Propagation
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A Propagation Advantage for East Coast Contesters

After reading the title of this month's column, I'm sure many of you are thinking "that's just what the East Coast needs – another advantage". Unfortunately the ionosphere does not necessarily play fair and thus does not try to level the worldwide playing field.

So what is this additional advantage for East Coast contesters? The good news for those of us not on the East Coast is that this is a summer advantage. Thus it does not occur in the prime DX contest season (CQ WW PH DX contest thru the ARRL PH DX contest).

To understand this advantage, we have to initially head pretty far south – in fact, below the equator to the extreme southwest portion of CQ Zone 13 where the Weddell Sea is. During the International Geophysical Year (IGY) that ran from July 1957 to December 1958, ground-based data from the Halley Bay and Faraday ionosondes showed a maximum foF2 (F2 region critical frequency) occurring at night (10:00 PM to 4:00 AM local time) instead of the usual maximum foF2 in the daytime hours (just after local noon). This was observed only in the Antarctic summer. This F2 region anomaly was called the Weddell Sea Anomaly (WSA) as it was initially thought to occur only in the area of the Weddell Sea.

Moving into the Space Age allowed this anomaly to be studied further. Satellite data showed that the larger part of the WSA actually developed in the Bellinghausen Sea, which is just west of the small peninsula off Antarctica that extends towards the southern tip of South America. Thus a more appropriate name for this anomaly might be the Bellinghausen Sea Anomaly.

But this F2 region anomaly didn't stop in Antarctica. More worldwide satellite data showed two other areas in the world in which the summer maximum foF2 occurred at night instead of during the day. These two areas are around Japan and off the northeast coast of North America. Figure 1 depicts all three anomalous areas (from H. Liu, S.V. Thampi and M. Yamamoto; *Phase reversal of the diurnal cycle in the midlatitude ionosphere*; **Journal of Geophysical Research**; Volume 115; A01305; 2010).

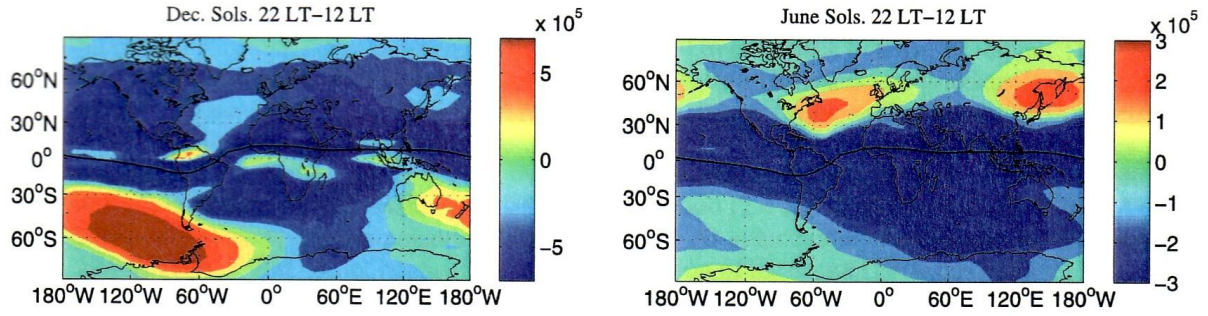

Figure 1 – Worldwide Depiction of the Summer Evening Midlatitude F2 Region Anomaly

The image at the left in Figure 1 is from 2200 local time to 1200 local time around the December solstice, which is summer in the southern hemisphere. The image at the right is also from 2200 local time to 1200 local time around the June solstice, which is summer in the northern hemisphere. The data indicates the difference in electron density between night and day, which can be positive (the anomalous areas) or negative (the rest of the world).

To reiterate, this is a summer evening anomaly. Although the anomalous areas around Japan and off the northeast coast of North America aren't as big as the area near Antarctica, there still should be a noticeable effect since they show up in long-term data sets (in other words, the anomaly is not a 'few and far between' event). Specifically, the anomaly off the northeast coast of North America may provide an advantage to East Coast contesters to Europe during summer evenings.

Indeed, a recent observation by an East Coast station appears to confirm the anomaly off the northeast coast of North America. In a personal e-mail on August 23 this year, Rob N3RW reported the best signals on 20m and 15m from Europe on August 17 occurred after sunset. I downloaded data from Wallops Island ionosonde (in the vicinity of N3RW's path to Europe) and plotted the MUF (maximum useable frequency – which is approximately 3 times foF2) assuming Wallops Island was the midpoint of a 3000 km hop.

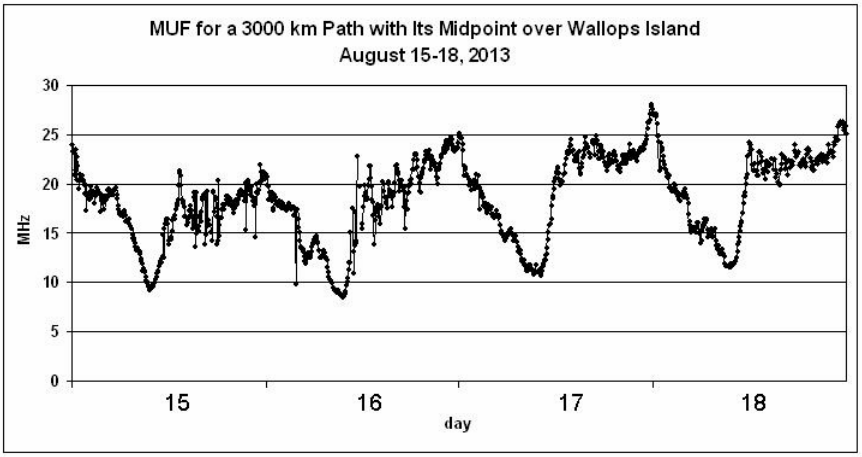

Figure 3 – Wallops Island Data for August 15 – 18

For the four days around August 17 that I plotted, the MUF peaked not around local noon (1600 UTC), but much later in the day (around 2300 UTC = 7:00 PM local). Note that the Wallops Island ionosonde in Virginia falls on the western fringe of the anomalous area in Figure 1, and much of Europe is on the eastern fringe of this anomalous area. So it's no surprise to see this anomaly in the Wallops Island data, and to hear about N3RW's observations.

Since this is a summer event, the contest that comes to mind that it could impact is the IARU HF Championship in July. One problem in taking advantage of this may be the ingrained tendency to move to the lower bands after sunset – and thereby miss any advantageous propagation that was there. So for next year's IARU contest, you East Coast contesters (and especially you WRTC 2014 participants) may want to check the higher bands much later in the day than normal. You may be in for a pleasant surprise.