

## Discussion (3) (SSH)

- Surface Spherical Harmonics. (Decomposition into orthogonal representations).
- SSH
  - 1e SSH's represent decompositions, which embody the first 12 longitudinal harmonics.
  - Solar cycle MINIMUM yr = 1958 MAX = 1963
- P6 5. - Harmonics respond to some independent force. They do not know what.
  - Conclusions: (11yr) retrograde-prograde oscillation derived from the average latitudes of SS activity moving across the differential rotation of the photosphere.
    - The other is a (19.6 yr) cycle which correlates w/ the orbital torque of the Sun.
- P6 7. 3rd harmonic near 9.5 nHz shows wavelet power. Each cycle on the 2D plot show that each solar cycle tends to have different frequency maximum near this value.
  - (\*) This may indicate that each SC represents an independent response to a impulse that repeats each 11yrs.
  - A detailed wavelet analysis on each 1e SSH may help sort this out.

## Discussion 4.

### I. Surface Spherical Harmonic Decomposition (SSHd)

- The report covers spanning the low Harmonic order 1-12.
- Test were performed on the Carrington Rotations.
- Long term memory has been discovered at flux tube release.
- Duration of SC's was not the focus.
- Focus is Longitudinal Variations
- Phase drift and Orbital torque.

P6 2

- There may be a Sun-Planet interaction.
- Solar rotation & ORBITAL momentum? Equator?
- Torque oscillation may offer best evidence of significant spin-orbit
- Non 11yr cycles.
  - Divided into 2 frequency ranges, bracketing 3mHz.
  - 2 strongest components are 21.4 yr cycle & 5.2 yr cycle. The 21.4 yr cycle is called the Hale cycle frequency & the second is the 3rd harmonic of the 11yr cycle.

793. \* \* \* Hale Cycle; 21.4 years. defined by magnetic polarity alternations in SS pairs and the solar dipolar field. This may represent the fundamental SC. Its presence in the Wolf series and in SSH amplitudes may result from alternating peak heights on the SC because of it is shifted by  $\pi/2$  w/respect to the Hale cycle.

Conclusion

## II Solar Activity: 1<sup>st</sup> to yrs.

- CME = Coronal Mass Ejections.

\* - Solar Wind Disturbances can take < 1 day or > 4 days to reach Earth.

- Earth's Magnetic Field = declination, horizontal, vertical force.

The above is effected by the Sun's ionizing-electromagnetic and corpuscular emissions respectively.

- The daily & Storm variations are modulated by the 11-yr Solar activity cycle, But the underlying physics are different.

\*\* \* The component of the magnetic field of the transient or recurrent wind streams that is aligned w/ the Earth's dipole axis acts as an "on-off" <sup>coupling</sup> switch, depending on its sign, between Interplanetary magnetic fields and the magnetosphere. This coupling produces a semiannual variation in magnetic disturbances with peak activity ~~or~~ occurring during the Equinoxes.

\*\*\* - GAUSS discovered and described the earth's magnetic field as an expansion of harmonics.  
GOTTINGEN Magnetic Union is formed

## III Differential Rotation

X - Uses Bayesian harmonic analysis. X

\*\*\* - The find evidence for rotation power in the Corona which matches signals found in solar neutrino experiments.

\* Beethorst (1988) invented the Bayesian harmonics technique.

- Findings = 9.5 yr cycle.

PNAS "Possible forcing... oceanic tides"

- Lunar nodal cycle 18.6 yrs (alternating sea surface temps)
- 90 yr grand cycle of the above:  $1/3$  to  $1/2$  of 18.6 yr cycle.
- 'Strong forcing' - 9 year intervals close to the perihelion or Solar perigee for several decades centered 1881-1974, but @ 6 yr intervals for several decades centered on 1923.
- 22 yr Hale cycle & temperature periodicity may correlate.
- In 1920s something happened that led to people disregarding any correlation between weather & Sunspots. Most notably w/ high SS #'s before 1920 that had cool periods, and after 1950 the same thing but w/ warm periods.
- North South tidal currents, in Arctic, Bering and Baltic seas, run on a 9 yr cycle. However every 18.6 yrs it reverses.

