

SOLAR & GEOMAGNETIC ACTIVITY DURING CYCLE 21 & IMPLICATIONS FOR CYCLE 22

by J.W. Hirman, G.R. Heckman, M.S. Greer, & J.B. Smith
submitted by Jim Dixon (NL7HI)

Old Cycle 21 ended and new Cycle 22 began in September 1986. As measured by its sunspots, the new cycle of solar activity is rising more rapidly than any previous cycle in the records dating back to 1755 A.D. Progress of the new cycle -- expected to last about 11 years -- is of interest because terrestrial satellite missions and other technical systems are affected by various forms of solar activity; all forms of activity rise more or less in concert with the sunspots of the new cycle. In consequence, the solar output also varies. For example, the slowly varying background ultraviolet flux varies, affecting the density of the terrestrial thermosphere. In turn, satellite drag and radio propagation effects vary. Flares, energetic solar proton events, and geomagnetic storms occur in cycles that begin and end about the same time as the sunspot cycle but do not track it as well as the slowly varying radiation. The exceptionally rapid rise of the new cycle is the basis for prediction of a cycle of record amplitude with smoothed sunspot numbers ~200 and smoothed 10.7-cm solar radio flux ~250, which would equal or exceed the

largest cycles of the past. Cycle 19, the largest recorded, peaked in 1958 with a smoothed sunspot number of 201. Methods based on observation of antecedent phenomena in Cycle 21 predict that Cycle 22 will have a large maximum sunspot number well above average but not record equaling. At the present time, there is no consensus regarding which group of predictions is likely to be the more valid. Nonetheless, it appears increasingly likely that Cycle 22 will reach a peak sunspot number well above the average of all previous cycles. In another 6-12 months we expect to have a better idea of the maximum yet to come.

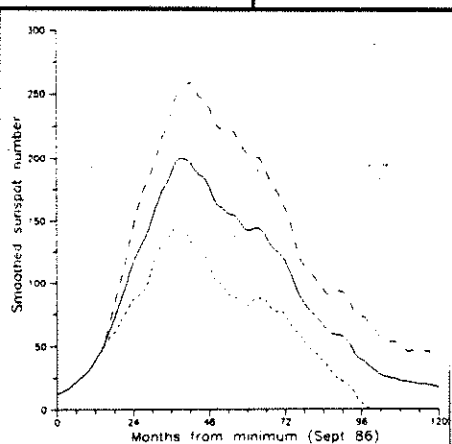


Fig. 2. Predicted profile for Cycle 22 from the method of McNish and Lincoln. Included are the lower and upper 90% confidence intervals for the predictions.

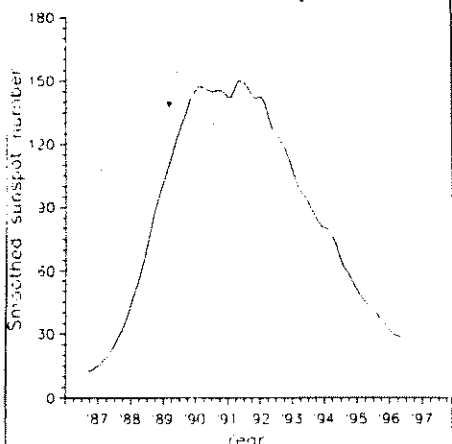


Fig. 3. Predicted profile for Cycle 22 obtained by using the average of the even sunspot cycles adjusted to a smoothed sunspot maximum of 150.

Conclusions

- Cycle 22 is under way and has had record high (for this phase in the cycle) sunspot and solar flux values for the last several months. The 13-month smoothed values during the early cycle rise, in fact, exceed the values for all previously recorded cycles.
- Flares, geomagnetic storms, and other episodic activity will increase in frequency as the new cycle rises but will probably peak at different times from the peak of the sunspot cycle.
- Precursor methods predict a

maximum smoothed sunspot number of 115-175. If this prediction proves to be correct, Cycle 22 could be similar to cycle 18--much larger than average (but not a record) with a broad period of maximum beginning in the second half of 1989.

