**~60 Year Cycle of ~27 Day Terracentric Solar Rotation**

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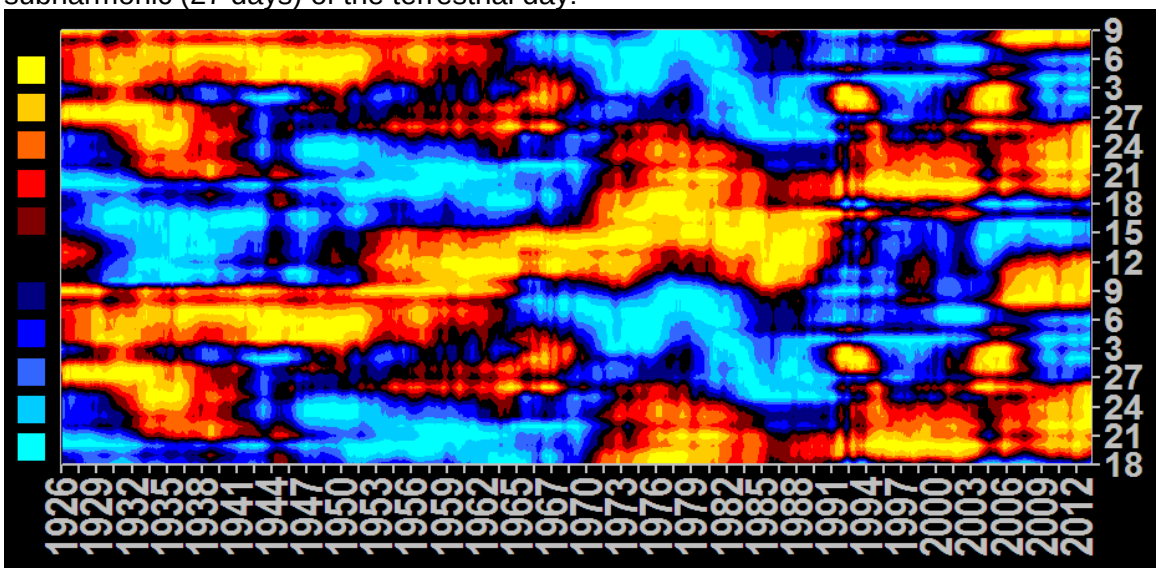
Something special about **27.03 day** solar rotation was reported in 2000:
http://www.spacedaily.com/news/sunstorm-00a2.html

Details:
Neugebauer, M.; Smith, E.J.; Ruzmaikin, A.; Feynman, J.; & Vaughan, A.H. (2000). The solar magnetic field and the solar wind: existence of preferred longitudes. Journal of Geophysical Research 105(A2), 2315-2324.
http://www.leif.org/EOS/1999JA000298.pdf
http://trs-new.jpl.nasa.gov/dspace/bitstream/2014/18001/1/99-1455.pdf

Consider the following terracentric heliomagnetic field orientation data:
http://www.leif.org/research/spolar.txt

It's a very simple exercise (accumulate by day, normalize by day, then normalize by year) to crudely but clearly reveal multidecadal phase cycling on the frame of the nearest subharmonic (27 days) of the terrestrial day:



http://img694.imageshack.us/img694/3158/hmf270366.png

The period is ~65 years. The half-period harmonic is also noticeable, slanting the opposite way, slicing regular quarter-period stair steps into the cumulative multidecadal phase structure.

Thus, verification of Neugebauer, Smith, Ruzmaikin, Feynman, & Vaughan's (2000) 27.03 day period is effortless:

(65) * (365.24219) = 23740.74235 days
(23740.74235)*(27) / (23740.74235 - 27) = 27.03074167 ~= **27.03 days**

Alternative verification, by looking at it the other way around:
(27.03)*(27) / (27.03 - 27) = 24327 days
24327 / 365.24219 ~= 66.6 years

Technical Aside: Anything between 27.025 & 27.035 days rounds off to 27.03 days, so theoretical rounding-related beat uncertainty ranges from ~80 down to ~57 years. The ends of this nonlinearly asymmetric range do not appear consistent with observation, but something in the mid-60s does. There's scope here for sensible statistical inference if false inferential modeling assumptions can be avoided, for example by devoting due care & attention to diagnostics while simultaneously acknowledging the perennially inevitable possibility of lurking conditional paradox.

