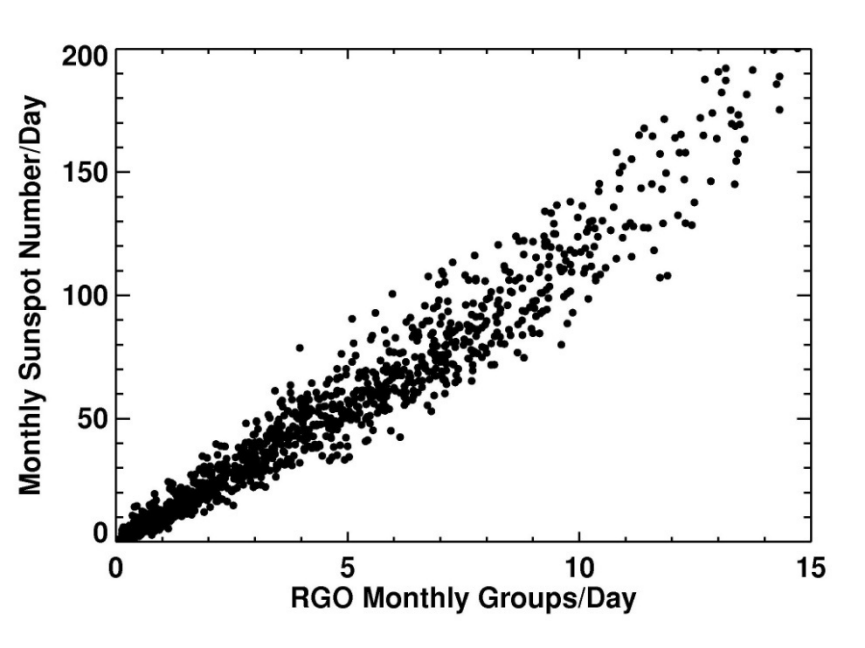
Group Sunspot Numbers

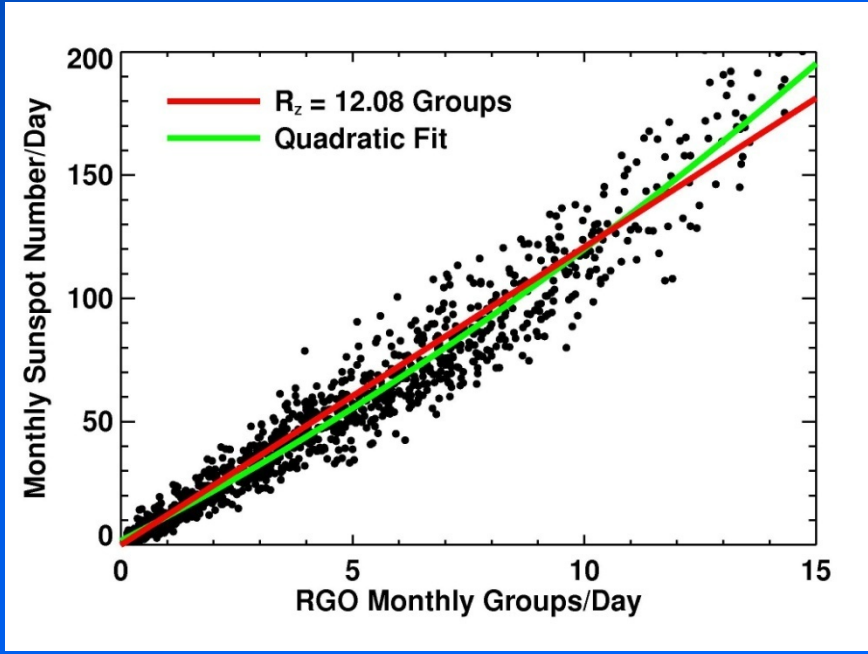
David H. Hathaway
NASA Marshall Space Flight Center
Heliophysics and Planetary Science Office

Sunspot Sunspot Workshop

Hoyt & Schatten (1998)

- Only counted the number of sunspot groups – similar to Wolf's Relative Sunspot Number, R_Z – groups are easier to identify and count than individual sunspots.
- Calibrated to R_Z using RGO photoheliographic results from 1874 to 1976
- Direct comparison shows nonlinear behavior but R_Z = 12.08 G is a good compromise (10% high at R_Z ~ 50 compared to quadratic)

