The SWPC F10.7 Radio Flux Prediction Graph

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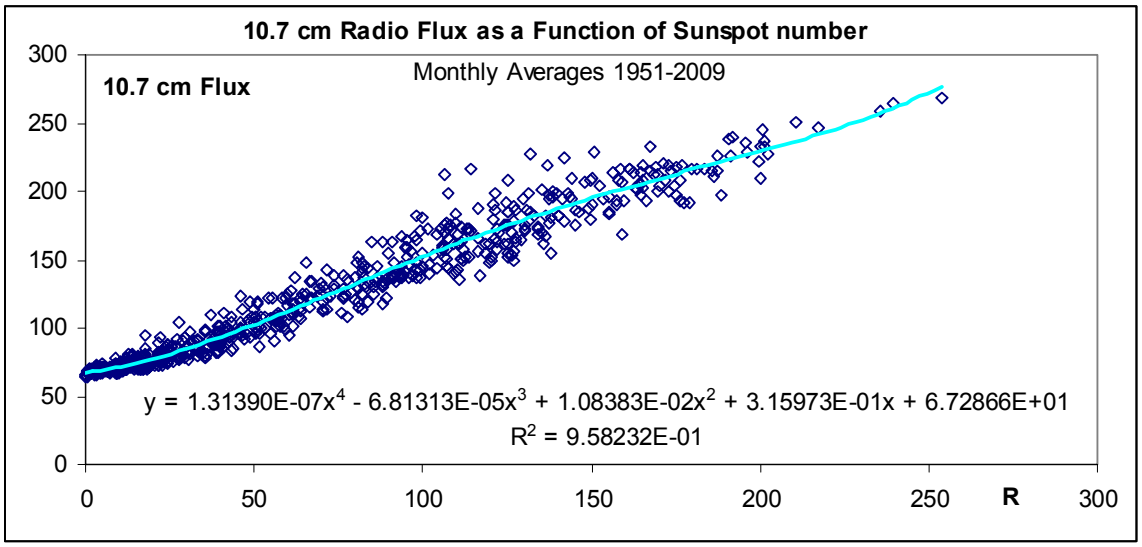
Fitting the monthly average the F10.7 flux (reduced to 1 AU) against the International Sunspot number, R, for the entire interval 1951-2009 to a forth order polynomial gives a formula for computing the Flux from the sunspot:

$$Flux = 67.29 + 0.316\,R + 0.01084\,R^2 - 0.006813\,R^3 + 0.0000001314\,R^4 \quad (1)$$