Digging in the science news article (linked above), note the following:
*"27.03 days (27 days and 43 minutes) over the last 38 years."*

Consider the possibility that longer records will reveal this rounded-off estimate to be low by roughly 1 minute 45 seconds, such that the period is 27.03122256 days.

Then the following framework [with confounded variables in square brackets] fits:

Beat with nearest subharmonic of terrestrial day:

(27.03122256)*(27) / (27.03122256 - 27) = 23375.50016 days
(23375.50016) / (365.24219) = **64 years** [multidecadal climate]

Beat of terrestrial day with nearest harmonic:

(27.03122256) / (27) = 1.001156391 days
(1.001156391)*(1) / (1.001156391 - 1) = 865.7592652 days
(865.7592652) / (365.24219) = 2.37037037 ~= **2.37 years** [QBO]
12*(2.37037037) = 28.44444444 ~= 28.44 months

Beat of terrestrial half-day with nearest harmonic:

(27.03122256) / (54) = 0.500578196 days
(0.500578196)*(0.5) / (0.500578196 - 0.5) = 432.8796326 ~= 432.9 days
(432.8796326) / (365.24219) = 1.185185185 ~= **1.185 years** [Chandler wobble]

Beats with nearest subharmonics of terrestrial year:

(2.37037037)*(2) / (2.37037037 - 2) = **12.8 years** [solar system radial acceleration]
(1.185185185)*(1) / (1.185185185 - 1) = **6.4 years** [terrestrial polar motion envelope]

The whole timing framework tunes effortlessly at multiple frequencies.

A number of solar, solar system, lunisolar, & terrestrial phenomena share common timing frameworks. For example, see illustrations shared informally here, here, & here.

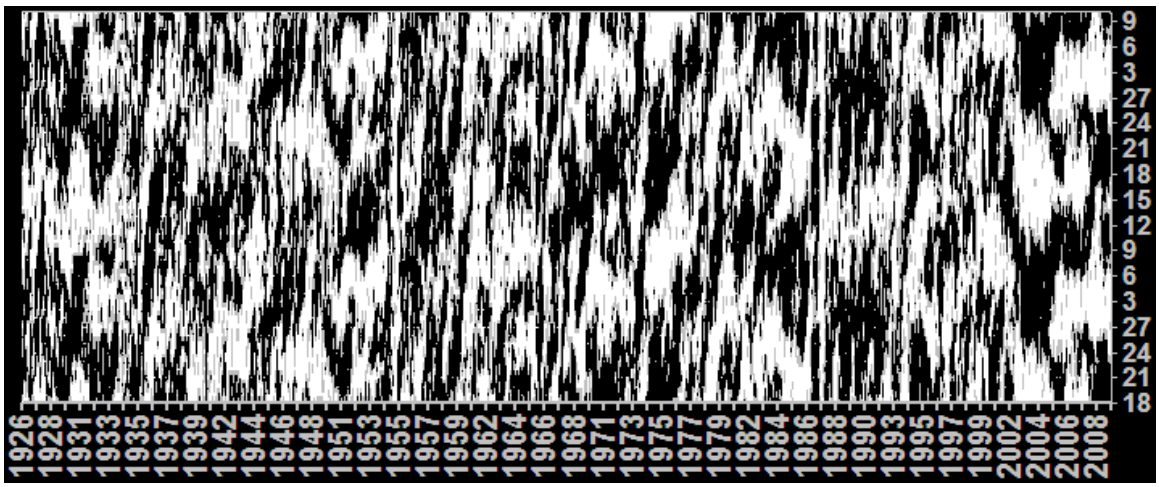
Questions arise:

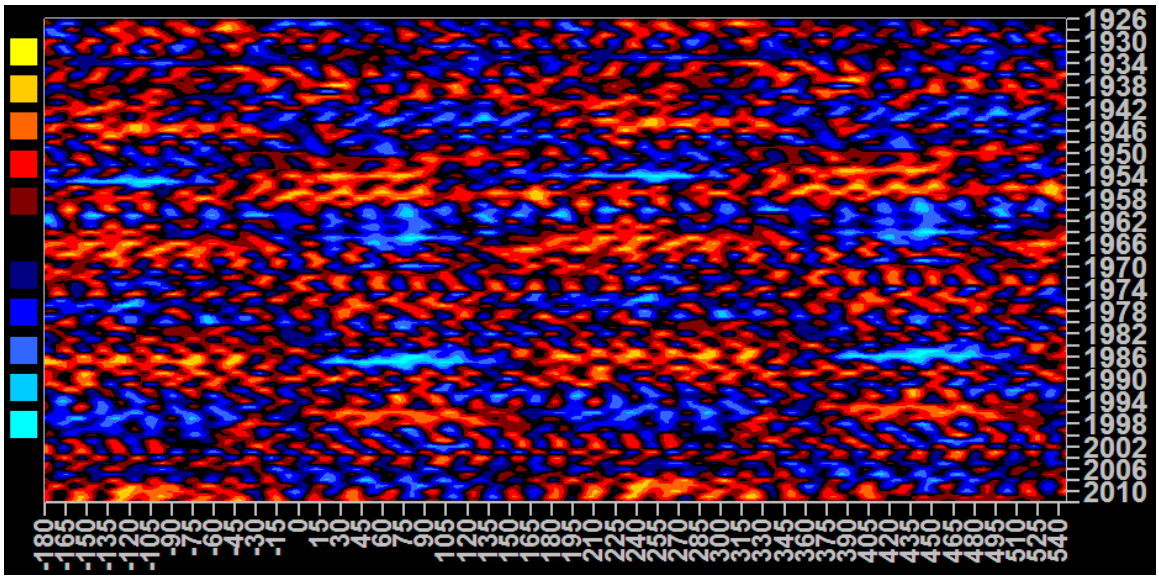
What's driving?
What's resonating?
What was resonating in the past?
What confounded pairs share a common driver?
What coherent pairs are statistical echoes of past physical driving?

No matter how one answers or deflects these questions, it appears that Neugebauer, Smith, Ruzmaikin, Feynman, & Vaughan (2000) pinpointed a fundamentally important universal constraint on heliomagnetic field sector geometry evolution.

**Appendix: HelioGraphic vs. HelioMagnetic Asymmetry**

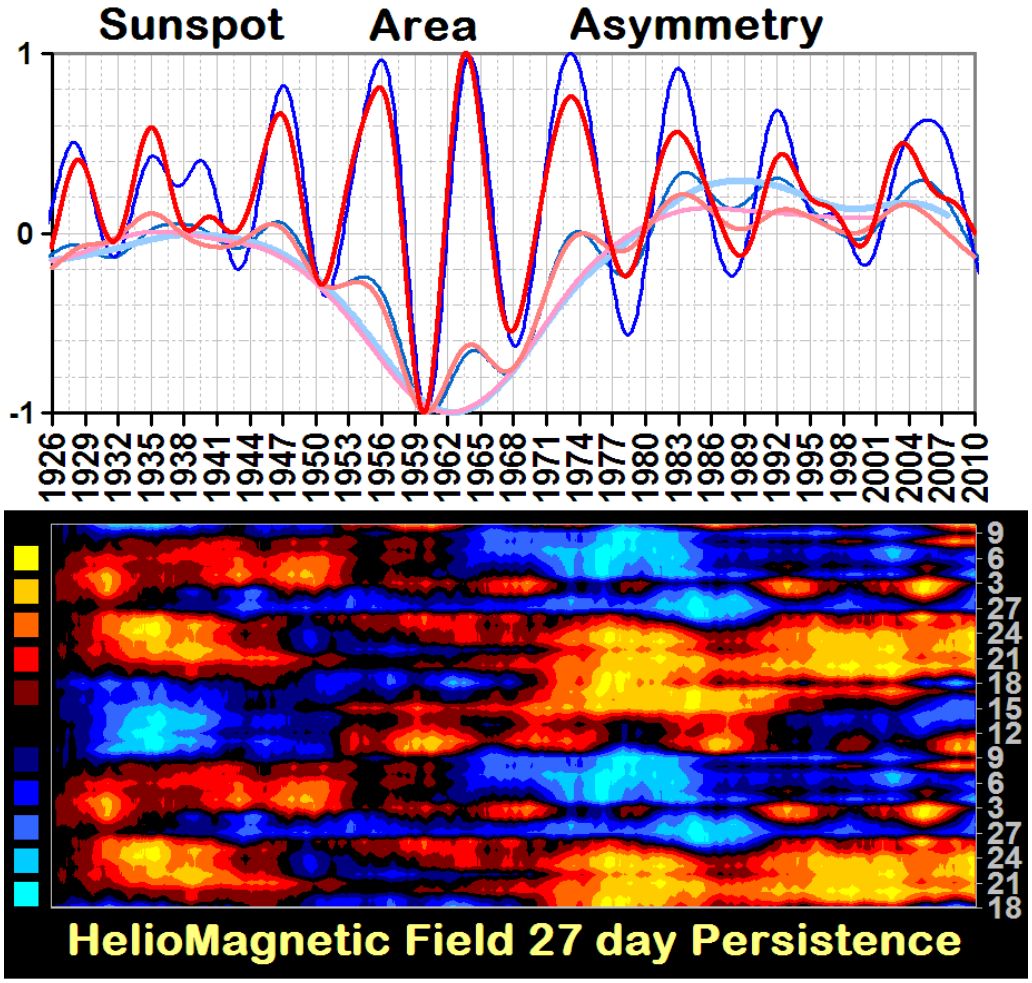
Draft summaries are informally shared here to suggest more careful consideration & discussion of similarities, differences, blends, & contrasts of helio***graphic*** & helio***magnetic*** asymmetries, with special attention to aggregation criteria & architecture:





Background:

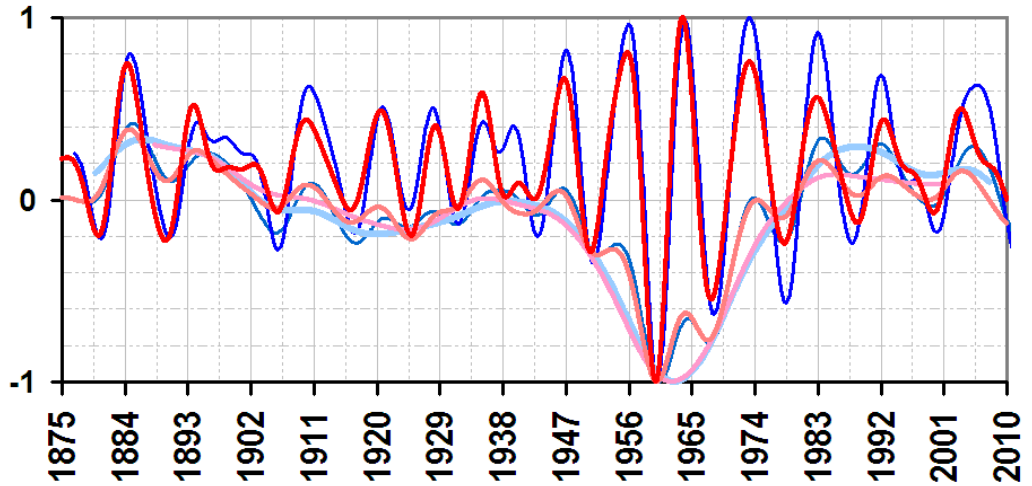
Vokhmyanin, M.V.; & Ponyavin, D.I. (2012). Sector structure of the interplanetary magnetic field in the second half of the 19th century inferred from ground-based magnetometers.
http://fallmeeting.agu.org/2012/files/2012/11/Poster_A0.pdf




http://img202.imageshack.us/img202/7220/hmf27dpersistenceheliog.png

Figure 3 on page 9 here motivated deepening exploration:
Lawrence, J.K.; Cadavid, A.C.; & Ruzmaikin, A. (2008). Rotational quasi-periodicities and the sun-heliosphere connection.
http://arxiv.org/ftp/arxiv/papers/0803/0803.3260.pdf

Background:
Ballester, J.L.; Oliver, R.; & Carbonell, M. (2005). The periodic behaviour of the north-south asymmetry of sunspot areas revisited. Astronomy & Astrophysics 431, L5-L8.
http://www.uib.es/depart/dfs/Solar/Preprints/A+A431.pdf




Data:
http://solarscience.msfc.nasa.gov/greenwch/sunspot_area.txt
http://solarscience.msfc.nasa.gov/greenwch/sunspot_area_north.txt
http://solarscience.msfc.nasa.gov/greenwch/sunspot_area_south.txt