on 10, 12 and 15 meters due to lower MUF's.

I expect HF propagation conditions to rapidly improve on 17-40 meters by 04/15/2005.

I expect LF and MF propagation conditions to only slowly improve with time due to high residual electron levels precipitating along magnetic force lines into the equatorial ring current.

Occasionally high lightning QRN levels will continue to plague amateur and SWL radio operations on 160-20 meters thanks to the continuing weak El Nino, mainly in eastern Oceania and North and South America, including the Caribbean.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet (Kp 0-2) geomagnetic conditions "WILL OCCUR".

During the period unsettled to active (Kp 3-4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp 5) geomagnetic storming "IS PROBABLE".

During the period moderate (Kp 6) geomagnetic storming is "POSSIBLE".

During the period strong to extreme (Kp-7 9) geomagnetic storming "WILL NOT OCCUR".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "LOW".

The chance of daylight side SID radio blackouts from solar flares is "LOW".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "LOW".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH", #157.

Daily solar flux levels should range between 90-75.

No geoeffective (Earth Facing) sunspot groups currently contain a beta-gamma twisted magnetic signature capable producing M and X class solar flares.

The chance of a small C class solar flare is "MODERATE".

The chance of a large M class solar flare is "LOW".

The chance of a huge X class solar flare is "LOW".

Propagation Forecast Scales-

LOW- 25%

MEDIUM- 50%

HIGH- 75%

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Fair then slowly becoming poor.

Nighttime- Poor then slowly becoming fair for ham signals, fair then slowly becoming good for broadcast signals.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low: 0-25 degrees

Mid: 25-60 degrees

High: 60-90 degrees

Low Latitude- Good.

Mid Latitude- Good.

High Latitude- Fair then becoming good by 04/16/05

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect POOR TO FAIR "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

*Expect POOR TO FAIR "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

+Expect GOOD TO FAIR "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100.

-Expect POOR TO FAIR "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect GOOD TO FAIR "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

***Expect POOR TO FAIR conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be GOOD.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be POOR but slowly becoming FAIR.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be POOR but slowly becoming FAIR.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Southern Hemisphere “mid latitude” propagation conditions in excess of 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere “high latitude” propagation conditions in excess of approximately 3200 miles should be FAIR but becoming GOOD.

Equatorial region to Southern Hemisphere “high latitude” propagation conditions in excess of 3200 miles should be FAIR but becoming GOOD.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9

Fair- S4-6

Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA

(See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

<https://thunderstorm.vaisala.com/tux/jsp/explorer/explorer.jsp>

During the 7 day outlook period there will be “HIGH TO MODERATE” lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect “HIGH TO MODERATE” lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect “MODERATE TO LOW” lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be “HIGH TO MODERATE” lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect “HIGH TO MODERATE” lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE TO LOW" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 04/08-14/2005

Sunspot Groups-

No sunspot group contained a beta-gamma or delta twisted magnetic signature that produced M or X class solar flares.

Solar Flux Readings- 88.7-83.4. My forecast was for 90-75.

SEC Sunspot Number- 56-17

Solar Wind Speed- 652-294

Solar Flares- C-2 M-0 X-0

Averaged Daily Background X-Ray Flux- B1.0 – A4.6

Dst Index- -67 to +8

Elevated Energetic Protons >10 MeV (10+o)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 3, #'S 155, 156, 157

No polar cap absorption on high latitude propagation paths occurred due to excessive energetic protons >10 Mev (10+0).

The Ap index has been at quiet to major geomagnetic levels, with a range of 0-67.

The Kp index has been at quiet to moderate geomagnetic storming levels, with a range of 0 to 6.

The Boulder mid latitude K index has been at quiet to minor geomagnetic storming levels, with a range of 0 to 5.

The high latitude K index has been at quiet to moderate geomagnetic storming levels, with a range of 0-6.

TODAY'S PROPAGATION LESSON –

19.) Long Delayed Echo (LDE)-

A fairly common propagation mechanism by which an RF transmitted signal returns to the sender within 1.25-5 seconds and in rare cases of up to 30 seconds. Research in the 1980's with HF OTHR discovered one propagation mechanism which involves ducting of the transmitted signal in the E-valley-F layer region of the ionosphere. A signal traveling along a magnetic field line much like a lightning induced whistler is another possibility.

The best time to observe an LDE is during the Fall/Spring equinox period when conditions are more balanced in the ionosphere. LDE's are very noticeable on amateur and SW broadcast signals between 17-28 mc with a peak near the maximum usable frequency (MUF). As recently as fall 2003 I did my own brief experiments using Morse code (CW) on the 15 meters band. I personally observed LDE's of my own transmitted signal of approximately 1.5-3 seconds and I could hear a mushy kind of doppler shift on my returned signal frequency.

Claims of very long delayed echo's (VLDE) on the order of hours and even days have been reported since the beginning of radio. Time periods of this magnitude would point to the "seeming possibility" of a refracting ionospheric type medium outside of Earth's own ionosphere, possibly somewhere past Pluto in the Oort Cloud. However no evidence so far has been found of such a medium and 99% of reported VLDE's are "probably" hoaxes.

Also on a different subject, there has been much speculation recently that present sunspot cycle #23 will be ending sooner than originally forecasted.

I personally disagree with that premise. While we have had some days recently where the Earth facing side of the Sun has been spotless, at the same time helioseismic holograph imagery has shown sunspot groups on the far side of the Sun. Also the number and strength of coronal holes has yet to diminish.

I think that solar cycle 23 will bottom out somewhere in 2007 as originally forecasted.

For more information go to KN4LF LF/MF/HF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

*****Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.**

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is

best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is too low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

- 3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.
- 4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.
- 5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.
- 6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.
- 7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.
- 8.) No current STRATWARM alert.
- 9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.
- 10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9
 G4 = Severe Storm - Kp = 8
 G3 = Strong Storm - Kp = 7
 G2 = Moderate Storm - Kp = 6
 G1 = Minor Storm - Kp = 5
 Active - Kp = 4
 Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
 Ap 50-99 Major Storm
 Ap 30-49 Minor Storm
 Ap 16-29 Active
 Ap 8-15 Unsettled
 Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-014

<http://www.kn4lf.com/kn4lf5.htm> <http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Thursday 04/07/2005 At 1900 UTC Valid 04/08-14/2005

DISCUSSION-

Per my forecast geomagnetic storming did occur but I was off by approximately 36 hours.

The period 04/01-07/2005 saw six hours of strong geomagnetic storming (Kp-7) and six hours of minor geomagnetic storming (Kp-5).

Mid latitudes saw six hours of moderate geomagnetic storming (Kp-6) and three hours of minor geomagnetic storming (Kp-5).

High latitudes saw six hours of severe geomagnetic storming (Kp-8), nine hours of strong geomagnetic storming (Kp-7), three hours of moderate geomagnetic storming (Kp-6) and six hours of minor geomagnetic storming (Kp-5).

This geomagnetic activity was due to a high velocity solar wind stream emanating from northern latitude geoeffective (Earth facing) coronal hole #154.

Due to the continued low daily sunspot count we experienced reduced MUF's that negatively impacted 10, 12 and at times 15 meters. But we still saw some intermittent east-west F layer propagation on 10, 12 and 15 meters, due to near equal day and night time in both hemispheres as we reached and passed the Fall/Spring Equinox.

There were also some Sporadic E (Es) openings on 6, 10 and 12 meters.

There was major night time signal absorption on the MF AM broadcast band, 160 and 120 meters on high latitude propagation paths.

There was major night time signal absorption on the LF band and moderate day time enhanced propagation conditions on high latitude paths.

At times intense lightning QRN hampered receive conditions on 160, 80 meters and 40 meters.

With the daily sunspot number and vaguely related solar flux on the decline and also due to seasonal chemical changes in the F layer we will not see any appreciable east-west F layer propagation on 10, 12 and 15 meters.

I expect HF propagation conditions to rapidly improve on 17-40 meters.

I expect LF and MF propagation conditions to only slowly improve with time due to high electron levels precipitating along magnetic force lines into the equatorial ring current.

There is a low probability that northern coronal hole #157 will begin impacting propagation conditions in a significant negative manner on or around 04/12/2005.

Occasionally high lightning QRN levels will continue to plague amateur and SWL radio operations on 160-40 meters thanks to the continuing weak El Nino, mainly in eastern Oceania and North and South America, including the Caribbean.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet (Kp-0-2) geomagnetic conditions "WILL OCCUR".

During the period unsettled to active (Kp-3-4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp-5) geomagnetic storming "IS POSSIBLE".

During the period moderate (Kp-6) geomagnetic storming is "IM PROBABLE".

During the period strong to extreme (Kp-7-9) geomagnetic storming "WILL NOT OCCUR".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "LOW".

The chance of daylight side SID radio blackouts from solar flares is "LOW".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "LOW".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH". CH #'s 155, 156, 157.

Daily solar flux levels should range between 95-80.

No geoeffective (Earth Facing) sunspot groups currently contain a beta-gamma twisted magnetic signature capable producing M and X class solar flares.

The chance of a small C class solar flare is "HIGH".

The chance of a large M class solar flare is "LOW".

The chance of a huge X class solar flare is "LOW".

Propagation Forecast Scales-

LOW- 25%

MEDIUM- 50%

HIGH- 75%

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Good then slowly becoming fair.

Nighttime- Poor then slowly becoming fair for ham signals, fair then slowly becoming good for broadcast signals.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good.

Mid Latitude- Good.

High Latitude- Fair becoming good.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect FAIR TO POOR "Northern Hemisphere" domestic propagation conditions on

east-west paths out to approximately 1100 miles.

***Expect FAIR TO POOR "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.**

+Expect FAIR TO GOOD "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100.

-Expect FAIR TO POOR "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect FAIR TO GOOD "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

***Expect FAIR TO POOR conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be GOOD.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be POOR but slowly becoming FAIR.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be POOR but slowly becoming FAIR.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere “mid latitude” propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Southern Hemisphere “mid latitude” propagation conditions in excess of 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere “high latitude” propagation conditions in excess of approximately 3200 miles should be FAIR but becoming GOOD.

Equatorial region to Southern Hemisphere “high latitude” propagation conditions in excess of 3200 miles should be FAIR but becoming GOOD.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9

Fair- S4-6

Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA

(See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

<https://thunderstorm.vaisala.com/tux/jsp/explorer/explorer.jsp>

During the 7 day outlook period there will be “HIGH TO MODERATE” lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect “HIGH TO MODERATE” lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect “MODERATE TO LOW” lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and

associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH TO MODERATE" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH TO MODERATE" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE TO LOW" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 04/01-07/2005

Sunspot Groups-

No sunspot group contained a beta-gamma or delta twisted magnetic signature that produced M or X class solar flares.

Solar Flux Readings- 88.6-78.3. My forecast was for 85-70.

SEC Sunspot Number- 54-26

Solar Wind Speed- 700-289

Solar Flares- C-3 M-0 X-0

Averaged Daily Background X-Ray Flux- A7.8-A2.5

Dst Index- -67 to +8

Elevated Energetic Protons >10 MeV (10+o)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 3, CH #154, 155, 156

No polar cap absorption on high latitude propagation paths occurred due to excessive energetic protons >10 Mev (10+0).

The Ap index has been at quiet to severe geomagnetic levels, with a range of 0-132.

The Kp index has been at quiet to strong geomagnetic storming levels, with a range of 0 to 7.

The Boulder mid latitude K index has been at quiet to moderate geomagnetic storming levels, with a range of 0 to 6.

The high latitude K index has been at quiet to severe geomagnetic storming levels, with a range of 0-8.

TODAY'S PROPAGATION LESSON –

18.) Sporadic-E (Es) Absorption, Blocking & Refraction-

Yes, just as the E-layer is the main refraction medium for medium frequency signal propagation within approximately 3100 miles, so is Sporadic-E (Es). Like stratospheric level warming and troposphere level temperature and moisture discontinuities, Sporadic-E (Es) which has an inter-relationship with wind shear and Internal Buoyancy/Gravity Waves (IBGW's), can depending on the circumstances absorb, block and refract medium frequency RF signals in an unpredictable manner.

For more information go to KN4LF LF/MF/HF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

*****Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.**

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is to low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.

4.) Previous 24 hour Ap index under 10, under 7 for several days

consecutively is best.

5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.

6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.

7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.

8.) No current STRATWARM alert.

9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above

3.

10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9

G4 = Severe Storm - Kp = 8

G3 = Strong Storm - Kp = 7

G2 = Moderate Storm - Kp = 6

G1 = Minor Storm - Kp = 5

Active - Kp = 4

Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm

Ap 50-99 Major Storm

Ap 30-49 Minor Storm

Ap 16-29 Active

Ap 8-15 Unsettled

Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0

K- 1= A- 3

K- 2= A- 7

K- 3= A- 15

K- 4= A- 27

K- 5= A- 48

K- 6= A- 80

K- 7= A- 140

K- 8= A- 240

K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-013

<http://www.kn4lf.com/kn4lf5.htm> <http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Friday 03/31/2005 At 1800 UTC Valid 04/01-07/2005

DISCUSSION-

The period 03/25-31/2005 was very quiet with one brief three hour minor geomagnetic storming (Kp-5) period, due to a high velocity solar wind stream emanating from geoeffective (Earth facing) coronal hole #153.

