

9/56 YEAR CYCLE: CALIFORNIAN EARTHQUAKES

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Remarkably, a 9/56 year seismic cycle was established for many countries around the circum Pacific belt. The only exceptions were historic quakes in Japan and Kamchatka (Far Eastern Russia) for whatever reason. All other regions/countries assessed showed positive correlates between 9/56 year patterns and the timing of major earthquakes. This paper considers the prospect of a 9/56 year cycle in Californian seismic history.

What is the 9/56 year cycle? It consists of a grid repeating 9 years horizontally and 56 years vertically, in which various events cluster into certain sectors. The 56 year columns have been called sequences and the 9 year horizontal rows sub-cycles. The 9/56 year cycle is hypothesised to arise from tidal triggering by Moon Sun gravitational effects (McMinn, 2006). Please note: The 56 year sequences have been numbered in accordance with McMinn (1996) with 1817, 1873, 1929 and 1985 being denoted as Sequence 01, 1818, 1874, 1930, 1986 Sequence 02 and so forth.

9/56 Year Seismic Cycle

The US Geological Survey listed 28 major quakes (mag => 6.9) occurring in California, Nevada and Baja California during the 1800-2010 period. Of this figure, 10 took place in the 12 months beginning April 15 of those years in Table 1, where as 2.5 could have been expected by chance. Table 1 comprised five 56 year sequences or about 9% of the complete 9/56 year grid. However, it contained:

- * 36% of all major Californian earthquakes.
- * 58% of major Californian earthquakes taking place in October to December.

Crucially, four 56 year sequences in Table 1 (Sqs 25, 34, 43 & 52) experienced many record events.

- * Sq 34 – The biggest northern Californian quake (San Francisco. mag 8.25. April 18, 1906).
- * Sq 34 – Record New Mexico quakes happened on July 16 and November 15 in 1906 (both mag 5.8).
- * Sq 34 - Equal first rank Arizona quake. (Flagstaff. mag 6.2. Jan 25, 1906).
- * Sq 43 - Record quake for Nevada (Pleasant Valley. mag 7.7. Oct 3,

- 1915).
- * Sq 43 – First and second rank quakes for Baja California (mag 7.2. Apr 4, 2010 & mag 7.1 Nov 21, 1915).
 - * Sq 52 - Record quake for western USA. (Great Cascadia. mag 9.0. Jan 26, 1700).
 - * Sq 52 - Record quake for Hawaii. (mag 7.9. Apr 2, 1868).
 - * Sq 52 - Record US volcanic eruption (ex Alaska) (Mt St Helens, May 18, 1980).

The notable exception was the record event for southern California (Fort Tejon, mag 8.25. Jan 9, 1857).

Table 1
9/56 YEAR CYCLE: CALIFORNIAN QUAKES mag => 6.9
Year beginning April 15

Sq 25		Sq 34		Sq 43		Sq 52		Sq 05
				1803	+ 9	1812	+ 9	1921
						1208		
						1221		
1841	+ 9	1850	+ 9	1859	+ 9	1868	+ 9	1877
						1021		
1897	+ 9	1906	+ 9	1915	+ 9	1924	+ 9	1933
		0418		1003				
				1121				
1953	+ 9	1962	+ 9	1971	+ 9	1980	+ 9	1989
						1108		1018
2009	+ 9	2018						
0803								
2010								
0404								

Years in **bold** contained quakes (mag => 6.9) in the year beginning April 15. Dates expressed as YYYYMMDD.

Moderate Californian Earthquakes

The US Geological Survey listed some 42 Californian moderate earthquakes (=> 6.5 to =< 6.8 mag) for the 1800 to 2010 period. Of this figure, 16 occurred in an 18/56 year pattern (see Table 2), where as chance would have given 5.3.

Table 2
18/56 YEAR CYCLE:
MODERATE CALIFORNIAN QUAKES (mag 6.5 to 6.8 mag)
Year ended December 31

					1804	1822
		1806	1824	1842	1860	1878
					*	
		1862	1880	1898	1916	1934
				**		***
1882	1900	1918	1936	1954	1972	1990
		#*		#*****		
1938	1956	1974	1992	2010		
	*		###**	##*		
1994	2012					
#*						

The 56 year sequences are separated by an interval of 18 years.