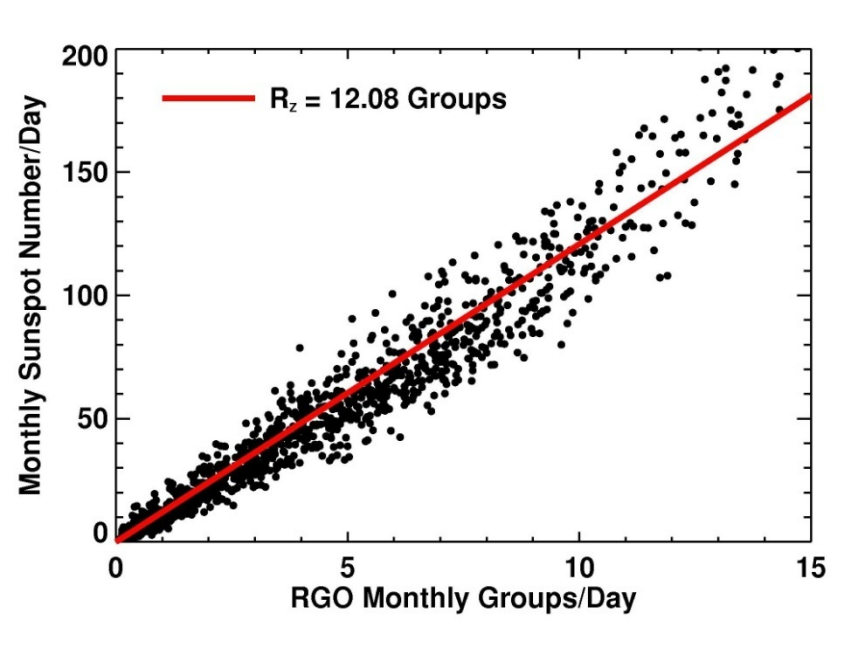


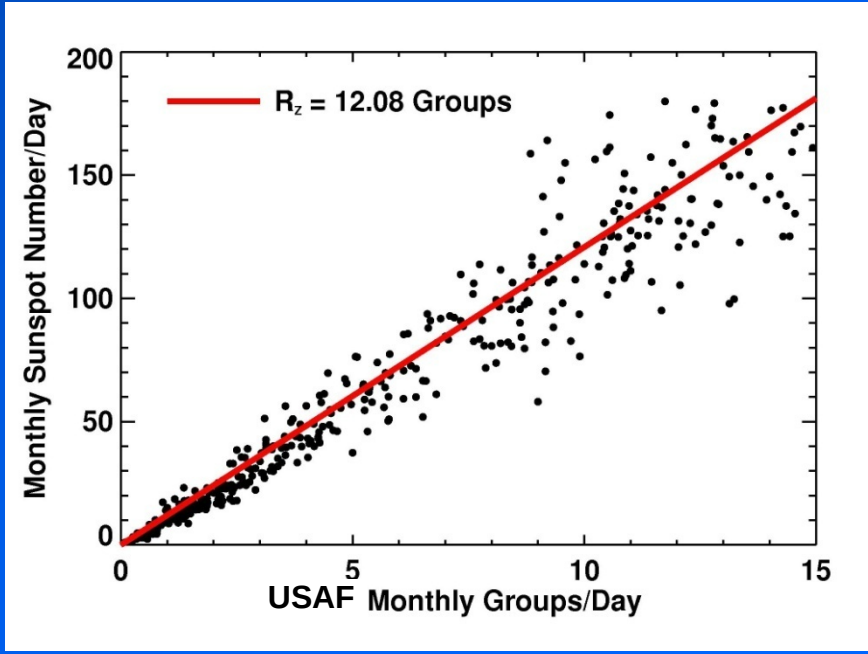


RGO vs. USAF Groups

The USAF group numbers show more scatter for daily group numbers above ~9/day. This scatter makes it difficult to see any nonlinear behavior – if anything the nonlinearity might go the other way (downward concavity instead of upward concavity.

The linear relation used by Hoyt & Schatten fits the data well.





R_Z and R_G

Earlier (pre-1874) R_G numbers are significantly lower than the R_Z numbers. This may be due to the "bootstrap" method of extending group numbers to years before 1874. The differences from 1874 to 1976 can be attributed to the nonlinear relationship – R_G increasingly underestimates R_Z for $R_Z > 130$.