Due to the continued low daily sunspot count we experienced reduced MUF's that negatively impacted 10 and 12 meters. But we still saw some intermittent east-west F layer propagation on 10 and 12 meters, due to near equal day and night time in both hemispheres as we reached the Fall/Spring Equinox. There were also some Sporadic E (Es) openings on 6, 10 and 12 meters.

There was minor intermittent night time signal absorption on the MF AM broadcast band, 160 and 120 meters on high latitude propagation paths.

There was minor intermittent signal absorption on the LF band at nighttime and minor enhanced propagation conditions at daytime on high and mid latitude paths.

At times intense lightning QRN hampered receive conditions on 160 and 80 meters and to a lesser extent on 40 meters.

With the daily sunspot number and vaguely related solar flux on the decline and also due to seasonal chemical changes in the F layer we will not see any appreciable east-west F layer propagation on 10 and 12 meters.

I expect HF propagation conditions to begin degrading on 04/02/2005, with LF and MF conditions to begin degrading on 04/03/2004, as a high velocity solar wind stream emanating from very large recurrent northern hemisphere geoeffective (Earth facing) coronal hole #154 begins blasting Earth's magnetosphere.

Occasionally high lightning QRN levels will continue to plague amateur and SWL radio

operations thanks to the continuing weak El Nino, mainly in eastern Oceania and North and South America, including the Caribbean.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet (Kp-1-2) geomagnetic conditions "WILL OCCUR".

During the period unsettled to active (Kp-3-4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp-5) geomagnetic storming "WILL OCCUR".

During the period moderate (Kp-6) geomagnetic storming is "PROBABLE".

During the period strong (Kp-7) geomagnetic storming is "POSSIBLE".

During the period severe to extreme (Kp-8-9) geomagnetic storming "WILL NOT OCCUR".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "LOW".

The chance of daylight side SID radio blackouts from solar flares is "LOW".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "LOW".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH". CH #154.

Daily solar flux levels should range between 85-70.

No geoeffective (Earth Facing) sunspot groups currently contain a beta-gamma twisted magnetic signature capable producing M and X class solar flares.

The chance of a small C class solar flare is "LOW".

The chance of a large M class solar flare is "LOW".

The chance of a huge X class solar flare is "LOW".

Propagation Forecast Scales-

LOW- 25%

MEDIUM- 50%

HIGH- 75%

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Poor, becoming fair on 04/03/2005.

Nighttime- Fair becoming poor for ham signals, good becoming fair for broadcast signals on 04/03/2005.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good.

Mid Latitude- Good, becoming fair between 04/02-04/2005, back to good between 04/05-07/2005.

High Latitude- Fair to good, becoming poor between 04/02-04/2005, back to fair between 04/05-07/2005.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect FAIR TO POOR "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

***Expect FAIR TO POOR "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.**

+Expect FAIR TO GOOD "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100.

-Expect FAIR TO POOR "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect FAIR TO GOOD "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

***Expect FAIR TO POOR conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be GOOD.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be GOOD TO FAIR, becoming POOR on 04/03/2005.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be GOOD TO FAIR, becoming POOR on 04/03/2005.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be GOOD, becoming FAIR on 04/03/2005.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be GOOD, becoming FAIR on 04/03/2005.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in excess of 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere "high latitude" propagation conditions in excess of approximately 3200 miles should be GOOD, becoming fair on 04/03/2005.

Equatorial region to Southern Hemisphere "high latitude" propagation conditions in excess of 3200 miles should be GOOD, becoming fair on 04/03/2005.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9
Fair- S4-6
Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA (See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

<https://thunderstorm.vaisala.com/tux/jsp/explorer/explorer.jsp>

During the 7 day outlook period there will be "HIGH TO MODERATE" lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect "HIGH TO MODERATE" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "MODERATE TO LOW" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH TO MODERATE" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH TO MODERATE" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE TO LOW" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 03/25-

31/2005

Sunspot Groups-

No sunspot group contained a beta-gamma or delta twisted magnetic signature that produced M or X class solar flares.

Solar Flux Readings- 83.0-76.1. My forecast was for 90-75.

SEC Sunspot Number- 65-11

Solar Wind Speed- 704-338

Solar Flares- C-0 M-0 X-0

Averaged Daily Background X-Ray Flux- A3.7—A2.0

Dst Index- -23 To +33

Elevated Energetic Protons >10 MeV (10+o)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 2, CH #153, 154

No polar cap absorption on high latitude propagation paths occurred due to excessive energetic protons >10 Mev (10+0).

The Ap index has been at quiet to minor geomagnetic levels, with a range of 2-39.

The Kp index has been at quiet to minor geomagnetic storming levels, with a range of 0 to 5.

The Boulder mid latitude K index has been at quiet to active geomagnetic storming levels, with a range of 0 to 4.

The high latitude K index has been at quiet to moderate geomagnetic storming levels, with a range of 0-6.

*****Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.**

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is to low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.

4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.

5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.

6.) Energetic protons no greater then 10 MeV (10+0) for 160/120 meters and no greater then (10-1) on MF AM broadcast band.

7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less then B9 for MF broadcast band but A9 or less is best.

8.) No current STRATWARM alert.

9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.

10.) A -50 or better

towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON –

17.) Sporadic-D (Ds) Absorption & Wave Guiding-

Sporadic-D (Ds) occurrences have an inter-relationship with brief but intense Sun based and Galactic X-rays and Cosmic Rays, huge positive cloud to ground lightning strokes and interrelated Elves and Sprites. Very large bursts of Gamma Rays have also been observed to occur in conjunction with Sprites.

Sporadic-D (Ds) absorption occurs both at day and night. Much of the night time occurrence of Sporadic-D (Ds) absorption is often masked by lightning QRN, as well as a lack of radio operation during thunderstorm events due to the lightning strike hazard and/or high QRN levels and also due to the operator not being able to recognize the mode due to unfamiliarity with it. It's doubtful that you will read about the Sporadic-D (Ds) phenomena anywhere else other than on this website.

While on the topic of lightning and propagation, an ionized lightning channel which

normally has a maximum diameter of approximately a silver dollar, can reflect RF much like meteor trails do. I've personally noticed it on the 70 cm band, as a single propagation burst lasting 1/4 to 1/2 second. (See definition #20. D Region Mid Winter Absorption Anomaly).

For more information go to KN4LF LF/MF/HF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9
G4 = Severe Storm - Kp = 8
G3 = Strong Storm - Kp = 7
G2 = Moderate Storm - Kp = 6
G1 = Minor Storm - Kp = 5
Active - Kp = 4
Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-012

<http://www.kn4lf.com/kn4lf5.htm> <http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Friday 03/25/2005 At 0000 UTC Valid 03/25-31/2005

DISCUSSION-

I'm back after a one week hiatus. Did anyone miss my outlooks? :<))

The period 03/11-24/2005 was quiet with two brief active periods due to high velocity solar wind streams from geoeffective (Earth facing) coronal hole #'s151 and 152.

Due to the low daily sunspot count we experienced reduced MUF's that negatively impacted 10 and 12 meters. But we still saw some intermittent east-west F layer propagation on 10 and 12 meters due to near equal day and night time in both hemispheres as we approached the Fall/Spring Equinox. There were also some Sporadic E (Es) openings on 6, 10 and 12 meters.

There was minor increased night time signal absorption on the MF AM broadcast band, 160 and 120 meters on high latitude propagation paths.

There was minor increased signal absorption on the LF band at nighttime and minor enhanced propagation conditions at daytime.

At times lightning QRN hampered receive conditions on 160 and 80 meters and to a lesser extent on 40 meters.

With the daily sunspot number and vaguely related solar flux on the decline and also due to seasonal changes in the F layer we will not see any appreciable east-west F layer propagation on 10 and 12 meters.

I expect LF and MF propagation conditions to "SLOWLY" improve during the upcoming seven day period.

By the way, just a reminder that the effects of the solar wind on Earth's magnetosphere decreases as we approach the Summer/Winter solstice and increases at the Fall/Spring Equinox. Why? Basically it's the orientation of Earth's magnetic field with respect to the Interplanetary Magnetic Field within the Solar Wind. When solar material and shock waves reach Earth their effects may be enhanced or dampened depending on the angle at which they arrive.

Occasionally high lightning QRN levels will continue to plague amateur and SWL radio operations thanks to the continuing weak El Nino, mainly in eastern Oceania and North and South America, including the Caribbean.

Overall propagation conditions should be pretty good for the upcoming CQ WW WPX SSB contest this weekend.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet (Kp-0-2) geomagnetic conditions “WILL OCCUR”.

During the period unsettled to active (Kp-3-4) geomagnetic conditions “WILL OCCUR”.

During the period minor (Kp-5) geomagnetic storming is “PROBABLE”.

During the period moderate (Kp-6) geomagnetic storming is “IMPROBABLE”.

During the period strong to extreme (Kp-7-9) geomagnetic storming “WILL NOT OCCUR”.

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is “LOW”.

The chance of daylight side SID radio blackouts from solar flares is “LOW”.

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is “LOW”.

The chance of a geoeffective (Earth facing) Coronal Hole is “HIGH”. CH #'s 153 and 154.

Daily solar flux levels should range between 90-75

No geoeffective (Earth Facing) sunspot groups currently contain a beta-gamma twisted magnetic signature capable producing M and X class solar flares.

However newly emerged sunspot group #10745 at N12E15 is growing in size and magnetic complexity and will become capable of producing large M class solar flares.

The chance of a small C class solar flare is “HIGH”.

The chance of a large M class solar flare is “LOW TO MEDIUM”.

The chance of a huge X class solar flare is “LOW”.

Propagation Forecast Scales-

LOW- 25%

MEDIUM- 50%

HIGH- 75%

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Poor.

Nighttime- Fair for ham signals, good for broadcast signals.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good.

Mid Latitude- Good.

High Latitude- Good to at times fair.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect FAIR "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

***Expect POOR TO FAIR "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.**

+Expect GOOD TO FAIR "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100.

-Expect FAIR "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect GOOD TO FAIR "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

***Expect POOR TO FAIR conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be GOOD.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be GOOD TO FAIR.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be GOOD TO FAIR.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be GOOD.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be GOOD.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in excess of 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere "high latitude" propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Southern Hemisphere "high latitude" propagation conditions in excess of 3200 miles should be GOOD.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9

Fair- S4-6

Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA

(See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

<https://thunderstorm.vaisala.com/tux/jsp/explorer/explorer.jsp>

http://www.nrlmry.navy.mil/nexsat_pages/mosaic/CONUS/focus_regions/Full/Overview/li

During the 7 day outlook period there will be "HIGH TO MODERATE" lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect "HIGH TO MODERATE" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "MODERATE TO LOW" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH TO MODERATE" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH TO MODERATE" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE TO LOW" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 03/11-24/2005

Sunspot Groups-

No sunspot group contained a beta-gamma or delta twisted magnetic signature that produced M or X class solar flares.

Solar Flux Readings- 115-87. My forecast was for ---.

SEC Sunspot Number- 77-35

Solar Wind Speed- 573-293

Solar Flares- C-16 M-0 X-0

Averaged Daily Background X-Ray Flux- B1.8—A6.2

Dst Index- -85 To +15

Elevated Energetic Protons >10 MeV (10+0)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 3, CH #151, 152, 153

No polar cap absorption on high latitude propagation paths occurred due to excessive energetic protons >10 Mev (10+0).

The Ap index has been at quiet to minor geomagnetic levels, with a range of 2-39.

The Kp index has been at quiet to minor geomagnetic storming levels, with a range of 0 to 5.

The Boulder mid latitude K index has been at quiet to minor geomagnetic storming levels, with a range of 0 to 5.

The high latitude K index has been at quiet to moderate geomagnetic storming levels, with a range of 0-6.

*****Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.**

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux

index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is too low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

- 3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.
- 4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.
- 5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.
- 6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.
- 7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.
- 8.) No current STRATWARM alert.
- 9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.
- 10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON –

16.) Solar Flare-

A day side earthward bound solar filament and/or approximate C5 class or higher solar flare can move the proton flux >10 MeV (10+0) and initiate large scale high latitude propagation path absorption but even smaller C4 class flares and weaker are the culprit behind hour-to-hour and night-to-night variations in signal strength on the AM broadcast band and 160 meters, both stateside and DX. This transfer of increased density and RF signal absorption from the day-side D-layer to night-side of the ionosphere occurs through high level neutral winds.

X-Ray Class Solar Flare. The rank of a solar flare based on its X-ray energy output. Flares are classified by the order of magnitude of the peak burst intensity (I) measured at the earth in the 1 to 10 angstrom band as follows:

Class (in Watt/sq. Meter)

B- I less than (I.t.) 10.0E-06

C- 10.0E-06 I.e.= I I.t.= 10.0E-05

M- 10.0E-05 I.e.= I I.t.= 10.0E-04

X- I g.e.= 10.0E-04

Background radiation in the 1 to 10 Angstrom range (Hard X-Rays), as well as Solar and Galactic Cosmic Rays is the source of ionization of the D-layer.