Pg 2

- 24 spectral peaks
- Computing 24 sinusoidal spectral oscillations show: a strong harmonic @ 9.3 yr & 10.3 yr ~~peaking~~ averaging 9.8 yrs.
- 6-year oscillations between 1900-1945? What is this all about?

- Figure 5 is important

- Positions of the Earth, Moon, and Sun to each other have a major affect on everything -
- The positions of the E, M, and S, have different affects on the

Pg 6 Tides in different parts of the world.

Pg 7 - 5, 2, 4, 9, 4; Perigee; eclipse and perihelion.

# PNAS (cont)

PL 7. - 18 yr repetitions of Strong tides.  
- 18.03 yr cycle of Tides (exact)

Fig 6 (X) - Strongest force happened 12/31/1881. Then, declined.  
Figure 6 (X) - Maxima reached @ on 1/8/1974 or 93.02 years later.  
- 1897-1947 anomaly

\* - Maximal tidal force only occur when the Sun & Moon are in direct mutual alignment. (SYZYGY)  
This is Full or New Moon. The Moon must be at Perigee & Sun @ Perihelion

- Repetitions of SYZYGY<sup>PERIGEE & ECLIPSE</sup> is defined as three lunar months.

- 29.5 Days = SYNODIC

- 27.5 Days = ANOMALISTIC

- 27.2 Days = NODICAL

PL 7B - Earth & Sun attain the Perihelion once a year: This occurs on Jan 2.

\* - The SYZYGY, Perigee, an eclipse, and perihelion occur every 18.030 years or 223 SYNODIC, 239 ANOMALISTIC, and 242 NODICAL months.

PL 8 - Longer term patterns = 93.02 yrs made up of  $(\frac{5}{1})$  18.03 yrs cycles and a 2.87 year pattern  
- Decadal → See PL 8

PL 8 (X) - Perigean Cycle. The Climatic events in 1880 & 1974 both occurred within a week of Perigean-Perihelion.

\*\* PL 8-9 - 1920 event → See PL 9 → Very important

• APSE Rotation } moon

• Line of Nodes

• 8.8475 yrs

• 18.6134 yrs

• 5.997 yrs

PL 9 (X)  
(X)

\* Pg 9 - Six year Repetitions  
1899-1947 cycle. (Described on Pg 9.)  
assoc w/ 18 yr cycles divided into (3) 6-yr cycles.  
- 9/21/1922 = Greatest Semidivisional title event in 4 centuries -

\* \* - Millennial Event  
16<sup>th</sup> 1433 (Coincides w/ Perihelion.)

Pg 10 - 9.31-yr 10.23-yr close to the 9<sup>th</sup> & 10<sup>th</sup> harmonic  
and work w/ 93 yr cycle.  
- In 1920's something interfered w/ tidal events and  
the result was the succession of (2) 9 year events  
were interrupted by 2.87 yr events

Pg 11 - 9 yr event ends in 1863 - look at this. 1883, 1893 are  
both involved. <sup>LOOK AT</sup> also the following paragraph  
1956 and 1863 are similar

Pg 11 - Centennial

Pg 12 - Longer term Variability.  
1610, (or 1619), 1787, (180<sup>Approx</sup> yrs)  
1247, 1433, 1610, 1787, (1867?)

## I. Sun, Moon & 56

- Earth orbital plane around Sun =  $360^\circ$

\*  $0^\circ E =$  Spring Equinox ( $E^\circ$ )

• Angular degree =  $A^\circ$

•  $NODE =$  ORBIT of heavenly body cuts an astronomical plane.

•  $NODE =$  Two astronomical planes intersect.


• Celestial Equator = Earth's equator extended out into space.

