

# Welcome to **CYCLE 25**

**A new solar cycle is under way  
and conditions on the HF bands  
are already improving.**



## Steve Ford, WB8IMY

The energy output of our nearest star rises and falls in cycles that span roughly 11 years. Scientists assign numbers to these cycles and speak of their peaks as solar maximums, and their troughs as solar minimums.

In 2018 and 2019, we reached the solar minimum of Solar Cycle 24. Solar activity was substantially reduced, with the solar flux index ranging between the upper 60s and the lower 70s. The sun was also bereft of sunspots (darkened regions of reduced temperature caused by magnetic fields rising from below the sun's surface) during much of this period. An active sun tends to spawn spots, but a quiet sun can be spotless for many weeks at a time.

When the sun goes quiet, the electron density of the ionosphere (the electrically charged region of our atmosphere responsible for refracting HF signals over great distances) diminishes. A lower electron density in the ionosphere means it's a less effective prism for signals, particularly at high frequencies. Therefore in the trough of Cycle 24, globe-spanning DX contacts became more challenging and less common. If you wanted the best conditions for long-distance communication, you had to go to the lower HF bands, such as 80 and 40 meters. Signals at those frequencies still offered DX opportunities because they were more easily refracted by the anemic ionosphere.

But in 2019, scientists noticed something out of the ordinary. A few sunspots appeared with magnetic fields whose polarities were reversed compared to the sunspots that came before. This trend continued, and by December 2019 these reversed-polarity sunspots became the norm.

Decades of solar research shows that when sunspots with reversed magnetic polarities become predominant, they herald the beginnings of new solar cycles. The scientific community reached the consensus that Cycle 24 had ended and Cycle 25 had begun!

## Differing Predictions

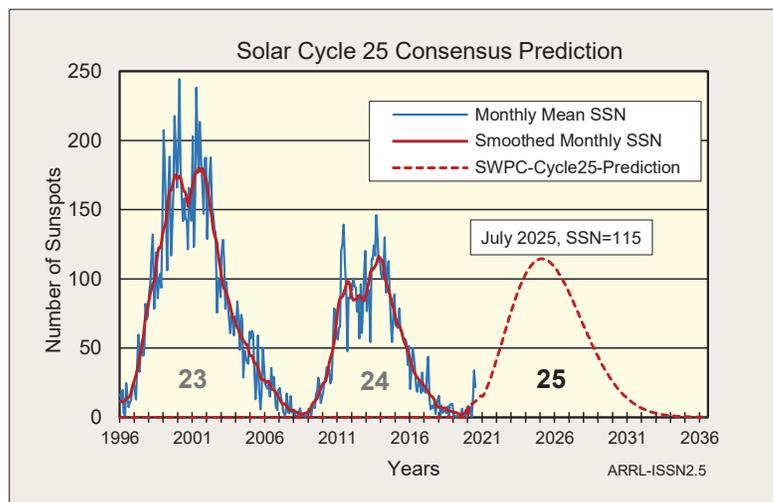
At the end of 2020, the solar flux index shot upward and a cluster of powerful sunspots appeared. For the first time in years, the upper HF bands opened on a large scale. The boost eventually faded, but it may have provided a preview of what's in store.

The only problem with forecasting the solar future is that the sun can be a fickle creature. Scientists still don't know why solar activity runs in 11-year cycles, nor can they accurately predict what a new cycle may bring. Pessimistic forecasts predict Cycle 25 to be very much like Cycle 24 — mediocre, but with reasonably good DX conditions at the peak in 2025 and 2026 (see Figure 1). Optimistic forecasts call for a highly active cycle. They believe it will be like Cycle 23, which peaked in 2000 and again in 2001.

Many hams fondly recall the peak of Cycle 23, when 15 meters was open for DX daily and 10 meters frequently opened as well. Even on 6 meters, hams could achieve occasional transatlantic and transpacific DX contacts. If you enjoyed the HF bands, the Cycle 23 peak was a great time to be on the air.

Some veteran amateurs hold out hope that Cycle 25 could be spectacular, comparable to the legendary Cycle 19 of the late 1950s. Speak with them and you'll hear incredible stories of effortless worldwide communication any time of the day or night, even on 10 meters.