Basically a C-class solar flare possesses energy 1/10 the level of an M- class solar flare

and an M-class solar flare possesses energy 1/10 the level on an X-class solar flare. (See definition #15. Shortwave Fadeout).

Solar flares are not random meaningless explosions but instead a process inter related with coronal mass ejections (CME's) by which the Sun expels complex magnetic signatures enroute to changing it's magnetic polarity or said a different way the swapping of the Sun's magnetic poles. Basically the Sun swapped it magnetic polarity at the peak of present solar cycle 23 somewhere between July 2000 and December 2001. The next polarity swap will occur during solar cycle 24 somewhere around 2010-2011.

For more information go to KN4LF LF/MF/HF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9
G4 = Severe Storm - Kp = 8
G3 = Strong Storm - Kp = 7
G2 = Moderate Storm - Kp = 6
G1 = Minor Storm - Kp = 5
Active - Kp = 4
Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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Published Thursday 03/17/2005 At 2200 UTC

The KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-012 for the period of 03/18-24/2005 has been cancelled due to a death in my family. The outlook will resume on Thursday 03/24/2005.

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-011

<http://www.kn4lf.com/kn4lf5.htm>

Date Format is MM/DD/YYYY

Published Thursday 03/10/2005 At 2000 UTC Valid 03/11-17/2005

DISCUSSION-

The period 03/04-05/2005 was quiet but the period 03/06-09/2005 became very active, due to a high velocity solar wind stream from geoeffective (Earth facing) northern hemisphere coronal hole #149.

We experienced reduced MUF's that impacted 15 meters pretty strongly. The low sunspot count acted to provide very little in the way of east-west F layer propagation on 10 and 12 meters. However there was some Sporadic E (Es) openings on these bands on 6, 10 and 12 meters.

There was increased signal absorption on the LF band at nighttime but enhanced propagation conditions at daytime.

There was increased night time signal absorption on the MF AM broadcast band, 160 and 120 meters on high and mid latitude propagation paths but was delayed until 03/08/2005 as is usually the case. The mid latitude absorption was caused by electrons precipitating southward along magnetic field lines to the equatorial ring current.

At times lightning QRN hampered receive conditions for the ARRL International SSB DX contest this weekend on 160 and 80 meters and to a lesser extent on 40 meters.

I expect LF and MF propagation conditions to "SLOWLY" recover during the upcoming seven day period, with a more rapid recovery on HF.

With the daily sunspot number and vaguely related solar flux on the rise we may see some east-west F layer propagation on 10 and 12 meters.

By the way, just a reminder that the effects of the solar wind on Earth's magnetosphere decreases as we approach the Summer/Winter solstice and increases at the Fall/Spring

Equinox. Why? Basically it's the orientation of Earth's magnetic field with respect to the Interplanetary Magnetic Field within the Solar Wind. When solar material and shock waves reach Earth their effects may be enhanced or dampened depending on the angle at which they arrive.

Occasionally high lightning QRN levels will continue to plague amateur and SWL radio operations thanks to the continuing weak El Nino, mainly in eastern Oceania and North and South America, including the Caribbean.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet (Kp-0-2) geomagnetic conditions "WILL OCCUR".

During the period unsettled to active (Kp-3-4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp-5) geomagnetic storming is "POSSIBLE".

During the period moderate (Kp-6) geomagnetic storming is "IMPROBABLE".

During the period strong to extreme (Kp-7-9) geomagnetic storming "WILL NOT OCCUR".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "LOW BUT BECOMING MEDIUM".

The chance of daylight side SID radio blackouts from solar flares is "LOW BUT BECOMING MEDIUM".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "LOW BUT BECOMING MEDIUM".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH". CH #150.

Daily solar flux levels should range between 130-100.

No geoeffective (Earth Facing) sunspot groups currently contain a beta-gamma twisted magnetic signature capable producing C & M class solar flares.

However newly emerged sunspot group #'s 10741 at N12E03 and 10742 at S06E43 are growing in size and magnetic complexity and will become capable of producing large M class solar flares.

The chance of a small C class solar flare is "HIGH".

The chance of a large M class solar flare is "MEDIUM BUT BECOMING HIGH".

The chance of a huge X class solar flare is "LOW".

Propagation Forecast Scales-**LOW- 25%****MEDIUM- 50%****HIGH- 75%****GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-****Daytime- Fair becoming poor.****Nighttime- Poor becoming fair for ham signals, fair becoming good for broadcast signals.****GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-****Low Latitude- Good.****Mid Latitude- Fair becoming good.****High Latitude- Poor becoming fair to at times good.****GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-****-Expect FAIR "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.*****Expect POOR TO FAIR "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.****+Expect GOOD TO FAIR "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100.****-Expect POOR "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.****+Expect FAIR "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.*****Expect POOR conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be GOOD.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be POOR TO FAIR.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be POOR.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR TO GOOD.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in excess of 3200 miles should be FAIR.

Equatorial region to Northern Hemisphere "high latitude" propagation conditions in excess of approximately 3200 miles should be FAIR.

Equatorial region to Southern Hemisphere "high latitude" propagation conditions in excess of 3200 miles should be FAIR TO POOR.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9

Fair- S4-6

Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA

(See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

http://www.lightningstorm.com/tux/jsp/gpg/lex1/mapdisplay_free.jsp

During the 7 day outlook period there will be "HIGH TO MODERATE" lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect "HIGH TO MODERATE" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "MODERATE TO LOW" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK**SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 03/04-10/2005****Sunspot Groups-**

No sunspot group contained a beta-gamma or delta twisted magnetic signature that produced C, M or X class solar flares.

Solar Flux Readings- 102.1-78.8. My forecast was for 100-70.

SEC Sunspot Number- 77-13

Solar Wind Speed- 845-352

Solar Flares- C-3 M-0 X-0

Averaged Daily Background X-Ray Flux- B1.6--A4.5

Dst Index- -62 To +5

Elevated Energetic Protons >10 MeV (10+o)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 2, CH #149, 150

No polar cap absorption on high latitude propagation paths occurred due to excessive energetic protons >10 Mev (10+0).

The Ap index has been at quiet to major geomagnetic levels, with a range of 2-94.

The Kp index has been at quiet to moderate geomagnetic storming levels, with a range of 0 to 6.

The Boulder mid latitude K index has been at quiet to moderate geomagnetic storming levels, with a range of 0 to 6.

The high latitude K index has been at quiet to strong geomagnetic storming levels, with a range of 0-7.

*****Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.**

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is to low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.

4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.

5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.

6.) Energetic protons no greater then 10 MeV (10+0) for 160/120 meters and no greater then (10-1) on MF AM broadcast band.

7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less then B9 for MF broadcast band but A9 or less is best.

8.) No current STRATWARM alert.

9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.

10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON –

15.) Short Wave Fadeout (SWF)-

During a Solar Flare event or Sudden Ionospheric Disturbance (SID), abrupt increased ionization of the D-layer results in reduced to total absorption of MF and HF circuits which are reflected by the ionosphere on the sunlit hemisphere of the earth. This is known as a Shortwave Fadeout (SWF).

Solar flares produce copious amounts of electromagnetic radiation including energetic protons which increase the ionization of the daytime D-layer. MF/HF communication depends on the reflection of signals from the higher E and F2 layers and these signals

must travel through the D layer at least twice.

Lower frequencies are affected first and higher frequencies last. The stronger the event, the stronger the ionization of the D layer, the higher the frequency effected via absorption.

Daytime E-layer propagation of the AM broadcast band and 160 meters (See definition #1. Overview) usually only occurs during the winter season and especially at higher latitudes with a lower sun angle and at the low part of a sunspot cycle, therefore SWF's rarely are rarely noticed. The 80/75 meter and 40 meter bands are most noticeably affected, with the higher bands least affected.

An SWF can last from several hours on the lower frequencies to minutes on the higher frequencies. (See definition #16. Solar Flare).

For more information go to KN4LF LF/MF/HF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9
G4 = Severe Storm - Kp = 8
G3 = Strong Storm - Kp = 7
G2 = Moderate Storm - Kp = 6
G1 = Minor Storm - Kp = 5
Active - Kp = 4
Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27

K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-010

<http://www.kn4lf.com/kn4lf5.htm>

Date Format is MM/DD/YYYY

Published Friday 03/04/2005 At 0000 UTC Valid 03/04-10/2005

DISCUSSION-

The past seven day period was mostly quiet with a couple of brief active periods due to a high velocity solar wind stream from geoeffective (Earth facing) coronal hole #148.

We did experience some reduced MUF's that impacted 10, 12 and 15 meters due to a low sunspot number but Sporadic E (Es) did provide for some openings on these bands. There was some intermittent increased signal absorption on the LF, MF AM broadcast band, 160 and 120 meters on high latitude propagation paths.

Overall propagation conditions were pretty good.

I expect LF, MF and HF propagation conditions to continue at near normal levels. The only downside will be continued occasional high lightning QRN levels due to El Nino, mainly in eastern Oceania and North and South America, including the Caribbean. At times the QRN will hamper otherwise good propagation conditions for the ARRL International SSB DX contest this weekend, especially on 160 and 80 meters.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet to unsettled (Kp 0-3) geomagnetic conditions "WILL OCCUR".

During the period active (Kp 4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp-5) geomagnetic storming is "PROBABLE".

During the period moderate (Kp-6) geomagnetic storming is "POSSIBLE".

During the period strong to extreme (Kp-7-9) geomagnetic storming "WILL NOT OCCUR".

The chance of polar cap absorption on high latitude propagation paths due to excessive

energetic protons >10 Mev (10+0) is "LOW".

The chance of daylight side SID radio blackouts from solar flares is "LOW".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "LOW".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH". CH #149, 150

Daily solar flux levels should range between 70-100.

No geoeffective (Earth Facing) sunspot groups will contain a beta-gamma twisted magnetic signature capable that produced C & M class solar flares.

The chance of a small C class solar flare is "MEDIUM".

The chance of a large M class solar flare is "LOW".

The chance of a huge X class solar flare is "LOW".

Propagation Forecast Scales-

LOW- 25%

MEDIUM- 50%

HIGH- 75%

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Poor.

Nighttime- Fair to good for ham signals, good for broadcast signals.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good.

Mid Latitude- Good.

High Latitude- Good to fair.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect FAIR "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

***Expect FAIR to good "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.**

+Expect GOOD to fair "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100.

-Expect POOR TO FAIR "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect FAIR "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

***Expect POOR conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be FAIR.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be POOR TO FAIR.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be GOOD.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in excess of 3200 miles should be FAIR.

Equatorial region to Northern Hemisphere "high latitude" propagation conditions in excess of approximately 3200 miles should be FAIR.

Equatorial region to Southern Hemisphere "high latitude" propagation conditions in excess of 3200 miles should be FAIR.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9

Fair- S4-6

Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA

(See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

http://www.lightningstorm.com/tux/jsp/gpg/lex1/mapdisplay_free.jsp

During the 7 day outlook period there will be "HIGH TO MODERATE" lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect "HIGH TO MODERATE" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "MODERATE TO LOW" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 02/25-03/03/2005

Sunspot Groups-

No sunspot group contained a beta-gamma twisted magnetic signature that produced C & M class solar flares.

Solar Flux Readings- 78.1-73.8. My forecast was for 95-75. This weeks solar flux level of 73.8 was the lowest since August 1997.

SEC Sunspot Number- 27-11

Solar Wind Speed- 749-435

Solar Flares- C-0 M-0 X-0

Averaged Daily Background X-Ray Flux- A2.1-A1.4

Dst Index- -41 to -2

Elevated Energetic Protons >10 MeV (10+o)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 1, CH #148

No polar cap absorption on high latitude propagation paths occurred due to excessive energetic protons >10 Mev (10+0) occurred.

The Ap index has been at quiet to active geomagnetic levels, with a range of 4-22.

The Kp index has been at quiet to active geomagnetic levels, with a range of 0 to 4.

The Boulder mid latitude K index has been at quiet to active geomagnetic levels, with a range of 1 to 4.

The high latitude K index has been quiet to moderate geomagnetic storming levels, with a range of 0-6.

*****Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.**

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is too low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.

4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.

5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.

6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.

7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.

8.) No current STRATWARM alert.

9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.

10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON –

Sunspot Group-

Sunspot groups are bipolar magnetic concentration regions on the photosphere of the Sun where magnetic field strengths many thousands of times stronger than the Earth's magnetic field reside. Sunspots appear as dark spots on the surface of the Sun because temperatures in the dark centers of sunspots drop to approximately 3700 K compared to 5700 K for the surrounding photosphere. The difference in temperature makes the spots appear darker than elsewhere. Sunspots typically last for several days to several weeks. They are seen to rotate around the sun, since they are on the surface, and the sun rotates fully every 27.5 days.