- Predictions based on the rate of rise of the cycle are for a near-record smoothed sunspot maximum of approximately 200.

- In the earliest months of a cycle the magnitude and rate of rise of the cycle indices are not reliable predictors of the ultimate size of the cycle. After about 2 years, the rate of rise improves as a predictor; as the cycle progresses into the third year, predictions based on the extended rate of rise become increasingly accurate.

- The probability of an average of lower cycle is quite low.

- There are several indications that Cycle 22 will have a long, flat period of maximum, especially in the 10.7-cm flux.

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YUKON QUEST '89
 by John Lehman (AL7JJ)

The board has agreed in principle for the club to sponsor participation in the Yukon Quest this year. Agreement is subject to clarification with the quest committee regarding the needs of the quest participants and organizers, the services to be provided by radio operators, and the arrangements for shelter and transport of volunteers. Jim Dixon and Wigi Tozzi will present our agreement in principle to the meeting of the quest organization on Tuesday, November 1.

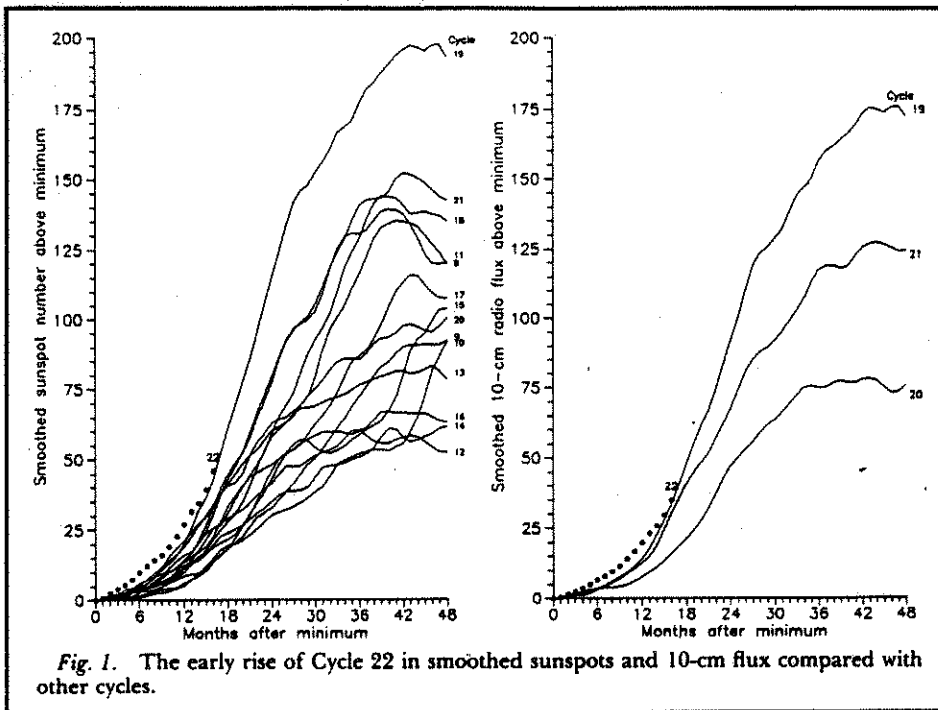


Fig. 1. The early rise of Cycle 22 in smoothed sunspots and 10-cm flux compared with other cycles.

Next Meeting
Friday, 4 November 1988
 7:30 pm in the Auditorium
 UAF Geophysical Institute

Coffee & Donuts: at 7:30.
Business meeting: promptly at 8:00.

Agenda
 Activity reports
 Election of Five Board Members at Large

The board of directors has nominated the people listed below for election to next year's board. All of the nominees are presently serving on the board for this year. Additional nominations will be accepted from the floor during the meeting.

