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ARLP041 Propagation de K7RA

ZCZC AP41
QST de W1AW
Propagation Forecast Bulletin 41 ARLP041
>From Tad Cook, K7RA
Seattle, WA October 10, 2014
To all radio amateurs

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Average daily sunspot numbers from October 2-8 dropped from 170.1 in the previous seven days to 98. Average daily solar flux also declined, from 168.9 to 131.9.

Predicted solar flux for the near term is 120 and 115 on October 10-11, 110 on October 12-14, then 115 and 125 on October 15-16, 145 on October 17-18, 140 on October 19, 135 on October 20-21, and 140 on October 22-25. The next day solar flux begins a decline to a low of 110 on November 7-9, and rises again to 145 on November 12-14.

The prediction for the planetary A index posits a more active geomagnetic future, at least for the near term. Predicted planetary A index is 5 on October 10, 8 on October 11-12, 5 on October 13-16, then 8, 5, 8, 10 and 20 on October 17-21, 15 on October 22-24, 10 on October 25-28, 8 on October 29, 5 on October 30, and 8 on October 31 through November 3.

F.K. Janda, OK1HH predicts mostly quiet conditions on October 10, quiet on October 11, mostly quiet October 12, quiet to active October 13, mostly quiet October 14, quiet to active October 15, quiet to unsettled October 16, quiet October 17-19, mostly quiet October 20, active to disturbed October 21-22, quiet to active October 23-24, quiet to unsettled October 25-27, and mostly quiet October 28-29.

The GOES 15 X-Ray Background Flux, which is a better measure than 10.7 cm solar flux in terms of effects on the ionosphere was at the C level from September 25 through October 3. You can see the data in this table:

<http://www.swpc.noaa.gov/ftpdir/latest/DSD.txt>

Looking at the data for all of last year shows that a string of consecutive days at the C level was uncommon in 2013:

http://www.swpc.noaa.gov/ftpdir/indices/old_indices/2013_DSD.txt

Data for the first quarter of 2014 shows a long string of days with C level readings, from January 27 through February 14:

http://www.swpc.noaa.gov/ftpdir/indices/old_indices/2014Q1_DSD.txt

Recent data at 5 minute intervals is shown here:

http://www.swpc.noaa.gov/rt_plots/xray_5mBL.html

Note the data of interest to us is shown in the upper red graph, and on the left vertical axis you can see the strength of the radiation as detected on the GOES-15 satellite, and on the right the corresponding letter designation for the flux values in the table. Today I can see that early on October 9 the radiation was in the C range, but according to data in the previously mentioned table, the average level for the whole day was B5.4.

How does this affect HF radio propagation? Consistently higher

levels cause denser ionization in the ionosphere, and greater density corresponds to higher MUF (Maximum Usable Frequency) values. Higher MUF means higher frequencies are available for practical long distance communications.

MUF is meaningful for particular paths between two points. So we cannot say "the MUF was 31.2 MHz today" as a general statement, but it might be that the MUF at a particular time between your location and another location of choice was 31.2 MHz, in which case the 10 meter band would be open over that path.

You can take a look at how predicted MUF varies by location, season and time-of-day by using a propagation prediction program. W6ELprop is available for free from <http://k9la.us/>. Click on Tutorials to find the downloadable file and instructions. This is a Windows program that works with the now retired Windows 98, Windows Xp and Vista, but I can use it in Windows 7 by running Windows Xp Mode in the Windows Virtual PC. I assume the same is true for Windows 8.

It seems that between August and September there was a slight upward change in smoothed sunspot numbers, and you can see it by comparing the tables on page 16 of the August forecast and page 17 in the September table:

<http://www.swpc.noaa.gov/weekly/pdf/prf2036.pdf>

<http://www.swpc.noaa.gov/weekly/pdf/prf2040.pdf>

Smoothed sunspot numbers are averaged over a whole year, so earlier numbers within the past year are more meaningful because they use more real data than future predicted values. So for example in the August table, you can see peak smoothed sunspot numbers of 80, 82, 81 and 80 for March through June. The September table is updated with an additional month of real sunspot data, and it now shows the peak values at 81, 83, 82 and 81 over the same four months.

Scott Bidstrup, TI3/W7RI in Costa Rica sent the following on October 2, but somehow I missed this for last week's bulletin. He has a fascinating observation regarding ionization from lightning strikes as a brief reflector of HF radio signals:

"Here in the single-digit latitudes, band conditions have been much improved of late. The increased 304a index tells the story - up 30 points from what it has been, and that's being seen in the activity on the bands. The 20m PSK window is back to being wall-to-wall, and once again with mostly west and central Europeans in the morning and the west coast U.S. and Japan in the evenings. I typically have been seeing 3 Europeans for every Stateside on the PSK window.

"Conditions on 10 meters have been much better, and the band has been producing good results during the morning hours, particularly to Europe, and W6 and W7 later in the day. 20 meters here is back to being open around the clock, and even 10 will open as soon as the Sun hits the ionosphere in the morning. But the 304a trend is flattening out, and may be headed back down. Sadly.

"But I haven't been on the HF bands much lately anyway. Our Autumn 6 meter transequatorial season has finally gotten underway. It was like the propagation gods just flipped a switch (two weeks late), and 6 meters went from zero one day to wide open the next and it's been open daily since. Within two days, I'd worked nearly every country in South America. Only a couple of openings into the States, however - lots of TEP from the States into South America, but going straight over my head. Here on the ground, nothing Stateside, just the usual suspects in South America. We're still waiting for openings into the South Pacific, though. That hasn't happened yet - FK8CP has been heard here only weakly and rarely so far.

"One odd thing I have noticed in all this is that when we are having a lot of lightening in the region, and there's the usual TEP opening over my head, but I'm hearing nothing here on the ground, I'll

occasionally get short bursts of strong signals right after a distant lightning strike. They'll last for a second or two. I am wondering if this is signals being bent back to earth by the ionization in the sprites above the lightning strikes."

Very interesting observation, Scott. It makes sense to me.

If you would like to make a comment or have a tip for our readers, email the author at, k7ra@arrl.net.

For more information concerning radio propagation, see the ARRL Technical Information Service web page at <http://arrl.org/propagation-of-rf-signals>. For an explanation of the numbers used in this bulletin, see <http://arrl.org/the-sun-the-earth-the-ionosphere>. An archive of past propagation bulletins is at <http://arrl.org/w1aw-bulletins-archive-propagation>. More good information and tutorials on propagation are at <http://k9la.us/>.

Monthly propagation charts between four USA regions and twelve overseas locations are at <http://arrl.org/propagation>.

Instructions for starting or ending email distribution of ARRL bulletins are at <http://arrl.org/bulletins>.

Sunspot numbers for October 2 through 8 were 105, 128, 125, 106, 86, 75, and 61, with a mean of 98. 10.7 cm flux was 149, 137, 128, 128, 130, 125, and 126, with a mean of 131.9. Estimated planetary A indices were 8, 4, 6, 6, 6, 6, and 9, with a mean of 6.4. Estimated mid-latitude A indices were 13, 3, 5, 5, 6, 5, and 6, with a mean of 6.1.

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