Sunspots usually come in groups with two sets of spots. One set will have a positive or north magnetic field while the other set will have a negative or south magnetic field. The magnetic field is strongest in the darker parts of the sunspots called the umbra and weaker and more horizontal in the lighter part called the penumbra.

The twisted magnetic fields associated with sunspot groups are one source of the solar flares, coronal mass ejections and geomagnetic storms that wreak havoc with the ionosphere here on Earth.

For more information go to KN4LF LF/MF/HF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9
G4 = Severe Storm - Kp = 8
G3 = Strong Storm - Kp = 7
G2 = Moderate Storm - Kp = 6
G1 = Minor Storm - Kp = 5
Active - Kp = 4
Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm

Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-009

<http://www.kn4lf.com/kn4lf5.htm>

Date Format is MM/DD/YYYY

Published Thursday 02/24/2005 At 2200 UTC Valid 02/25-03/03/2005

DISCUSSION-

The past seven day period was mostly quiet with a brief active period on Friday 02/18/2005. A high velocity solar wind stream from geoeffective (Earth facing) coronal hole #147 created brief strong to extreme (K-7-9) geomagnetic storming at high latitudes and minor (K-5) geomagnetic storming at mid latitudes.

We did experience some high latitude reduced MUF's that impacted 10 and 12 meters. Elevated absorption on the MF AM broadcast band, 160 and 120 meters on high and mid latitude propagation paths finally ended, providing for good propagation conditions late in the week.

Overall I expect LF, MF and HF propagation conditions to continue at near normal during the Friday-Monday 02/26-28/2005 period. The only downside will be continued high lightning QRN levels due to El Nino, mainly in eastern Oceania and North and South America, including the Caribbean. The QRN will hamper otherwise good propagation conditions for the CQ 160 meter SSB contest this weekend.

Thanks to geoeffective (Earth facing) Coronal Hole #148 some high latitude path degradation on HF frequencies will commence once again by Tuesday 03/01/2005. LF and MF propagation degradation will follow 2-3 days later.

NOTE! If I am overestimating the negative impact that Coronal Hole #148 will have on propagation conditions during the next seven day period then overall propagation conditions will be pretty good.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet to unsettled (Kp 0-3) geomagnetic conditions "WILL OCCUR".

During the period unsettled to active (Kp 3-4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp-5) geomagnetic storming is "PROBABLE".

During the period moderate (Kp-6) geomagnetic storming is "POSSIBLE".

During the period strong to extreme (Kp-7-9) geomagnetic storming "WILL NOT OCCUR".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "LOW".

The chance of daylight side SID radio blackouts from solar flares is "LOW".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "LOW".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH".

Daily solar flux levels should range between 95-75.

No geoeffective (Earth Facing) sunspot groups will contain a beta-gamma twisted magnetic signature capable that produced C & M class solar flares.

The chance of a small C class solar flare is "MODERATE THEN LOW".

The chance of a large M class solar flare is "LOW".

The chance of a huge X class solar flare is "LOW".

The chance of a filament eruption is "MEDIUM".

Propagation Forecast Scales-

LOW- 25%

MEDIUM- 50%

HIGH- 75%

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Poor.

Nighttime- Fair to good for ham signals, good for broadcast signals.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good.

Mid Latitude- Good to fair.

High Latitude- Fair to poor.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect FAIR "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

***Expect FAIR to good "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.**

+Expect GOOD to fair "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100.

-Expect POOR TO FAIR "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect FAIR "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

***Expect POOR conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be FAIR.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be POOR TO FAIR.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be GOOD.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be FAIR.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be GOOD.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in excess of 3200 miles should be FAIR.

Equatorial region to Northern Hemisphere "high latitude" propagation conditions in excess of approximately 3200 miles should be FAIR.

Equatorial region to Southern Hemisphere "high latitude" propagation conditions in excess of 3200 miles should be FAIR.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9

Fair- S4-6

Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-**U.S. LIGHTNING STRIKE DATA
(See Where Your QRN Is Coming From)**

Sorry but global views of near real time lightning strikes are no longer available.

http://www.lightningstorm.com/tux/jsp/gpg/lex1/mapdisplay_free.jsp

During the 7 day outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect "HIGH" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "MODERATE TO HIGH" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 02/11-17/2005

Sunspot Groups-

Sunspot group #10735 which has now set around the west limb of the Sun contained a beta-gamma twisted magnetic signature that produced C & M class solar flares.

Solar Flux Readings- 105.1-85.1. My forecast was for 110-85.

SEC Sunspot Number- 60-23

Solar Wind Speed- 636-337

Solar Flares- C-8 M-1 X-0

Averaged Daily Background X-Ray Flux- B2.1-A7.0

Dst Index- -90 to +10

Elevated Energetic Protons >10 MeV (10+0)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 2, CH #147, 148

No polar cap absorption on high latitude propagation paths occurred due to excessive energetic protons >10 Mev (10+0) occurred.

The Ap index has been at quiet to minor geomagnetic storming levels, with a range of 0 to 48.

The Kp index has been at quiet to minor geomagnetic storming levels, with a range of 0 to 5.

The Boulder mid latitude K index has been at quiet to minor geomagnetic storming levels, with a range of 0 to 5.

The high latitude K index has been quiet to severe geomagnetic storming level, with a range of 0-9.

*****Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.**

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is too low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

- 3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.
- 4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.
- 5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.
- 6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.
- 7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.
- 8.) No current STRATWARM alert.
- 9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.
- 10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON –

Polar Cap Absorption (PCA)-

An anomalous condition of the polar ionosphere whereby MF (300-3000 kc) and HF (3000-30000 kc) radio waves are absorbed, and LF and VLF (3-300 kHz) Radio waves are wave guided at lower altitudes than normal. In practice, the absorption is inferred from the proton flux at energies greater than 10 MeV (10+0), so that PCA's, Polar Radio Blackouts and Proton Events are interrelated and often simultaneous.

(((NOTE!!! high latitude radio propagation paths may still be disturbed for days, up to weeks, following the end of an official proton event.))) This fact is still stubbornly opposed by some otherwise very knowledgeable space weather physicists, hung up on threshold Riometer readings.

For more information go to KN4LF LF/MF/HF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9

G4 = Severe Storm - Kp = 8

G3 = Strong Storm - Kp = 7
G2 = Moderate Storm - Kp = 6
G1 = Minor Storm - Kp = 5
Active - Kp = 4
Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-008

<http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Thursday 02/17/2005 At 2000 UTC Valid 02/18-24/2005

DISCUSSION-

The past seven day period was mostly quiet with a brief active period. A high velocity solar wind stream from geoeffective (Earth facing) coronal hole #145 created a moderate (K-6) geomagnetic storm at high latitudes and active (K-4) geomagnetic conditions at mid latitudes.

We did experience some high latitude reduced MUF's that impacted 10 and 12 meters.

Elevated absorption on the MF AM broadcast band, 160 and 120 meters on high and mid latitude propagation paths continued.

Overall I expect HF propagation conditions to continue at normal during the next seven days, with LF and MF propagation conditions slowly improving.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period unsettled to active (Kp 3-4) geomagnetic conditions "WILL OCCUR".

During the period quiet to unsettled (Kp 0-3) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp-5) geomagnetic storming is "WILL OCCUR".

During the period moderate (Kp-6) geomagnetic storming is "POSSIBLE".

During the period strong to extreme (Kp-7-9) geomagnetic storming "WILL NOT OCCUR".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "LOW".

The chance of daylight side SID radio blackouts from solar flares is "MODERATE".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "MODERATE".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH".

Daily solar flux levels should range between 110-85.

Geoeffective (Earth Facing) sunspot group #10735 located at S07W06 contains a beta-gamma twisted magnetic signature capable of producing C & M class solar flares.

The chance of a small C class solar flare is "HIGH".

The chance of a large M class solar flare is "MODERATE".

The chance of a huge X class solar flare is "LOW".

Just a quick note, if sunspot group #10735 releases an M class solar flare during the period it could wreck my forecast. Also #10735 released a C4.9 solar flare at 2338 UTC on 02/16/05. It is too early to tell if a coronal mass ejection (CME) was associated with this solar flare but if it does then it will be geoeffective (Earth Facing) and my forecast could be inaccurate.

Propagation Forecast Scales-

LOW- 25%

MEDIUM- 50%

HIGH- 75%

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Fair to poor.

Nighttime- Fair for ham signals, good for broadcast signals.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good.

Mid Latitude- Good.

High Latitude- Fair to good.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect fair "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

***Expect fair to good "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.**

+Expect good to fair "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100.

-Expect poor to fair "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect fair "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

***Expect poor conditions on south "TO" north paths in the "Southern Hemisphere" out**

to approximately 1100 miles.

Equatorial region domestic propagation conditions out to approximately 1100 miles should be good.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair to good.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be poor to fair.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be good.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be good.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be good.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in excess of 3200 miles should be good.

Equatorial region to Northern Hemisphere "high latitude" propagation conditions in excess of approximately 3200 miles should be good.

Equatorial region to Southern Hemisphere "high latitude" propagation conditions in excess of 3200 miles should be fair.

Propagation Forecast Scales-**Excellent- +1 db Over S9 Or better****Good- S7-9****Fair- S4-6****Poor- S1-3****GLOBAL NOISE (QRN) OUTLOOK-****U.S. LIGHTNING STRIKE DATA****(See Where Your QRN Is Coming From)**

Sorry but global views of near real time lightning strikes are no longer available.

http://www.lightningstorm.com/tux/jsp/gpg/lex1/mapdisplay_free.jsp

During the 7 day outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect "MODERATE" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "LOW" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK**SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 02/11-17/2005****Sunspot Groups-**

Geoeffective (Earth Facing) sunspot group #10735 located at S07W06 contains a beta-gamma twisted magnetic signature capable of producing C & M class solar flares.

Solar Flux Readings- 121.7- 110.8

SEC Sunspot Number- 115-61

Solar Wind Speed- 711-336

Solar Flares- C-8 M-0 X-0

Averaged Daily Background X-Ray Flux- B2.1-B1.4

Dst Index- -33 to +1

Elevated Energetic Protons >10 MeV (10+0)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 2, CH #145, 146

No polar cap absorption on high latitude propagation paths occurred due to excessive energetic protons >10 MeV (10+0) occurred.

The Ap index has been at quiet to active geomagnetic levels, with a range of 2 to 27.

The Kp index has been at quiet to active geomagnetic levels, with a range of 0 to 4

The Boulder mid latitude K index has been at quiet to active geomagnetic levels, with a range of 0 to 4.

The high latitude K index has been quiet to moderate geomagnetic storming level, with a range of 0-6.

*****Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.**

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is to low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.

4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.

5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.

6.) Energetic protons no greater then 10 MeV (10+0) for 160/120 meters and no greater then (10-1) on MF AM broadcast band.

7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less then B9 for MF broadcast band but A9 or less is best.

8.) No current STRATWARM alert.

9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.

10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON –

Geological/Meteorological Effects On LF/MF/HF Propagation-

Geological effects such as earthquakes and volcanic eruptions, as well as meteorological effects such as troposphere originating Internal Buoyancy/Gravity Waves (IBGW's), stratospheric level Quasi Biennial Oscillations (QBO) and warming (STRATWARM) have a negative effect on MF RF signals in the form of small to medium increased absorption variations of MF RF signals via the D layer, due to traveling ionospheric disturbances (TID's).

Also temperature and moisture discontinuities involved with cold frontal inversions and air mass triple points involved with extra-tropical low pressure systems can refract, diffract or scatter MF radio signals in unpredictable ways, most notably on high

transmitted RF power levels. This is another concept that a fellow Physicist and expert in optics took me to ask over.

As far as MF refraction it's more significant at say 3000 kc, then 1850 kc or 1500 kc. But it's also more noticeable with higher transmitted RF powers, i.e. WSAI 1530 50 KW and even more so with BSKA 1521 KC 1000 KW and now defunct 2000 kc region 100 KW marine stations.

We know that the MF spectrum is defined as 300-3000 kc but the differences in refractive properties between 300 and 3000 is very significant. At 3000 kc refraction is a good description, on 160 scattering, at 300 kc diffraction.

Using the strictest definition of RF refraction, it's effect on 160 meters is small but it has been measured by government researchers as significant enough to impact 160 but near the air mass triple point. In my opinion scattering is actually the more consistent propagation medium for 160 meters along a cold front, away from the extra-tropical cyclone center.

However the temperature and moisture discontinuities in the vicinity of a triple point air mass structure such as seen with a mature extra-tropical cyclone is very complex and fluid. The NW quadrant of the extra-tropical cyclone is the location that the original government researchers identified as the region of existence for the complex temperature/moisture discontinuity structure that allows for refraction of RF signals as low as 1500 kc. I have not been successful at garnering data from the federal government that can be released to the general public. NOAA has been similarly stymied and therefore is now conducting similar research.