Denotes major earthquakes => 6.9 mag.

* Denotes moderate earthquakes => 6.5 to =< 6.8 mag.

Source of Raw Data: US Geological Survey.

Major earthquakes (mag => 6.9) in south western North America happened preferentially in the 9/56 year pattern shown in Table 1. However, the lesser events mainly took place in an 18/56 year grid and in another sector of the 9/56 year grid. The dichotomy between the timing of major and moderate quakes in the 9/56 year cycle was totally unexpected.

Seasonality

Sequences 43, 52 & 05 in Table 1 contained 7 major quakes, which took place in the 2.7 months to December 21, whereas a mere 0.5 could have been expected by chance. Such seasonality also showed up in other 9/56 year patterns.

In the following grid, four important Californian quakes occurred in the 1.5 months to January 31, including the 1700 Great Cascadia and the 1857 Great Fort Tejon earthquakes.

Sq 52	Sq 05	Sq 14	Sq 23	Sq 32	Sq 41	Sq 50
1700						
0126						
1756	1765	1774	1783	1792	1801	1810
1812	1821	1830	1839	1848	1857	1866
					0109	
1868	1877	1886	1895	1904	1913	1922
						0131
1924	1933	1942	1951	1960	1969	1978
	1932					
	1221					
1980	1989	1998	2009			

In Sequences 12 & 21, two major Californian quakes happened in the month to June 15.

Sq 12		Sq 21
1828	+ 9	1837
1884	+ 9	1893
1940	+ 9	1949
May19		
1996	+ 9	2005
		Jun15

The 1906 San Francisco earthquake and the 1980 Mt St Helens eruption took place in the month to May 18.

Sq 34		Sq 43		Sq 52
		1803	+ 9	1812
1850	+ 9	1859	+ 9	1868
1906	+ 9	1915	+ 9	1924
Apr18				
1962	+ 9	1971	+ 9	1980
				May18

2009 & 2010 Baja California Quakes

The August 3, 2009 Baja California earthquake (mag 6.9) showed seasonality, as three major earthquakes (mag \Rightarrow 6.9) occurred in the 1.3 months ended August 20 in the ensuing grid.

Sq 07		Sq 16		Sq 25
1823	+ 9	1832	+ 9	1841
1879	+ 9	1888	+ 9	1897
1935	+ 9	1944	+ 9	1953
1991	+ 9	2000	+ 9	2009
Jul 12				Aug 03
Aug 17				

The April 4, 2010 Baja Californian event occurred in the following 9/56 year grid together with two other major April quakes (mag \Rightarrow 6.9). The Californian earthquake of June 28, 1992 did not align closely with these events and was therefore anomalous. Furthermore, earthquakes on October 22, 2010 (Baja California) and December 16, 1954 (California) happened within about 1.8 months of each other.

1806	1815	1824	1833	1842
1862	1871	1880	1889	1898
1918	1927	1936	1945	1954
0421				1216
1974	1983	1992	2001	2010
		0425		0404
		0628		1022

Hawaiian Earthquakes

Hawaiian earthquakes also tended to occur within a similar section of the 9/56 year cycle, as recorded for California in Table 1. The [US Geological Survery](#) listed 15 major quakes on the island of Hawaii (see Appendix 2). Of this figure, 8 took place in the 12 months ended August 22 of those years in Table 3, whereas 1.6 could have been expected by chance.

Table 3 HAWAIIAN ISLAND QUAKES & 9/56 YEAR CYCLES

Year ended August 22					
Sq 34	Sq 43	Sq 52	Sq 05	Sq 14	Sq 34
		1868			
		0328	1877	1886	1895
		0402			
				1942	1951
1906	1915	1924	1933	19410925	0422
					0821
1962			1989		2007
0627	1971	1980	0625	1998	20061015

The 56 year sequences are each separated by an interval of 9 years.