- Steve Estes (KL7XO)
- Bob Safford (WL7BON)
- Lennie Torgerson (NO7JJ)
- Lewis Overton (NØSN)
- Jerry Curry (KL7EDK)

Program: at 8:30

Larry Sweet, of the Geophysical Institute, will offer a special presentation on the new SAR facility and it's prominent, 10-meter diameter dish antenna. The facility, the only one of its

kind in the United States, is a joint venture between GI and NASA. It receives, analyses, stores, and will distribute data from European, Japanese and Canadian satellites. The program will include hands-on operation of the tracking facility, including an opportunity to use the SAR computer to steer the antenna and to examine captured data.

The Problem with Reprints

Editorial Comments
by Lewis Overton (NØSN)

Occasionally I am offered the opportunity to reprint some very interesting articles from publications outside the ham radio community. Sometimes these articles come to me all pasted up on a page, looking almost ready to photocopy for inclusion in the newsletter.

I am then asked, a few days or weeks later, and perhaps even with some heat, just why I did not print the article, when all I had to do was tuck it in with the rest of the stuff I took to the copier. Surely, with contributions already scarce, I cannot afford to turn down submissions from members!

The answers to that quite legitimate question are two. The first involves the long arm of the law, the second simply matters of logistics. I will attempt to explain, in the hope that those who do submit items will continue to do so, understanding why there may be delays in publication, and that those who do not now submit material may be encourage to do so.

Most publications are protected under the copyright laws of the United States. While these laws permit limited copying for personal, and sometimes classroom use, rights to the use of the article are often reserved or limited in the coyright statement. The article reprinted from EQS this month is an instance where the premission to reprint is limited to certain publications. By my interpretation, Short Circuit falls within the allowable group. Jim made an excellent choice of a timely, pertinent article of appropriate size, and falling within the scope of what we can legally reprint.

Some of the ham radio publications grant reprinting rights to club newsletters in their

copyright notices. Short Circuit and World Radio do so. QST does not! The copyright notice, usually near the front of the publication, gives the restrictions on reprinting. The expression, "*All rights reserved*" means that reprint requires specific, prior written consent. *Continued on back page.*

"If You Can't Lick 'em"

by Adam Overton (NL7OU)

...and I thought they hadn't noticed. In case you missed the column "On the Inside" in the Fairbanks Daily News-Miner for Friday, October 19, 1988, we've been discovered. It seems the News-Miner has noticed that two of the new borough board members, Hank Hove (KL7HPR) and Bonnie Williams (NL7GL) are hams. A third board member, Chris Birch, is studying for his license. Honest, guys, we really aren't trying to take over. Trust me!

SHORT CIRCUIT

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Continued from page 2.

Most publications are not so generous. They must survive on the revenues from sales. In addition, authors are concerned from two perspectives: first, they may well need royalties from publications to continue to write, and second, unless quoted in full, there is always the possibility that out of context quotes may distort what the author intended to say.

This editor feels that local newsletters ought to be concerned mostly with items of primarily local interest. A monthly, amateur letter cannot compete with QST or even World Radio in delivering items of national interest.

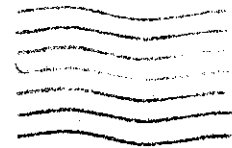
On the other hand, there are, indeed, articles of interest to local hams which I would like to reprint. If you find an interesting article, by all means send me a copy, including the copyright notice. I will make a judgement on whether Short Circuit requires prior permission to reprint, and if necessary, will contact the publisher..

Alas, that may take a while. If the article does not "age" well, meaning that it contains information which will be of little benefit if not presented soon, then the time to gain permission may itself keep the item from publication.

A further, and generally minor point, concerns how articles are submitted. Except for illustrations, which must be pasted into the newsletter, I prefer to retype the material. The reason is simply that to compress things into a readable and mailable form, it is often necessary considerably adjust formats.

Fitting in a whole page, already pasted up, is often difficult. The preferred method is to send me the original or a photocopy (that doesn't violate the copyright laws, by the way). I'll seek reprint permission, and fit things into the newsletter as well as I can. Where there are illustrations, try to get the best copy you can, or refer me to the original. Some copy stores can make half-tone copies which show up well in print.

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South Carolina

First Class

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