The QBO is a wind shift in the equatorial stratosphere, an oscillation from easterly to westerly and back on the time scale of approximately two years (26 months) and is a source of [Internal Buoyancy/Gravity Waves \(IBGW\)](#) which create absorptive perturbations in the D and E-layers and even possibly the F 1/2 layer. A note, the E-valley/Flayer ducting propagation mechanism does not exist only during gray line periods. Internal Buoyancy/Gravity Waves (IBGW's) are a source of the ducting mechanism and allow for occurrences of ducting along any propagation path in total darkness. Measurement of the timing of arrival of propagated MF RF signals demonstrates the existence of the ducting mechanism, versus conventional numerous E layer land/ocean surface hops.

The HAARP ionospheric program, earthquakes, volcanic eruptions, thunderstorms, lightning (especially positive cloud to ground strokes), elves, sprites, tornadoes and hurricanes and even man made activities such as rocket launches including the space shuttle, are all sources of (IBGW's).

Many times I've heard ham's lament that propagation was going to go to crap due to another space shuttle launch, in a sense they are correct. Much more research is needed on the subject.

For more information go to KN4LF LF/MF/HF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9
G4 = Severe Storm - Kp = 8
G3 = Strong Storm - Kp = 7
G2 = Moderate Storm - Kp = 6
G1 = Minor Storm - Kp = 5
Active - Kp = 4
Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-007

<http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Thursday 02/10/2005 At 2300 UTC Valid 02/11-17/2005

DISCUSSION-

The past seven day period was active but not as active as I had forecasted. Solar wind streams from geo effective (Earth facing) coronal hole #143 and 144 created a strong (K-7) geomagnetic storm at high latitudes and a moderate (K-6) geomagnetic storm at mid latitudes. The storming commenced on Monday 02/07/2005 and ended on Thursday 02/10/2005.

We did experience some high and mid latitude reduced MUF's that impacted 10, 12 and 15 meters and also some increased absorption on the MF AM broadcast band, 160 and 120 meters on high and mid latitude propagation paths. But as is usually the case the MF bands actually saw improved propagation conditions during the first couple of days after commencement of the geomagnetic storming.

Prolific solar flare producing sunspot group #10720 did rise around the east limb of the Sun on 02/05/2005 and was renumbered 10732. It does contain a beta-gamma twisted magnetic signature but so far has only produced B and C class solar flares.

I did expect that solar, space and geomagnetic weather would increase sharply by 02/05-06/2005 in association with sunspot group # 10732 and 10733 but I was wrong.

Overall I expect propagation conditions to return to normal during the next seven days.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period unsettled to active (Kp 3-4) geomagnetic conditions "WILL OCCUR" through 02/11/2005.

During the period quiet to unsettled (Kp 0-3) geomagnetic conditions "WILL OCCUR" beginning on 02/12/2005.

During the period minor (Kp-5) geomagnetic storming is "POSSIBLE".

During the period moderate (Kp-6) geomagnetic storming is "IMPROBABLE".

During the period strong to extreme (Kp-7-9) geomagnetic storming "WILL NOT OCCUR".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "LOW".

The chance of daylight side SID radio blackouts from solar flares is "MODERATE".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "MODERATE".

The chance of a geoeffective (Earth facing) Coronal Hole is "LOW".

Daily solar flux levels should range between 115-130.

Sunspot group #10732 contains a beta-gamma twisted magnetic signature capable of producing C & M class solar flares.

The chance of a small C class solar flare is "HIGH".

The chance of a large M class solar flare is "MODERATE".

The chance of a huge X class solar flare is "LOW".

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Fair becoming poor on 02/13/2005.

Nighttime- Poor becoming fair for ham signals on 02/13/05, fair becoming good for broadcast signals on 02/13/05.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good.

Mid Latitude- Fair becoming good on 02/13/2005.

High Latitude- Poor to fair becoming good on 02/13/2005.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect poor to fair "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles, becoming fair to good on 02/16/2005.

***Expect poor to fair "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles, becoming fair to good on 02/16/2005.**

+Expect good to fair "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100 miles, becoming fair to good on 02/06/2005.

-Expect poor "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles, becoming fair on 02/16/2005.

+Expect good to fair "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles, becoming fair to good on 02/16/2005.

***Expect poor conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles, becoming fair on 02/16/2005.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be good.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be poor to fair, becoming fair to good on 02/16/05.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be poor to fair, becoming fair to good on 02/16/05.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair, becoming good on 02/16/05.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair, becoming good on 02/16/05.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be good.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be good.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be good.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in

excess of 3200 miles should be fair.

Equatorial region to Northern Hemisphere “high latitude” propagation conditions in excess of approximately 3200 miles should be poor to fair, becoming fair to good on 02/16/05.

Equatorial region to Southern Hemisphere “high latitude” propagation conditions in excess of 3200 miles should be poor, becoming fair on 02/16/05.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9

Fair- S4-6

Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA

(See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

http://www.lightningstorm.com/tux/jsp/gpg/lex1/mapdisplay_free.jsp

During the 7 day outlook period there will be “HIGH” lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect “MODERATE” lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "LOW" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 02/04-10/2005

Sunspot Groups-

Sunspot group #10732 contained a beta-gamma twisted magnetic signature capable of producing C & M class solar flares.

Solar Flux Readings- 82.1-114.1

SEC Sunspot Number- 22-62

Solar Wind Speed- 331-881

Solar Flares- C-12 M-0 X-0

Averaged Daily Background X-Ray Flux- B1.3- B2.2

Dst Index- -1 to -67

Elevated Energetic Protons >10 MeV (10+o)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 2, CH #143, 144

No polar cap absorption on high latitude propagation paths occurred due to excessive

energetic protons >10 Mev (10+0) occurred.

The Ap index has been at quiet to major geomagnetic storming levels, with a range of 0 to 94.

The Kp index has been at quiet to moderate geomagnetic storming levels, with a range of 0 to 6

The Boulder K index has been at quiet to moderate geomagnetic levels, with a range of 0 to 6.

*****Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.**

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is too low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.

4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.

5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.

6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.

7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.

8.) No current STRATWARM alert.

9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.

10.) A -50 or better

towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON –

Geomagnetic/Ionospheric Storm-

A worldwide disturbance of the Earth's magnetosphere, induced by direct connection to the Sun's interplanetary magnetic field (IMF), distinct from regular diurnal variations. Basically it's a precipitation of electrons trapped within our magnetosphere, as the electrons collide. The end result is a reduction of the MUF of the F2 layer.

(((Note! Unfortunately elevated Kp indices of as little as a 3 will create absorptive conditions for medium frequency signal propagation on higher propagation paths))).

Initial phase of a geomagnetic storm is that period when there may be an increase of the middle latitude horizontal intensity.

Main phase of a geomagnetic storm is that period when the horizontal magnetic field at middle latitudes is generally decreasing.

Recovery phase of a geomagnetic storm is that period when the depressed northward field component returns to normal levels.

By the way effects of the solar wind on the magnetosphere decreases as we approach the Summer/Winter solstice and increase at the Fall/Spring Equinox. Why? Basically it's the orientation of Earth's magnetic field with respect to the Interplanetary Magnetic Field within the Solar Wind. When solar material and shock waves reach Earth their effects may be enhanced or dampened depending on the angle at which they arrive.

The Wang-Sheeley Interplanetary Magnetic Field (IMF) Model is used to predict Sun's IMF polarity. When the polarity of the IMF is negative a visible mid latitude Aurora display is likely as a Coronal Mass Ejection (CME) strikes the Earth's magnetic field.

For more information go to KN4LF HF/MF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9

G4 = Severe Storm - Kp = 8

G3 = Strong Storm - Kp = 7

G2 = Moderate Storm - Kp = 6

G1 = Minor Storm - Kp = 5

Active - Kp = 4

Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm

Ap 50-99 Major Storm

Ap 30-49 Minor Storm

Ap 16-29 Active

Ap 8-15 Unsettled

Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0

K- 1= A- 3

K- 2= A- 7

K- 3= A- 15

K- 4= A- 27

K- 5= A- 48

K- 6= A- 80

K- 7= A- 140

K- 8= A- 240

K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook Update #2005-006A

Issued Monday 02/07/2005 at 2200 UTC

Per my previous outlook propagation conditions began degrading on Sunday 02/06/2005 thanks to high speed solar wind streams from geoeffective (Earth facing) coronal holes #143 and 144. We are currently experiencing a strong (K-7) geomagnetic storm at high latitudes and a minor (K-5) geomagnetic storm at mid latitudes. The storming should begin to subside on Tuesday-Wednesday 02/08-09/2005.

Old Sunspot group #10720 now renumbered as #10732 has returned around the east limb of the Sun and is now located at N12E49 and contains a beta-gamma twisted magnetic signature capable of large M class solar flares. We also have a new sunspot group #10733 located at S09E78 which contains a beta-delta twisted magnetic signature capable of large M class and isolated X class solar flares. This is the group I mentioned in my last propagation outlook that was visible on GONG imagery.

Bottom line is that propagation wrecking renewed major solar flaring, dayside radio blackouts, coronal mass ejections, proton and geomagnetic storming is likely to occur through the rest of the forecast period.

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-006

<http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Thursday 02/03/2005 At 2000 UTC Valid 02/04-10/2005

DISCUSSION-

The past seven day period was mostly quiet. Per my last outlook we did see a short period of active to minor geomagnetic storming (Kp-4-5) related to recurring geoeffective (Earth facing) coronal hole #142.

My daily solar flux minimum forecast of 80 was very close to the observed 82, the end result being no F2 openings on 10 and 12 meters but there were some Sporadic E (Es) openings.

On the opposite side of the coin the low bands of 160, 120, 90 and 80 meters saw the best propagation conditions since September 2004. Why? Because all of the general guide lines as spelled out by me further down in this outlook were met.***

Now for the hard part, prolific sunspot group #10720 is due to rise around the east limb of the Sun on or around 02/05/2005. Looking at the latest GONG helioseismic holographic solar imagery #10720 is still be in existence, though allegedly in a declining stage. Also in the vicinity is another very large sunspot group.

I'm not sure if this is part of group #10720 or is a newly emerged group. In any event a backside coronal mass ejection (CME) occurred in the vicinity of this group yesterday and it's entirely possible that solar, space and geomagnetic weather will increase sharply by 02/05-06/2005.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet to active (Kp 0-4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp-5) geomagnetic storming is "WILL OCCUR".

During the period moderate (Kp-6) geomagnetic storming is "PROBABLE".

During the period strong to extreme (Kp-7-9) geomagnetic storming is "POSSIBLE".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "HIGH".

The chance of daylight side SID radio blackouts from solar flares is "HIGH".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "HIGH".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH".

Daily solar flux levels should range between 80-140.

No sunspot groups currently contain a twisted beta-gamma-delta magnetic signature capable of producing M & X class solar flares, until #10720 rises around the east limb of the Sun on 02/05/2005.

The chance of a small C class solar flare is "HIGH".

The chance of a large M class solar flare is "HIGH".

The chance of a huge X class solar flare is "MODERATE".

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Poor becoming fair on 02/06/2005.

Nighttime- Fair to good for ham signals, good for broadcast signals, becoming fair to poor for ham signals and fair for broadcast signals on 02/06/2005.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good becoming good to fair on 02/06/2005.

Mid Latitude- Good becoming fair to poor on 02/06/2005.

High Latitude- Good to fair, becoming poor on 02/06/2005.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect good to fair "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles, becoming fair to poor on 02/06/2005.

***Expect fair to good "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles, becoming fair to poor on 02/06/2005.**

+Expect good to fair "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100 miles, becoming fair to good on 02/06/2005.

-Expect fair "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles, becoming poor on 02/06/2005.

+Expect fair to good "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles, becoming fair to good on 02/06/2005.

***Expect poor to fair conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles, becoming poor on 02/06/2005.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be fair to good.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good to fair, becoming poor on 02/06/05.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair to good, becoming poor on 02/06/05.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good, becoming fair to poor on 02/06/05.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good to fair, becoming poor on 02/06/05.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be good to fair.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be fair to good.

Equatorial region to Northern Hemisphere “mid latitude” propagation conditions in excess of approximately 3200 miles should be good, becoming fair to poor on 02/06/05.

Equatorial region to Southern Hemisphere “mid latitude” propagation conditions in excess of 3200 miles should be fair to good, becoming poor on 02/06/05.

Equatorial region to Northern Hemisphere “high latitude” propagation conditions in excess of approximately 3200 miles should be good to fair, becoming poor on 02/06/05.

Equatorial region to Southern Hemisphere “high latitude” propagation conditions in excess of 3200 miles should be fair to good, becoming poor on 02/06/05.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9

Fair- S4-6

Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA

(See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

http://www.lightningstorm.com/tux/jsp/gpg/lex1/mapdisplay_free.jsp

During the 7 day outlook period there will be “HIGH” lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect “MODERATE” lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "LOW" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 01/28-02/03/2005

Sunspot Groups-

No sunspot group contained a twisted magnetic signature capable of producing M & X class solar flares.