Years in **bold** contained major Hawaiian earthquakes in the 11 months ending August 22 of those years in Table B.

Five Hawaiian quakes occurred in the 3 months ending June 27 of those years in Table 3, while coincidence would give about 0.3. Two additional major events happened on September 25, 1941 and October 15, 2006. The record quake for Hawaii (April 2, 1868) also fell within Sequence 52, while most record earthquakes for south western North America took place in Sequences 25, 34, 43 and 52.

Lunar Tidal Effects

The obvious question arises - what activates this 9/56 year seismic cycle? Tidal triggering via lunisolar cycles is believed account for the timing of major earthquakes. The Moon, Sun and lunar north (ascending) node repeat the angles 0° and 180° to within one degree every 9.0 and 56.0 solar years (McMinn, 2006). This represents an amazing alignment of several Moon Sun cycles based on the first and second harmonics. The 9.0 year cycle is equivalent to a Half Saros cycle, where as the 56 year cycle is derived by dividing the 112 year cycle by two. Both the 18 year Saros and the 112 year eclipse cycle were listed by Robert van Gent in his extensive coverage of key Moon Sun eclipse cycles.

Lunar North Node. Any events falling with significance in a 9/56 year pattern will always have the north (ascending) node sited in two sectors approximately opposite in the ecliptical circle. For example, all 10

Californian earthquakes in Table 1 occurred with the lunar north node sited in two very narrow segments of the ecliptical circle:

* 285 – 345 E ° - a 060° segment.

* 135 – 145 E ° - a 010° segment.

Events in an 18/56 year grid will have the north node in the same ecliptical sector. All 17 moderate events in 18/56 year grid (see Table 2) happened with the north node located between 250 and 320 E °, a 70° ecliptical segment. No exceptions arose for either pattern, a factor very unlikely to occur by chance. The lunar nodes are strongly associated with Moon Sun tidal effects and these forces may explain why Californian earthquakes fall asymmetrically in 9/56 and 18/56 year patterns.

NB: Lunar nodes are imaginary points in the heavens, where the plane of the Earth's orbit around the Sun (the ecliptic) cuts the plane of the Moon's orbit around the Earth. The north (ascending) node occurs where the Moon crosses the ecliptic from south to north.

Apogee is the point in the lunar orbit, where the Moon is the greatest distance from Earth, while perigee is the least distance. In the lunar apse cycle, the apogee – perigee axis (apsides) rotates counter clockwise around the ecliptical circle, with apogee passing from spring equinox to spring equinox every 8.8474 tropical years. The apsides axis is very important in oceanic tides on Earth. When the full/new Moon is at apogee, the amplitude of tides in New York Harbor is 50% lower than when the full/new Moon is at perigee. Apogee could be expected to play a key role in any Moon Sun seismic effect.

Apogee takes 5.995 tropical years to complete one cycle north node to north node. The 18.0 year Saros eclipse cycle divided by 6 produced the integral number three and the 9 year Half Saros divided by 6 gave 1.5 (one plus a half). The 56 year cycle divided by 6 gave 9.3333 tropical years (9 plus one third). Additionally, 9.0 divided by the 8.8474 year apse cycle yielded 1.02, while 56.0 divided by the apse cycle gave 6.33 (6 plus one third). For apogee, there was an emphasis on the 1st, 2nd and 3rd harmonics in the 9/56 year grid and this could be expected to show up in tidal cycles.

Conclusions

Major earthquakes (mag =>6.9) in California – Nevada – Baja California fell preferentially in patterns of the 9/56 year cycle as shown in Table 1. This

particularly applied to events in the 2.7 months to December 21. Four 56 year sequences (Seqs 25, 34, 43 & 52) contained numerous record quakes in south western North America. There were also indications that seasonality may be important within the 9/56 year seismic cycle. Interestingly, moderate Californian earthquakes (mag \Rightarrow 6.5 to \Leftarrow 6.9) were most likely to take place within an 18/56 year cycle as presented in Table 2.