- Sun-Moon reference points, pertaining to financial trends, is where the ecliptic is intersected by:

• The plane of Earth's equator, these two planes cut at the vernal (Spring) equinox;  $0^\circ E^\circ$  (0 Aries) and the autumn equinox point -  $180^\circ E^\circ$  (0 Libra).

Viewed from the northern hemisphere, the Sun passes from below to above the celestial equator at the spring equinox and from above to below at autumn equinox

Sun-Moon  
Reference  
intersected  
by

The plane of the Moon's orbit around the earth (Inclined  $5^\circ$  to the ecliptical). The points where these two planes intersect is called the North & South Nodes, 180 degrees apart on the ~~the~~ ecliptical circle. The ascending or North node is the point where the moon crosses from below to above the ecliptical. The descending or South node is where the moon crosses from below to above the ecliptical.

- The Equinox points move clockwise (RETROGRADE) against the background of fixed stars, while the moon's nodes move clockwise around the ecliptical circle in

(\*) the NUTATION cycle of 18.6 YRS.

- Equatorial bulge is tilted in relation to the ecliptic  $23.5^\circ$  (OBLIQUITY).

# 56 (cont)

- Precession of Equinoxes.

Equinox points rotate retrograde, completing a cycle every 25,800 yrs.

P6 3 - 200 BCE - Spring Equinox point ( $0E^{\circ}$ ) was cited in the ~~eastern~~ constellation aries. But now its in the early part of the con. AQUARIUS.

P6 3 - North Pole orientates to Polaris (star)

\*\*\* The NUTATION Cycle, 18.6133 years (Page 3)

ECLIPTICAL CIRCLE - Solar yr = 365.2422 (Tropical yr)

- Tropical Month = 27.3216 Days

Inclination Circle - Gives respective angles between the Sun, Moon & Moon's north node - ( $A^{\circ}$ )

- Nodal yr = 346.6200 Days

- " Month = 27.2122 "

- Synodic Month = 29.5306

SAROS Cycle -> Every 223 SYNODIC MONTHS. (18 Tropical yrs)

Saros half cycle = 9 Tropical yrs.

P6 4 56 year cycle

• On the same date Every 56 yrs, the ecliptical position on the lunar North Node moves only  $3E^{\circ}$  clockwise.

July 1, 1761 = NN @  $48E^{\circ}$

1817 = NN @  $45E^{\circ}$

1873 = NN @  $42E^{\circ}$

1929 = NN @  $39E^{\circ}$

1985 = NN @  $36E^{\circ}$

$3E^{\circ}$   $48-3=45-3=42-3=39-3=36$

• The 9 & 56 year cycles are based on the angles  $0^{\circ}$  and  $180^{\circ}$  between the Sun, Moon, and lunar nodes and repeat to within  $1^{\circ}$ .



\*\*\*\*  
Pg 4 - 56 (cont)  
The 1<sup>st</sup> and 2<sup>nd</sup> Harmonics are crucial  
in understanding the ~~56~~ 56 year cycle.

Sun's Nodes & the Sun

NOTATION cycle. The ecliptical position of the  
North Node on particular dates correlate perfectly  
with the 9/30 yr sub cycles on July 1<sup>st</sup>

Look at his Series 1 & Series 2 charts (Diagram)

→ July 1<sup>st</sup> 1760 - 2000 -

- 1755 to 1940 correlate with KINDBERG's 30 major crises.

Question → Does the 1899-1945 aberration or anomaly come into  
Pg 5 play from the previous paper I read.

Diagram 1 has all degree coordinates for alignment during  
financial crisis.

Pg 4 Diagram 2 is <sup>even</sup> better!

Pg 6 - there's a lot of data. 1799 pops up again.

Question → Find all the positions for:  
- archetypes, turnings.

Pg 6 - Sun's ecliptical position Pg

Take a look at degrees of the Sun & the Dow.

Pg 7 September effect is interesting.

Pg 7.8 Sunisolar cycles are a key.

Pg 8 Diurnal cycles may need more study.

\*\*\*Pg 9 Harmonics

END paper