Solar Flux Readings- 87-82

SEC Sunspot Number- 49-27

Solar Wind Speed- 775-343

X-Ray Solar Flares- C-1 M-0 X-0

Averaged Daily Background X-Ray Flux- A4.7-A4.0

Dst Index- -38 to -11

Elevated Energetic Protons >10 MeV (10+o)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 2, CH #141, 142

No polar cap absorption on high latitude propagation paths occurred due to excessive energetic protons >10 MeV (10+0) occurred.

The Ap index has been at quiet to minor geomagnetic storming levels, with a range of 0 to 39.

The Kp index has been at quiet to minor geomagnetic storming levels, with a range of 0 to 5.

The Boulder K index has been at quiet to active geomagnetic levels, with a range of 0 to 4.

*****Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.**

- 1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.**
- 2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.**

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is too low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

- 3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.**
- 4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.**
- 5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.**
- 6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.**
- 7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.**
- 8.) No current STRATWARM alert.**
- 9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.**

10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON –

Horizontal Propagation Path Skewing-

Basically the simplest way to look at medium frequency signal propagation path skewing is that the transmitted RF signal will "always" seek to propagate along the path with least absorption, which almost always means via a darkness path. As an example a signal transmitted from Norway to New England, which is a polar great circle path, will be directly absorbed most of the time by the Aurora Oval, with the remaining medium frequency signal skirting south and then west on the darkness path, arriving in New England from say the SE rather than the expected NE path. Also medium frequency skewed propagation paths are the norm rather than the exception, especially past approximately 3200 miles.

I add horizontal or side scatter propagation due to electron gradient changes, as a more complex explanation of signal path skewing around the Aurora Oval.

For more information go to KN4LF HF/MF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9
G4 = Severe Storm - Kp = 8
G3 = Strong Storm - Kp = 7
G2 = Moderate Storm - Kp = 6
G1 = Minor Storm - Kp = 5
Active - Kp = 4
Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-005

<http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Thursday 01/27/2005 At 2200 UTC Valid 01/28-02/03/2005

DISCUSSION-

After the wild week of 01/14-20/2005 for space weather this past week of 01/21-27/2005 returned to normal.

Just a few words concerning prolific space weather producing sunspot group #10720.

#1.) During #10720's transit across the visible face of the Sun it produced 100 C class, 24 M class and 5 X class solar flares, quite prolific.

#2.) It produced at least six geoeffective (Earth facing) coronal mass ejections. The last CME that arrived on Friday 01/21/05 was so intense that it was followed by partial magnetopause crossing. In simpler terms Earth's magnetic field was compressed in the opposite direction of the Sun such that orbiting satellites including the space station were exposed to nearly the full wrath of the Sun.

#3.) It produced an energetic excessive proton storm that reached 5040 pfu, the strongest of cycle 23. At one point protons actually penetrated to ground level in the polar regions!

#4.) Last but not least it produced at least 38 hours of geomagnetic storming.

Sunspot group #10720 is due to rise around the east limb of the Sun on or around 02/05/2005. However looking at the latest GONG solar imagery #10720 appears to have

dissipated.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet to active (Kp 0-4) geomagnetic conditions “WILL OCCUR”.

During the period minor (Kp-5) geomagnetic storming is “WILL OCCUR”.

During the period moderate (Kp-6) geomagnetic storming is “POSSIBLE”.

During the period strong to extreme (Kp-7-9) geomagnetic storming is “IMPROBABLE”.

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is “LOW”.

The chance of daylight side SID radio blackouts from solar flares is “LOW”.

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is “LOW”.

The chance of a geoeffective (Earth facing) Coronal Hole is “HIGH”.

Daily solar flux levels should range between 80-100.

No sunspot groups currently contain a twisted beta-gamma-delta magnetic signature capable of producing M & X class solar flares.

The chance of a small C class solar flare is “MEDIUM”.

The chance of a large M class solar flare is “LOW”.

The chance of a huge X class solar flare is “ZERO”.

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Good.

Nighttime- Fair to good for ham signals, good for broadcast signals.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good.

Mid Latitude- Good.

High Latitude- Good to fair.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect good to fair "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

***Expect fair to good "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.**

+Expect good to fair "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100 miles.

-Expect fair "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect fair to good "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

***Expect poor to fair conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be fair.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good to fair.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair to good.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good to fair.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be good.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be fair to good.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be good.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in excess of 3200 miles should be fair to good.

Equatorial region to Northern Hemisphere "high latitude" propagation conditions in excess of approximately 3200 miles should be good to fair.

Equatorial region to Southern Hemisphere "high latitude" propagation conditions in excess of 3200 miles should be fair to good.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9

Fair- S4-6

Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA

(See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

http://www.lightningstorm.com/tux/jsp/gpg/lex1/mapdisplay_free.jsp

During the 7 day outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect "MODERATE" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "LOW" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 01/21-27/2005

Sunspot Groups-

Sunspot group #10720 contained a twisted magnetic signature capable of producing M & X class solar flares.

Solar Flux Readings- 115-85

SEC Sunspot Number- 69-40

Solar Wind Speed- 1004-348

X-Ray Solar Flares- C-15 M-5 X-0

Averaged Daily Background X-Ray Flux- B6.2-A8.6

Dst Index- -113 to +7

Elevated Energetic Protons >10 MeV (10+0)- 1

Geoeffective (Earth Facing) Coronal Mass Ejections- 2

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 2, CH #140, #141

Strong polar cap absorption on high latitude propagation paths occurred due to excessive energetic protons >10 MeV (10+0) occurred.

The Ap index has been at quiet to severe geomagnetic storm levels, with a range of 2 to 179.

The Kp index has been at quiet to severe geomagnetic storm levels, with a range of 0 to 8.

The Boulder K index has been at quiet to strong geomagnetic storm levels, with a range of 0 to 7.

Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is too low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.

- 4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.
- 5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.
- 6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.
- 7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.
- 8.) No current STRATWARM alert.
- 9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.
- 10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON –

Electron Gyro Frequency Absorption-

Unfortunately medium frequencies fall within or very near the electron gyro-frequency which is in the approximate range of 630 to 1630 kHz and of course the AM broadcast band and 160 meter band is very close to these electron gyro-frequencies. There is a direct correlation between the strength Earth's magnetic field lines and electron gyro frequencies.

Basically, the electron gyro-frequency is a measure of the interaction between an electron in the Earth's atmosphere and the Earth's magnetic field. The closer a transmitted a medium frequency carrier or sideband wave frequency is to the electron gyro-frequency, the more energy that is absorbed by the gyro electrons from that carrier wave frequency. This is especially true for medium frequency signals traveling perpendicular to the Earth's magnetic field, meaning high latitude NW and NE propagation paths. Unfortunately this form of medium frequency signal absorption is ALWAYS present.

For more information go to KN4LF HF/MF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

- G5 = Extreme Storm - Kp = 9
- G4 = Severe Storm - Kp = 8
- G3 = Strong Storm - Kp = 7

G2 = Moderate Storm - Kp = 6
G1 = Minor Storm - Kp = 5
Active - Kp = 4
Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook Update #2005-004A

Issued Saturday 01/22/2005 at 1800 UTC

Yesterday I forecasted that partially geoeffective (Earth facing) coronal mass ejection #6 would produce no more than moderate to possibly strong (Kp-6-7) geomagnetic storming. I also said that though only partially geoeffective, the incoming CME screaming along at a withering 1004 km/s, was a very large impulse and very hard to judge as far as it's potential impact on our magnetic field. In any event I was wrong. During the day yesterday we saw severe (Kp-8) geomagnetic storming for at least six hours!

Just a few words concerning sunspot group #10720 that is rotating around the west limb of the Sun today, hoorah.

#1.) During #10720's transit across the visible face of the Sun it produced 100 C class, 24 M class and 5 X class solar flares, quite prolific.

#2.) It produced at least six geoeffective (Earth facing) coronal mass ejections. The last

CME that arrived on Friday 01/21/05 was so intense that it was followed by partial magnetopause crossing. In simpler terms Earth's magnetic field was compressed in the opposite direction of the Sun such that orbiting satellites including the space station were exposed to nearly the full wrath of the Sun.

#3.) It produced an energetic excessive proton storm that reached 5040 pfu, the strongest of cycle 23. At one point protons actually penetrated to ground level in the polar regions!

#4.) Last but not least it produced at least 38 hours of geomagnetic storming.

Fortunately we will now see solar, space and geomagnetic weather return to some sense of normalcy.

Note! The following paragraph was full of errors so has been re written on Sunday 01/23/05.

But we also have recurrent sunspot group #10715, soon to be re-numbered as 10727, as it rotates into view around the eastern limb of the Sun in the next 24-48 hours. Last solar rotation this sunspot group was a prolific producer of solar flares. This group has the potential to grow rapidly in size and complexity, similar to now departed sunspot group #10720.

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-004

<http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Thursday 01/20/2005 At 1930 UTC Valid 01/21-27/2005

DISCUSSION-

To say it's been a very active week for solar, space and geomagnetic weather is an understatement! My forecast for a strong (Kp-7) geomagnetic storming verified. Also I forecasted the daily solar flux to reach 150 and it reached 149. Overall the forecast for 01/14-20/2005 was one of my best since I started producing the outlooks again.

Now the forecast for the week of 01/20-21/2005 is much tougher. Prolific solar flare producing sunspot group #10720 will be setting around the western limb of the Sun in a couple of days but continues to produce large solar flares at the time of this writing. We currently have two new coronal mass ejections enroute Earth but both are probably only partially (Earth facing) geoeffective. The newest one released from the X7.1 solar flare this morning though only partially geoeffective, is a very large impulse and very hard to judge as far as it's potential impact on our magnetic field in one to two days. I'm hedging that it will produce no more than moderate geomagnetic storming.

We also have recurrent sunspot group #10715 returning in four days, which last month was a prolific producer of solar flares.

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet to active (Kp 0-4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp-5) geomagnetic storming is "WILL OCCUR".

During the period moderate (Kp-6) geomagnetic storming is "PROBABLE".

During the period strong (Kp-7) geomagnetic storming is "POSSIBLE".

During the period severe to extreme (Kp-8-9) geomagnetic storming is "IMPROBABLE".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "HIGH".

The chance of daylight side SID radio blackouts from solar flares is "HIGH".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "HIGH".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH".

Daily solar flux levels should range between 135-85.

Sunspot group #10720 located at N14W56 currently contains a twisted beta-gamma-delta magnetic signature capable of producing M & X class solar flares.

The chance of a small C class solar flare is "HIGH"

The chance of a large M class solar flare is "HIGH".

The chance of a huge X class solar flare is "HIGH"

GLOBAL LF 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Fair to poor.

Nighttime- Poor for ham signals, fair for broadcast signals.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Fair to good.

Mid Latitude- Poor to good.

High Latitude- Poor to fair.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect poor to fair "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

***Expect poor "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.**

+Expect good "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100 miles.

-Expect poor "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect good "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

***Expect poor conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be good to fair.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair to poor.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be poor.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair to good.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be good.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be fair to good.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be good.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in excess of 3200 miles should be fair.

Equatorial region to Northern Hemisphere "high latitude" propagation conditions in excess of approximately 3200 miles should be fair to poor.

Equatorial region to Southern Hemisphere "high latitude" propagation conditions in excess of 3200 miles should be poor.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9

Fair- S4-6

Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA

(See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

http://www.lightningstorm.com/tux/jsp/gpg/lex1/mapdisplay_free.jsp

During the 7 day outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect "HIGH TO MODERATE" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "MODERATE TO LOW" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 01/14-20/2005

Sunspot Groups-

Sunspot group #10720 located at N14W56 currently contains a twisted magnetic signature capable of producing M & X class solar flares.

Solar Flux Readings- 128-149

SEC Sunspot Number- 65-109

Solar Wind Speed- 443-1004

X-Ray Solar Flares- C-76 M-21 X-5

Averaged Daily Background X-Ray Flux- B6.8-C1.6

Dst Index- -5 to -125

Elevated Energetic Protons >10 MeV (10+o)- 2, Max 5040 pfu

Geoeffective (Earth Facing) Coronal Mass Ejections- 4

Partially geoeffective (Earth Facing) Coronal Mass Ejections-2

Geoeffective Coronal Holes- 1, CH #140 1/18/05

Strong polar cap absorption on high latitude propagation paths has occurred due to excessive energetic protons >10 Mev (10+0) occurred.

The Ap index has been at quiet to severe geomagnetic storm levels, with a range of 4 to 132.

The Kp index has been at quiet to strong geomagnetic storm levels, with a range of 1 to 7.

The Boulder K index has been at quiet to moderate geomagnetic storm levels, with a range of 1 to 6.

Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is too low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the

background x-ray flux. See #7.

- 3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.
- 4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.
- 5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.
- 6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.
- 7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.
- 8.) No current STRATWARM alert.
- 9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.
- 10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON –

E Valley-F Layer Propagation Ducting Mechanism/Chordal Hop Propagation-

Antenna polarization plays a large role in the success of a long haul DX contact. As a medium frequency RF signal traverses our planets magnetic lines of force in a perpendicular manner on high and mid latitude paths say between W3 land and SM, higher angle horizontally polarized signals are more readily absorbed than lower angle vertically polarized signals. On other paths on the globe opposite results can be found, i.e. horizontally polarized signals suffer less absorption on a propagation path between VK6 and W4.