But the truth is, no one knows what Cycle 25 will bring. We know the new cycle has started, but how strong it will be is anyone's guess. At least the bleak predictions



**Figure 1** — The scientific consensus on what may lie ahead for Cycle 25 compared to previous solar cycles. However, predicting solar cycles is difficult.

## 2021 Propagation Forecast

Carl Luetzelschwab, K9LA

The major question is, “How big will Cycle 25 be?” I’m aware of 39 predictions for Cycle 25. There are so many because we don’t fully understand the solar cycle process yet, and thus there are many different ways to make a prediction. Figure 2 shows the distribution of these 39 predictions.

The average of all 24 solar cycles is 179 (in terms of the V2.0 sunspot record). Thirty-three of the 39 predictions (85%) are for a below-average cycle, three are for an average cycle, and three are for a big cycle.

One of the predictions for a big cycle is by Scott W. McIntosh, Sandra Chapman, Robert J. Leamon, Ricky Egeland, and Nicholas W. Watkins (available at [www.arxiv.org/pdf/2006.15263.pdf](http://www.arxiv.org/pdf/2006.15263.pdf)). This prediction has received much publicity in the scientific and amateur radio community. If it comes true, we’ll have excellent propagation worldwide on 15, 10, and 6 meters, via the F2 region of the ionosphere.

We’ll know which of the predictions is the most accurate at Cycle 25’s solar maximum, but that’s 4 or so years from now. We may have an earlier clue by noting how fast Cycle 25 rises. This is because a big cycle rises faster than a small cycle. All we can do is wait and see what happens.

In regard to propagation in 2021, 17 meters will benefit first from the ascent of Cycle 25, with more consistent worldwide openings (more days in the month). Fifteen meters

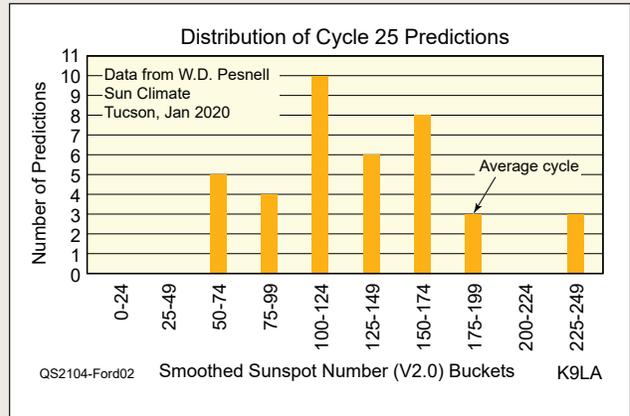


Figure 2 — Distribution of Cycle 25 predictions.

will follow in 2021 with more consistent worldwide openings, and 2022 should be even better. I don’t expect consistent worldwide east-to-west openings on 10 meters until 2022. Of course, you should always check the higher bands due to the short-term events that happen in the ionosphere that are tough to predict.

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of an extended Cycle 24 solar minimum appear to be false, and that’s good news.

### Changes in Behavior

Let’s take the middle path and anticipate that the behavior of Cycle 25 will fall somewhere between Cycles 23 and 24.

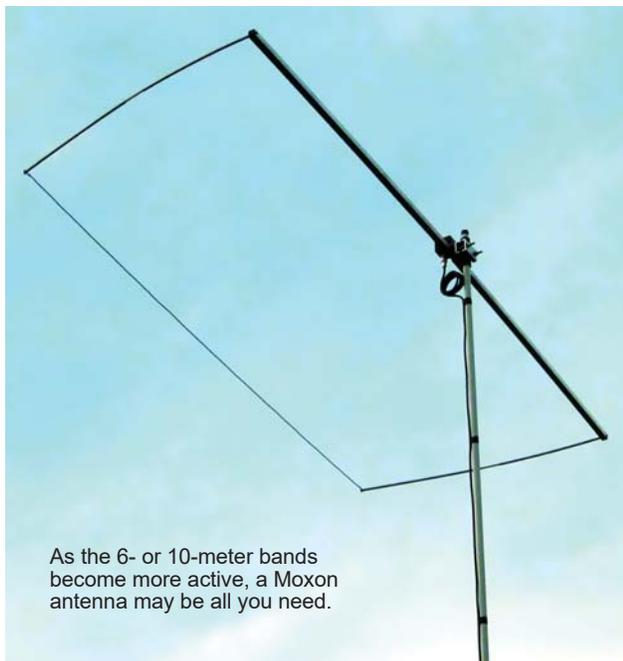
As we move into the early years of this decade, you’ll notice that the 20-meter band will start remaining open well after sundown. This behavior on the “queen of the DX bands” will become pronounced by 2025, and you’re likely to see episodes of 20 meters remaining open all night. Thirty meters will probably do the same.