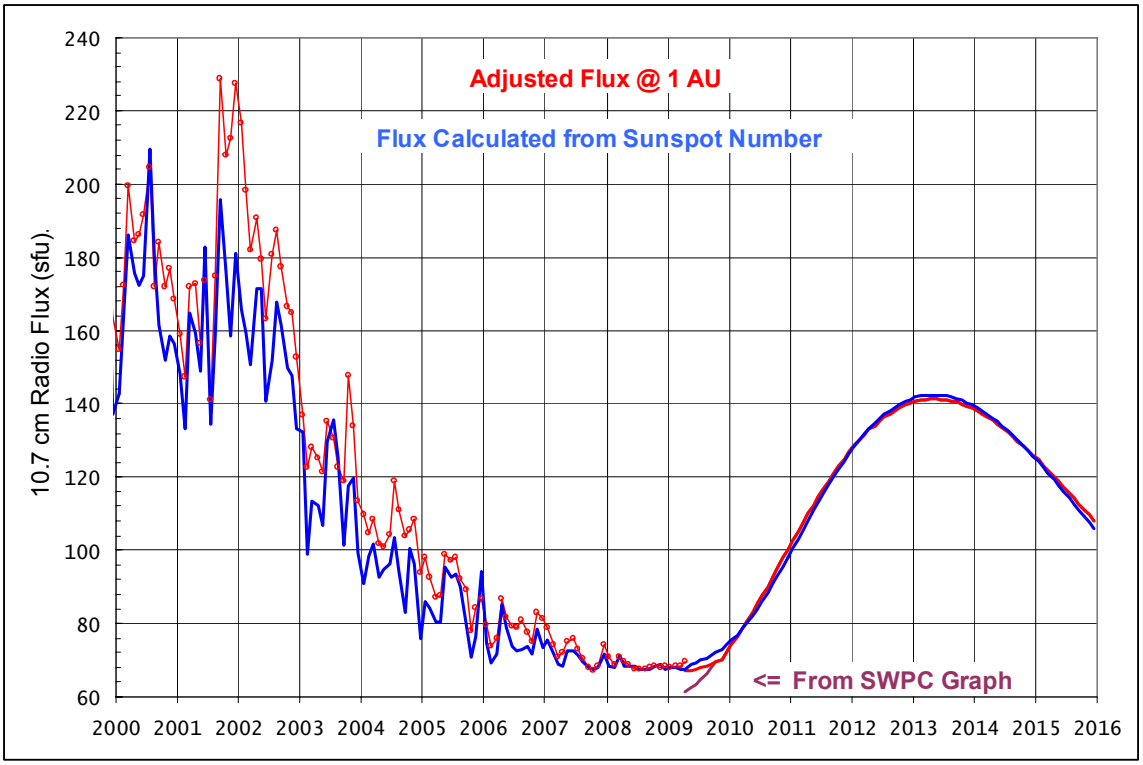


The correlation is shown in Figure 1 above. We know that this formula does not accurately portray the most recent relationship between R and F10.7 (see previous essay), but if we make no assumptions or corrections and just take the data as they are we can consider the conversion formula as indicative of the average conditions the last half century.

SWPC gives a table showing the predicted sunspot Number and the predicted F10.7 cm flux for the next decade. Here are the first few rows of that table, with the middle value of the predicted values in **bold** script, followed by a high and low limit:

Year	Month	Predicted Sunspot Number			Predicted F10.7 cm Flux:		
2009	01	**2.1**	5.1	0.0	**67.4**	69.4	65.4
2009	02	**2.7**	7.7	0.0	**67.3**	70.3	64.3
2009	03	**3.3**	8.3	0.0	**67.2**	71.2	63.2
2009	04	**3.9**	9.9	0.0	**67.2**	71.2	63.2
2009	05	**4.6**	11.6	0.0	**67.3**	72.3	62.3
2009	06	**5.5**	12.5	0.0	**67.5**	73.5	61.5
2009	07	**6.7**	14.7	0.0	**67.8**	74.8	60.8
2009	08	**8.1**	17.1	0.0	**68.2**	76.2	60.2
2009	09	**9.7**	18.7	0.7	**68.8**	76.8	60.8
2009	10	**11.5**	21.5	1.5	**69.7**	78.7	60.7
2009	11	**12.6**	22.6	2.6	**70.2**	79.2	61.2
2009	12	**14.6**	24.6	4.6	**72.1**	81.1	63.1

Using this table we can plot the predicted Flux as shown by the smooth red curve for the next solar cycle [or alt least up through 2015, Figure 2]:



I don't know how SWPC came by their predicted F10.7, but my best guess is that they ran a correlation like the one shown in Figure 1 and applied it to the predicted sunspot number. Doing this using the observed sunspot number up to last month gives the ragged blue curve with the smooth blue curve coming from the predicted sunspot number. There is a good match for the predicted part of the curves [the red and the blue after May 2009]. The graph on SWPC's website http://www.swpc.noaa.gov/SolarCycle/ seems to match the smooth curves quite well, with the exception of the variation during 2009, which I show as the purple curve. It is simply incorrect to start the curve from a flux of 60 and inexplicable [to my way of thinking – other than plain sloppiness] why the graph should disagree with the published table at http://www.swpc.noaa.gov/ftpdir/weekly/Predict.txt

As discussed in the previous essay and obvious from the discrepancy between the red and blue ragged curves above in Figure 2, the formula (1) for the average correlation between the Flux and the Sunspot Number does not work so well after about 1989, so it is not clear that it should work after May 2009. This means that we have little idea about what the predicted F10.7 flux should be. If the Sunspot Number prediction is correct, then the F10.7 flux is predicted too high, and if the F10.7 flux prediction is correct, then the predicted Sunspot Number is too high. My own feeling is that since the predicted Sunspot Number is really a prediction of the number of active [magnetic] regions which should be reflected in the F10.7 Flux, that the Sunspot Number [based on *visible* spots] will be much smaller than the predicted values. This will, indeed, be interesting to watch. Either way, we'll learn a lot.