You would expect a true long path QSO on 160 to be theoretically possible but improbable on most paths during any season. However a G to VK long path might be possible if the E-valley/F-layer ducting propagation mechanism or the Chordal Hop propagation mechanism is involved. A 160 meter signal can traverse a daylight path via these propagation modes if the transmitted signal enters/exits at each end of the path at or near sunrise/sunset when the D layer ionization is weak (ionospheric tilting).

The downward tilt of ionospheric layers is eastward at sunrise. As a result, signals coming from the west are refracted downward at steeper angles and are therefore heard better on higher angle antennas. The opposite is true at local sunset.

A note though, the E-valley/F-layer ducting propagation mechanism does not exist only during gray line periods. Internal Buoyancy/Gravity Waves (IBGW's) are a source of the ducting mechanism and allow for occurrences of ducting along any propagation path in total darkness. Measurement of the timing of arrival of propagated MF RF signals demonstrates the existence of the ducting mechanism, versus conventional numerous

E layer land/ocean surface hops.

The majority of the time medium frequency RF signals in excess of approximately 3200 miles propagate via the E-valley/F-layer propagation mechanism or via the Chordal Hop (mostly on HF) propagation mechanism. High solar flux values can aid in long haul medium frequency propagation, as high solar flux values ensure a strong F-layer half of the E-Valley/F-layer duct mechanism. Typically the majority of transmit antenna's radiation must be focused between 40-60 deg. to enter the E-Valley/F-layer duct.

If one is lucky enough to be on the receive end of a ducted medium frequency signal due to an IBGW or two, a change in the vertical and/or horizontal electron gradient will allow the RF to drop out of the duct at your QTH.

A note, high solar activity in the form of increased ionization created by ultraviolet and X-ray radiation, can fill in the E-Valley/F-layer ducting region with medium frequency absorptive ionization and interfere with the E-Valley/F-layer ducting mechanism. In a sense the E/F layer duct is shut down and the medium frequency RF signal can only propagate between the E-layer and land/ocean surface, at a higher angle and with more signal loss. This closing of the duct can be reciprocal on each end of the propagation path or one way only. (((((When closing of the duct occurs the advantage of a low angle vertical radiator is lost, with a higher takeoff angle horizontal dipole making the contact still possible, albeit maybe weaker.))))))

Medium frequency radio waves possess elliptical polarization, with the signal splitting into ordinary and extra-ordinary rays. These rays can propagate in or out of phase, mainly out of phase. The out of phase extra-ordinary ray represents a 50% power loss on the receive end of a propagation path.

For more information go to KN4LF HF/MF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9
G4 = Severe Storm - Kp = 8
G3 = Strong Storm - Kp = 7
G2 = Moderate Storm - Kp = 6
G1 = Minor Storm - Kp = 5
Active - Kp = 4
Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook Update #2005-003B

Issued Sunday 01/16/2005 at 1700 UTC

Very large and geoeffective (Earth facing) sunspot group #10720 at N13W03, with it's "delta" twisted magnetic signature continues to be a very prolific producer of solar flares. On Thursday-Saturday 01/13-15/2005 it produced 54 C class, 12 M class and 2 X class solar flares. So far at least two of the solar flares produced high velocity (1000-1300 km/s) geoeffective coronal mass ejections (CME's).

CME #1 should arrive sometime today UTC and trigger strong (Kp-7) to severe (Kp-8) geomagnetic storming. Extreme (Kp-9) geomagnetic storming is also very possible. CME #2 should arrive on UTC Monday 01/17/05 and extend the length of the expected storm. Barring further geoeffective coronal mass ejections, propagation conditions should return to unsettled to active (kp-3-4) by UTC Wednesday 01/19/2005.

The geomagnetic storming will create greatly reduced MUF's and potentially impact HF frequencies down to as low as 14 mc, as well as aurora absorption of signals at high and probably also "some" mid latitude propagation paths. Also per my outlook update of #2005-003A, an excessive energetic protons >10 Mev (10+0) storm has also commenced and this will act to produce polar cap absorption on high and probably also "some" mid latitude propagation paths. Last but not least we will have to contend with continued solar flare induced day light side radio blackouts starting with the MF AM broadcast band and working up in frequency to as high as 10 mc.

Bottom line is that this one, two, three punch may completely knock out MF/HF propagation for short periods of time.

We also have to keep a close eye on sunspot group # 10718 located at S07W21 with a "beta-gamma-delta" twisted magnetic signature capable of producing large M class and huge X class solar flares.

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KN4LF Daily LF/MF/HF Radio Propagation Outlook Update #2005-003A

Issued Saturday 01/15/2005 at 1700 UTC

Per my forecast of yesterday evening, geoeffective (Earth facing) sunspot group number #10720 released an M9-X1 class solar flare just after 0000 UTC this morning. If it also released a Coronal Mass Ejection then we can expect severe Kp-8 to extreme Kp-9 geomagnetic storming in 2-3 days time, also possibly a proton storm too.

Also I want to clarify something. In my propagation outlook update #2005-002A I said, "As hard as it may seem to believe no other global propagation forecasting entity whether it be governmental, educational or private predicted this geomagnetic storm".

What I was alluding to and meant to say was that no forecasting entity whether it be governmental, educational or private predicted the severity of the geomagnetic storm.

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-003

<http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Thursday 01/13/2004 At 2200 UTC Valid 01/14-20/2005

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet to active (Kp 0-4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp-5) geomagnetic storming is "PROBABLE".

During the period moderate (Kp-6) to strong (Kp-7) geomagnetic storming is "POSSIBLE".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "MEDIUM".

The chance of daylight radio blackouts from solar flares is "HIGH".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "HIGH".

The chance of a geoeffective (Earth facing) Coronal Hole is "MEDIUM".

Daily solar flux levels should range between 90-150.

Sunspot group #10718 located at S06E32 currently contains a twisted magnetic signature capable of producing C & M class solar flares.

Sunspot group #10720 located at S16W19 currently contains a twisted magnetic signature capable of producing M & X class solar flares.

The chance of a small C class solar flare is "HIGH".

The chance of a large M class solar flare is "HIGH".

The chance of a huge X class solar flare is "HIGH".

GLOBAL LF UNDER 30-300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Poor to fair.

Nighttime- Fair for ham signals, good for broadcast signals.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good.

Mid Latitude- Good.

High Latitude- Good to fair.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect fair to good "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

***Expect fair "Northern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.**

+Expect good to fair "Northern Hemisphere" domestic conditions on south "TO" north paths out to approximately 1100 miles.

-Expect fair to poor "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect fair to good "Southern Hemisphere" domestic conditions on north "TO" south paths out to approximately 1100 miles.

***Expect poor to fair conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be good.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good to poor.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair to poor.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good to fair.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair to good.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be good.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be fair to good.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in

excess of approximately 3200 miles should be good.

Equatorial region to Southern Hemisphere “mid latitude” propagation conditions in excess of 3200 miles should be good.

Equatorial region to Northern Hemisphere “high latitude” propagation conditions in excess of approximately 3200 miles should be good to fair.

Equatorial region to Southern Hemisphere “high latitude” propagation conditions in excess of 3200 miles should be good to fair.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better

Good- S7-9

Fair- S4-6

Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA

(See Where Your QRN Is Coming From)

Sorry but global views of near real time lightning strikes are no longer available.

http://www.lightningstorm.com/tux/jsp/gpg/lex1/mapdisplay_free.jsp

During the 7 day outlook period there will be “HIGH” lightning induced QRN levels in low latitude areas of the Northern Hemisphere tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere mid latitude regions can expect “HIGH” lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect “MODERATE” lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems and El Nino.

During the outlook period there will be "HIGH" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "HIGH" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "MODERATE" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 01/06-13/2005

Sunspot Groups-

Sunspot group #10718 located at S06E32 currently contains a twisted magnetic signature capable of producing C & M class solar flares.

Sunspot group #10720 located at S16W19 currently contains a twisted magnetic signature capable of producing M & X class solar flares.

Solar Flux Readings- 83-118

SEC Sunspot Number- 22-57

Solar Wind Speed- 370-769

X-Ray Solar Flares- C-16 M-1 X-0

Averaged Daily Background X-Ray Flux- A6.5-B2.6

Dst Index- -9 to -105

Elevated Energetic Protons >10 MeV (10+o)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 1

Partially geoeffective (Earth Facing) Coronal Mass Ejections-1

Geoeffective Coronal Holes- 2 CH #137, 138

No polar cap absorption on high latitude propagation paths due to excessive energetic

protons >10 Mev (10+0) occurred.

The Ap index has been at quiet to severe geomagnetic storm levels, with a range of 0 to 132.

The Kp index has been at quiet to strong geomagnetic storm levels, with a range of 0 to 7.

The Boulder K index has been at quiet to strong geomagnetic storm levels, with a range of 0 to 7.

Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is too low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.

4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.

5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.

6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.

7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.

8.) No current STRATWARM alert.

9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.

10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON –

Correlation Of Energetic Protons, Solar Flux and Ap & Kp Indices With Medium Frequencies-

I've been observing energetic proton levels, as well as the Ap & Kp indices for 30 years and see a direct correlation between high energetic proton levels above 10 MeV (10+0) and poor propagation on high and at times mid latitude MW paths at day AND night, where as A & K don't as readily correlate. (See paragraph three of definition #2. Aurora Oval Blockage, Absorption And Refraction and definition #7. High Latitude Path Skewing), for a further explanation on the lack of correlation of Ap & Kp indices with medium frequency propagation conditions.

High solar flux values are "incorrectly" considered to be detrimental to medium-frequency signals both domestic and TA/TP, as more absorption can be present as the transmitted signal makes two trips through the D layer, near sunrise and sunset. However most medium wave frequency RF signals in excess of 3100 miles are propagated via the E valley/F layer ducting and/or Chordal Hop/Pederson Ray propagation mechanism and a high solar flux value ensures a strong E and F-layer duct mechanism. Actually a solar flux of at least 100 is needed for the E valley/F layer ducting mode.

The main reason that MF radio propagation "seems to be better" at the bottom of a sunspot cycle is not so much due to lower solar flux levels BUT due to much less geomagnetic activity.

Keep in mind though that the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is too low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the interrelated background x-ray flux. See #1e & f above.

An elevated energetic proton flux level greater than (10+0) on 160 meters and greater than (10-1) on the medium frequency broadcast band creates noticeably increased winter time day and year round night time D layer absorption of medium wave frequencies, especially on high latitude propagation paths but it can also negatively impact mid latitudes, depending on the intensity of the event.

Elevated energetic proton events too small to be categorized as a Polar Cap Absorption event (PCA) can still impact high and at times mid latitude medium frequency propagation paths in the form of excessive D layer absorption.

(((Note, high latitude medium frequency radio propagation paths can still be disturbed for days and up to weeks, following the end of an official >10 MeV (10+0) proton event.)))

For more information go to KN4LF LF/MF/HF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9
G4 = Severe Storm - Kp = 8
G3 = Strong Storm - Kp = 7
G2 = Moderate Storm - Kp = 6
G1 = Minor Storm - Kp = 5
Active - Kp = 4
Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook Update #2005-002A

Issued Saturday 01/08/2005 at 1200 UTC

Per my propagation outlook #2005-02 that I published yesterday, we are now seeing severe K-8 to extreme K-9 geomagnetic storming at high latitudes and moderate K-6 to strong K-7 mid latitude geomagnetic storming. The Kp is currently 7.

Also per my outlook lightning QRN is pretty intense tonight in the eastern 2/3's of the U.S.

As hard as it may seem to believe no other global propagation forecasting entity

whether it be governmental, educational or private predicted this geomagnetic storm.

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-002

<http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Friday 01/07/2004 At 0400 UTC Valid 01/07-14/2005

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet to active (Kp 0-4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp-5) geomagnetic storming is "WILL OCCUR".

During the period moderate (Kp-6) geomagnetic storming is "PROBABLE".

During the period strong (Kp-7) geomagnetic storming is "POSSIBLE"

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "SMALL".

The chance of daylight radio blackouts from solar flares is "SMALL".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) emanating from a solar filament is "MEDIUM".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH".

Daily solar flux levels should range between 75-90.

No sunspot group currently contains a twisted magnetic signature capable of producing M or X class solar flares.

The chance of a small C class solar flare is "MEDIUM"

The chance of a large M class solar flare is "LOW".

The chance of a huge X class solar flare is "VERY LOW"

GLOBAL LF UNDER 300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Poor to fair.

Nighttime- Fair for ham signals, good for broadcast signals.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good.

Mid Latitude- Good to fair.

High Latitude- Good to poor.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect fair "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

***Expect fair domestic conditions on north "TO" south paths in the "Northern Hemisphere" out to approximately 1100 miles.**

+Expect good to fair domestic conditions on south "TO" north paths in the "Northern Hemisphere" out to approximately 1100 miles.