Activity on 17 and 15 meters will begin to increase as these bands open for longer stretches of time during the day. As with 20 meters, 17 and 15 meters will likely remain open for a few hours after sunset.

Twelve and 10 meters will open almost every day. During the peak years in the fall and winter months, watch for 6 meters to occasionally become a DX band as well.



Lawrence Burt, KF0Q, operating on the HF bands. Expect a surge in DX and contest activity as these bands improve in the years to come. [Lawrence Burt, KF0Q, photo]



As the 6- or 10-meter bands become more active, a Moxon antenna may be all you need.

Increased solar activity is not a good thing for the lower bands. Hams who've enjoyed seeking out DX contacts on 160 through 40 meters will find their prospects reduced as the electron density of the ionosphere increases. More lower-frequency signal energy will be absorbed compared to quieter times, and less will be refracted. Noise levels at those frequencies will increase as well.

### Low-Power Operating and Mobiles

As the ionosphere becomes more refractive, it becomes easier to make contacts with low power and compromise antennas. Some may recall that during the peak of Cycle 22 in the late 1980s and early 1990s, we saw a variety of inexpensive 10-meter transceivers flooding the market. These were lower powered radios that typically produced about 25 W output. Conditions were so good on 10 meters that you could work much of the world with these radios and a simple dipole antenna.

QRP operators — hams who use 5 W output or less — will benefit greatly from improved conditions to come. QRP operating has been popular for years because the radios are simpler (especially kit radios) and, at such low output levels, their signals are far less likely to cause interference. Even at the lowest solar minimum of Cycle 24, we saw the blossoming of activities such as Parks on the Air (POTA) and Summits on the Air (SOTA) with hams taking transceivers outdoors. As it becomes easier to make very low-power contacts, these activities will likely increase considerably.

HF mobile activity fell with the decline of Cycle 24 because the poor conditions made it difficult to enjoy operating from a vehicle. Even with 100 W transceivers, mobile antennas are suboptimal at best, and this handicap becomes more burdensome when the sun refuses to cooperate. But with the rise of Cycle 25, look for more HF mobile activity to accompany the improving conditions. By the time we approach the peak, mobile signals will become more common, especially on the upper HF bands, where their antennas are more efficient and effective.

### Preparing for the Peak

There's little to be done at this moment in terms of your station equipment. However, you may want to consider plans for improving your capabilities on the upper HF bands.

As we approach the solar maximum, it will be helpful to have directional antennas for 17 through 10 meters. You'll find these antennas to be relatively inexpensive and easy to build. Also, as frequencies increase, antennas tend to become smaller and lighter. For example, Moxon antennas are not much more than wire or tubular rectangles, but the space-saving design can be remarkably effective.

Don't forget 6 meters. A directional antenna for 6 meters can be small (Moxons will also work on this band) and easy to build. If we start enjoying global openings on the "magic band," you'll be glad you were ready. These antennas can also provide excellent results during the shorter openings caused by sporadic-E propagation (mainly during the summer) and meteor scatter. These openings will take place regardless of the level of solar activity, so an investment in a directional 6-meter antenna will reap benefits for many years to come.

Better days are on the way — we just don't know by how much. All hams will benefit regardless of license class. Who knows? History may repeat itself and Cycle 25 could even rival Cycle 19.

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