

"See Spot Run" ... Across the Sun!

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When Dick and Jane were watching Spot run back in the middle of the last century, it's a pretty safe bet that they were watching their dog¹ ... unless, of course, it was the late 1950s and they were hams! In that case, Dick and Jane might have been watching a parade of spots making their way across the surface of the sun. Solar Cycle 19, which peaked in 1957-58, was the granddaddy of all solar cycles of the radio age. CQ described propagation at the time as "Once in a Lifetime Conditions." And for many hams, that has indeed been the case. But is there a chance we might get another shot at those "once in a lifetime conditions" in Cycle 25? It all depends on who you ask.

But before we get into that, turn to page 92 and look at Figure 2 in this month's Propagation column. It clearly shows that we have turned the corner on the not-too-lamented Cycle 24 and are slowly beginning to see the rise of Cycle 25. This is consistent with our report in the July issue on the first solar flare of any significant size in nearly three years on May 29 as well as new sunspots bearing the magnetic signature and latitude markers of a new cycle.

Back to predictions for the likely magnitude of Cycle 25, the consensus projection of an international panel of scientists chaired by NOAA and NASA, and released last December, is that Cycle 25 will be "average in intensity and similar to Cycle 24," with a smoothed sunspot number (SSN) peak between 105 and 125 in mid-2025.²

It is worth noting that the method of counting sunspots was revised in 2014 — something that's been periodically mentioned but has basically stayed under the radar — and a range of 105-125 under the current method is equivalent to a range of 74-88 under the old system ... not a very strong cycle!³

But ... just at last month's deadline, we got word of a paper produced by another international team of scientists, with equally impressive affiliations, that challenges the consensus view and predicts a major cycle. We managed to squeeze the essentials into our news column but didn't have time or space to give it more detail. We'll try to do that in this issue, both here and in News Bytes on page 9.

The paper's authors, led by Scott McIntosh of the National Center for Atmospheric Research in Colorado, and Sandra Chapman of the Centre for Fusion, Space and Astrophysics at the University of Warwick in England, analyzed 270 years of data on sunspot counts as well as 22-year magnetic cycles on the sun. They concluded that when the end of two magnetic cycles (or "terminator events") are closer together than average, the following cycle may be very strong. In addition, it was noted that early Cycle 25 sunspots (as denoted by their magnetic polarity) are appearing further from the solar equator than usual, and that this is frequently a sign of a strong cycle to come.

"Given this relationship and our prediction of a terminator event in 2020," the paper states, "we deduce that sunspot cycle 25 will have a magnitude that rivals the top few since records began. This outcome would be in stark contrast to the community consensus estimate of sunspot cycle 25 magnitude."⁴

More specifically, the McIntosh group concludes that "our best estimate for the SSN amplitude of solar cycle 25 is 233 spots, with a 68% confidence that the amplitude will fall between 204 and 254 spots. We predict with 95% confidence that the cycle 25 amplitude will fall between 153 and 305 spots." (For comparison, Cycle 19's peak in 1958 was 201 under the old system and would have been 285 under the current method.)

If you remember back to waning years of Cycle 23, you may recall that forecasts for #24 were likewise all over the place. What finally brought most of the models into agreement on the

prediction that turned out to be correct, a weak cycle, was the nearly five-year duration of the solar minimum. From the chart in Figure 2a of this month's Propagation column, it appears that the Space Weather Prediction Center expects a fairly rapid climb for Cycle 25, which would suggest a more typical minimum period of about two years. In addition, if you look at Tomas's Figure 1, the two new sunspots are at relatively high latitudes, something the McIntosh group says is another indicator of an active cycle. Dick and Jane, meet Scott and Sandra.

The most fascinating thing about this puzzle, in our view, is how all of this demonstrates how much we still don't know about our local star and the dynamics of its interactions with our planet. We've learned a tremendous amount in the past couple of hundred years, but clearly have so much more to learn. And the best part is that we, as citizen scientists, can help with this process through such resources as WSPR (Weak Signal Propagation Reporter) and RBN (Reverse Beacon Network), and just by getting on the air and discovering unanticipated band openings. We may be in the depths of the solar minimum, but there's still a whole lot of DX happening on the radio.

By the way, most of the historical information I'm citing here, as well as the conversion factor from the old to new sunspot counting methods (0.7 if you're wondering), comes from the pages of our soon-to-be-available third edition of the *CQ Shortwave Propagation Handbook*. As this is written in late July, we're still in the middle of editing, but we expect the book to be finished in time for this year's holiday season. It's chock full of great information, and you'll definitely want to save space on your gift list and your bookshelf for your very own copy.

The CQ Cloud Experiment

Just a quick housekeeping note to wrap things up for this month: Hopefully, you haven't noticed but as of the end of July, CQ closed its Hicksville office and moved to ... the cloud. After being forced to work from home for three months earlier this year, with very little notice and virtually no time to plan — and discovering that it all worked reasonably well — we decided to give it a try on at least a semi-permanent basis, and with some advance planning. Various components of our physical operations have been parceled out to staff members' homes, with everyone and everything tied together via the internet. Your mail will still reach us and (hopefully) the phone will ring in one of our staff members' home offices when you call. If it works as planned (or close enough to it), then it could become permanent. If not, we'll put ourselves back in the market for office space. It's very likely that we are not the only company doing or considering this right now, in light of our collective experiences during the coronavirus lockdown. How business gets done is changing and CQ is in the forefront. But please forgive any glitches that may occur as we settle into our new normal.

— 73, Rich, W2VU

Notes:

1. For the blissfully young, the "Dick and Jane" series of early reader books were staples in many American classrooms in the mid-20th century.
2. NOAA/NASA prediction update <<https://tinyurl.com/va6wbwh>>
3. Correlation of old to new sunspot numbers from the forthcoming 3rd edition of *The CQ Shortwave Propagation Handbook*, now in pre-production and expected to be published this fall.
4. The complete paper by McIntosh, Chapman, et. al. is at <<https://arxiv.org/pdf/2006.15263.pdf>>