-Expect fair "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect fair to good domestic conditions on north "TO" south paths in the "Southern Hemisphere" out to approximately 1100 miles, becoming poor on 12/20, then back to fair on 12/21.

***Expect poor conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be good.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans

Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good to poor.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair to poor.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good to fair.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair to good.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be good.

"Low latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be fair to good.

Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be good.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in excess of 3200 miles should be good.

Equatorial region to Northern Hemisphere "high latitude" propagation conditions in excess of approximately 3200 miles should be fair to good.

Equatorial region to Southern Hemisphere "high latitude" propagation conditions in excess of 3200 miles should be fair to good.

Propagation Forecast Scales-

**Excellent- +1 db Over S9 Or better
Good- S7-9**

Fair- S4-6
Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA **(See Where Your QRN Is Coming From)**

Sorry but global views of near real time lightning strikes are no longer available.

http://www.lightningstorm.com/tux/jsp/gpg/lex1/mapdisplay_free.jsp

During the 7 day outlook period there will be "moderate lightning induced QRN levels in low latitude areas of the Northern Hemisphere due to the proximity of the Inter-Tropical Convergence Zone (ITCZ) and tropical cyclones.

Northern hemisphere mid latitude regions can expect "moderate" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "low" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

During the outlook period there will be "high" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "high" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "moderate" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 12/31/2004-01/07/2005

Sunspot Groups-

Sunspot group #10715 located at N04W33 contained a beta-gamma-delta twisted magnetic signature that produced M and X class solar flares.

Solar Flux Readings- 83-101

SEC Sunspot Number- 15-60

Solar Wind Speed- 426-860

X-Ray Solar Flares- C-12 M-1 X-1

Averaged Daily Background X-Ray Flux- A9.2-B2.8

Dst Index- -12 to -64

Elevated Energetic Protons >10 MeV (10+0)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 4

Partially geoeffective (Earth Facing) Coronal Mass Ejections-0

Geoeffective Coronal Holes- 3 CH #136, 137, 138

No polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) occurred.

The Ap index has been at quiet to major storm levels, with a range of 4 to 56.

The Kp index has been at quiet to minor storm levels, with a range of 0 to 5.

The Boulder K index has been at quiet to active levels, with a range of 0 to 4.

Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is to low on the order of one million times. However most are used to

solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

- 3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.**
- 4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.**
- 5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.**
- 6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.**
- 7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.**
- 8.) No current STRATWARM alert.**
- 9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.**
- 10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.**

TODAY'S PROPAGATION LESSON -

Solar Filament-

A relatively cool and dense ribbon of gas held together by solar magnetic fields. From Earth they usually appear as dark lines across the face of the Sun. At times the magnetic lines holding the filament open up creating a tremendous eruption in the form of a Coronal Mass Ejection (CME).

For more information go to KN4LF HF/MF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

G5 = Extreme Storm - Kp = 9
G4 = Severe Storm - Kp = 8
G3 = Strong Storm - Kp = 7
G2 = Moderate Storm - Kp = 6
G1 = Minor Storm - Kp = 5
Active - Kp = 4
Unsettled - Kp = 3

Ap Indices-

Ap 100-400 Severe Storm
Ap 50-99 Major Storm

Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
Ap 0-7 Quiet

Correlation Of Kp To Ap Indices-

K- 0= A- 0
K- 1= A- 3
K- 2= A- 7
K- 3= A- 15
K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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KN4LF Daily LF/MF/HF Radio Propagation Outlook #2005-001

<http://www.kn4lf.com/kn4lf6.htm>

Date Format is MM/DD/YYYY

Published Friday 12/31/2004 At 0000 UTC Valid 12/31-01/07/2005

SOLAR, SPACE WEATHER AND GEOMAGNETIC CONDITIONS EXPECTED-

During the period quiet to active (Kp 0-4) geomagnetic conditions "WILL OCCUR".

During the period minor (Kp 5) geomagnetic storming is "POSSIBLE".

The chance of polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) is "MEDIUM".

The chance of daylight radio blackouts from solar flares is "MEDIUM".

The chance of a geoeffective (Earth facing) Coronal Mass Ejection (CME) is "SMALL".

The chance of a geoeffective (Earth facing) Coronal Hole is "HIGH".

Daily solar flux levels should range between 100-130.

Sunspot group # 10715 located at N04E51 has a beta-gamma-delta twisted magnetic signature.

The chance of a large M class solar flare is "HIGH".

The chance of a huge X class solar flare is "MEDIUM"

NOTE!!! A DAYSIDE RADIO BLACKOUT FROM A PROTON SID FROM AN M AND/OR X CLASS SOLAR FLARE FROM SUNSPOT GROUP # 10715 WILL TEMPORARILY RENDER THE BELOW OUTLOOK NULL AND VOID FOR SHORT PERIODS OF TIME.

GLOBAL LF UNDER 300 KC PROPAGATION CONDITIONS EXPECTED-

Daytime- Poor to fair.

Nighttime- Fair to poor.

GLOBAL HF 3000-30000 KC PROPAGATION CONDITIONS EXPECTED-

Low Latitude- Good.

Mid Latitude- Good.

High Latitude- Good to fair.

GLOBAL MF 300-3000 KC PROPAGATION CONDITIONS EXPECTED WITH AN EMPHASIS ON THE MF AM BROADCAST BAND, 160 METERS AND 120 METERS-

-Expect fair to good "Northern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

***Expect fair domestic conditions on north "TO" south paths in the "Northern Hemisphere" out to approximately 1100 miles.**

+Expect good to fair domestic conditions on south "TO" north paths in the "Northern Hemisphere" out to approximately 1100 miles.

-Expect fair "Southern Hemisphere" domestic propagation conditions on east-west paths out to approximately 1100 miles.

+Expect fair to good domestic conditions on north "TO" south paths in the "Southern Hemisphere" out to approximately 1100 miles, becoming poor on 12/20, then back to fair on 12/21.

***Expect poor conditions on south "TO" north paths in the "Southern Hemisphere" out to approximately 1100 miles.**

Equatorial region domestic propagation conditions out to approximately 1100 miles should be fair to good.

"High latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair.

"High latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair.

"Mid latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be good.

"Mid latitude" Southern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific and cross equatorial propagation conditions in excess of approximately 3200 miles should be fair to good.

"Low latitude" Northern Hemisphere (TA) Trans Atlantic, (TI) Trans Indian, (TP) Trans Pacific propagation conditions in excess of approximately 3200 miles should be good.

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Equatorial region to Northern Hemisphere "mid latitude" propagation conditions in excess of approximately 3200 miles should be good.

Equatorial region to Southern Hemisphere "mid latitude" propagation conditions in excess of 3200 miles should be good.

Equatorial region to Northern Hemisphere "high latitude" propagation conditions in excess of approximately 3200 miles should be good to fair.

Equatorial region to Southern Hemisphere "high latitude" propagation conditions in excess of 3200 miles should be good to fair.

Propagation Forecast Scales-

Excellent- +1 db Over S9 Or better
Good- S7-9
Fair- S4-6
Poor- S1-3

GLOBAL NOISE (QRN) OUTLOOK-

U.S. LIGHTNING STRIKE DATA **(See Where Your QRN Is Coming From)**

Sorry but global views of near real time lightning strikes are no longer available.

http://www.lightningstorm.com/tux/jsp/gpg/lex1/mapdisplay_free.jsp

During the 7 day outlook period there will be "moderate lightning induced QRN levels in low latitude areas of the Northern Hemisphere due to the proximity of the Inter-Tropical Convergence Zone (ITCZ) and tropical cyclones.

Northern hemisphere mid latitude regions can expect "moderate" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts, associated extra-tropical cold core low pressure systems and El Nino.

Northern hemisphere high latitude regions can expect "low" lightning induced QRN tied to winter season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

During the outlook period there will be "high" lightning induced QRN levels in low latitude areas of the Southern Hemisphere due to the proximity of the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones.

Southern hemisphere mid latitude regions can expect "high" lightning induced QRN, tied to summer season thunderstorms and tropical cyclones.

Southern hemisphere high latitude regions can expect "moderate" lightning induced QRN tied to summer season thunderstorms, cold/warm/occluded fronts and associated extra-tropical cold core low pressure systems.

END OF OUTLOOK

SOLAR, SPACE WEATHER AND GEOMAGNETIC INDICES FOR THE PERIOD 12/24-30/2004

Sunspot Groups- Sunspot group #10713 which has now set on the western horizon of the Sun contained a beta-gamma twisted magnetic signature that produced C and M class solar flares.

Sunspot group #10715 located at N04E51 contains a beta-gamma-delta twisted magnetic signature that has produced C and M class solar flares.

Solar Flare Totals- C 17 M-3 X-0

Solar Flux Readings- 98-112, forecast was for 90-115.

SEC Sunspot Number- 11 to 42

Solar Wind Speed- 351-581

X-Ray Solar Flares- C-21 M-2 X-0

Averaged Daily Background X-Ray Flux- A9.2-B2.8

Dst Index- -60 to - +5

Elevated Energetic Protons >10 MeV (10+0)- 0

Geoeffective (Earth Facing) Coronal Mass Ejections- 0

Partially geoeffective (Earth Facing) Coronal Mass Ejections- 1

Geoeffective Coronal Holes- 2

CH #135 12/24-27, CH 136 12/29-present.

No polar cap absorption on high latitude propagation paths due to excessive energetic protons >10 Mev (10+0) occurred.

The Ap index has been at quiet to minor storm levels, with a range of 2 to 32.

The Kp index has been at quiet to active levels, with a range of 0 to 4.

The Boulder K index has been at quiet to minor geomagnetic storming levels, with a range of 0 to 5.

Here are some "general" guidelines concerning correlation of propagation indices to actual expected HF/MF propagation conditions.

1.) Dropping indices numbers are better, with the exception of solar flux and sunspot number on HF.

2.) For medium frequencies a solar flux under 150, under 100 better, 70 is best for E layer multi hop. For high frequencies over 125 is good, over 150 is better, over 200 is best.

Keep in mind though that at medium frequencies the 10.7 cm (2800 mhz) solar flux index is not a "reliable" gauge of ionization in our atmosphere, as the energy of photons at this frequency is too low on the order of one million times. However most are used to solar flux and sunspot number and it's a hard habit to break. A better indicator is the background x-ray flux. See #7.

3.) Solar flux of at least 100 for E valley-F layer ducting mechanism.

4.) Previous 24 hour Ap index under 10, under 7 for several days consecutively is best.

5.) Previous 3 hour Kp index under 3 for mid latitude paths, under 2 for high latitude paths, 0-1 for several days consecutively is best.

6.) Energetic protons no greater than 10 MeV (10+0) for 160/120 meters and no greater than (10-1) on MF AM broadcast band.

7.) Background x-ray flux levels less than C1 for several days consecutively for 160/120 meters and less than B9 for MF broadcast band but A9 or less is best.

8.) No current STRATWARM alert.

9.) IMF Bz with a (+) sign, indicates a lesser chance of high latitude path auroral absorption/unpredictable refraction or scattering of MF RF signals, when the Kp is above 3.

10.) A -50 or better towards a positive number Dst index during the recovery time after a geomagnetic storm, as related to the Equatorial Ring Current.

TODAY'S PROPAGATION LESSON -

Coronal Hole-

The corona is not part of the Sun's surface. It is instead part of the Sun's atmosphere, much like Earth's troposphere. Coronal holes are low density areas associated with open magnetic field lines and are found near the Sun's poles at the bottom of a sunspot cycle and everywhere during a cycle maximum. A coronal hole is a dark region where a breakdown in the magnetic field structure in the solar corona has occurred. From these regions stream the high velocity solar wind and are a source of geomagnetic storming on Earth.

Coronal holes occur most often on the downside of a solar cycle and their absence at the bottom of a solar cycle and at the beginning of the next, allow for the best LF and MF band radio propagation conditions. Many think it's the lower solar flux values seen

at the bottom of a solar cycle that accounts for improved propagation conditions but it's actually a lack of coronal holes and geomagnetic storming.

For more information go to KN4LF HF/MF Frequency Radio Propagation Theory Notes at <http://www.kn4lf.com/kn4lf8.htm> .

Space Weather Scales-

Kp Indices-

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Ap 100-400 Severe Storm
Ap 50-99 Major Storm
Ap 30-49 Minor Storm
Ap 16-29 Active
Ap 8-15 Unsettled
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Correlation Of Kp To Ap Indices-

K- 0= A- 0
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K- 4= A- 27
K- 5= A- 48
K- 6= A- 80
K- 7= A- 140
K- 8= A- 240
K- 9= A- 400

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Note! I use "RAW" and error prone public domain data from the NOAA Space Environment Center, as well as other U.S. Government organizations, to produce my "not for profit" propagation forecast outlooks. This data is gathered and made public by the U.S. Government using taxpayer \$\$\$\$. However the forecast outlooks that I produce from the "RAW" public domain data, is my personal intellectual property. Therefore the propagation outlooks contained herein is copyrighted © 1988-2005 by Thomas F. Giella, KN4LF, all rights reserved. Reproduction of information herein is allowed as long as proper credit is

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