Any events clustering in the 9/56 year cycle will have the lunar north node sited within two narrow segments approximately opposite in the ecliptical circle with no exceptions. For events in an 18/56 year grid, the north node will be located within one segment of the ecliptic with no exceptions. Furthermore, apogee – perigee axis could be expected to play a role in any tidal seismic cycles. Seasonality in Californian earthquakes also suggested that the position of the Sun on the ecliptic could also play a crucial role in the timing of major seismic events.

The findings strongly indicated that the 9/56 seismic cycle arose from Moon Sun tidal triggering effects. How these forces actually function remains a great unknown. If the Moon Sun mathematics can ever be deciphered, accurate predictions could be given for windows when major quakes were most likely to occur. Such a breakthrough could potentially save many lives.

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Appendix 1**MAJOR CALIFORNIAN EARTHQUAKES: 1800 –****2010 (a)**

Year	Mth	Dy	Mag	Location
1812	12	08	7.0	Wrightwood
1812	12	21	7.0	Santa Barbara Channel
1838	06	00	7.0	San Francisco Peninsula
1857	01	09	8.25	Great Tejon earthquake
1868	10	21	7.0	Hayward Fault
1872	03	26	7.6	Owens Valley
1892	02	24	7.0	Laguna Salada, BC
1899	04	16	7.0	West of Eureka
1906	04	18	8.25	Great San Francisco quake
1915	10	03	7.3	Pleasant Valley, NV
1915	11	21	7.1	Volcano Lake, BC
1918	04	21	6.9	San Jacinto
1922	01	31	7.3	West of Eureka
1923	01	22	7.2	Cape Mendocino
1927	11	04	7.3	South West of Lompoc
1932	12	21	7.2	Cedar Mountain, Nevada
1934	12	31	7.0	Colorado River
1940	05	19	7.1	Imperial Valley
1952	07	26	7.7	Kern County
1954	12	16	7.1	Fairview Peak, NV
1980	11	08	7.2	West of Eureka
1989	10	18	7.1	Loma Prieta
1991	08	17	7.1	West of Crescent City
1992	04	25	7.2	Cape Mendocino
1992	06	28	7.3	Landers
1994	09	01	6.9	Mendocino Fracture Zone
1999	10	16	7.2	Hector Mine
2005	06	15	7.2	Offshore Northern CA
2009	08	03	6.9	Baja California
2010	04	04	7.2	Mexicali, Baja California
2010	10	22	6.9	Baja California

(a) Includes quakes in California, Nevada and Baja California (mag => 6.9).

Events in **bold** fall in the 12 months beginning April 15 in Table 1.

of those years in the 9/56 year cycle in Table 1.

Source: [US Geological Survey](http://earthquake.usgs.gov/regional/sca/ca_eqs.php) *Californian Earthquake History: 1769 to Present*.

http://earthquake.usgs.gov/regional/sca/ca_eqs.php

Appendix 2 MAJOR HAWAIIAN QUAKES: 1865-1990

Year	Mag	Region
Mar 28, 1868	6.5-7.0*	Mauna Loa south flank
Apr 2, 1868	7.5-8.1*	Mauna Loa south flank
Oct 5, 1929	6.5	Hualalai
Sept 25, 1941	6.0	Kaoiki
May 29, 1950	6.2	Mauna Loa southwest rift
Apr 22, 1951	6.3	Kilauea
Aug 21, 1951	6.9	Kona
May 23, 1952	6.0	Kona
Mar 30, 1954	6.5	Kilauea south flank
June 27, 1962	6.1	Kaoiki
Apr 26, 1973	6.2	Honomu
Nov 29, 1975	7.2	Kilauea south flank
Nov 16, 1983	6.6	Kaoiki
June 25, 1989	6.1	Kilauea south flank
Oct 15, 2006	6.6	Offshore west side of the island

Years in **bold** contained major Hawaiian earthquakes in the 11 months ending August 22 of those years in Table B.

Source of Raw Data: [US Geological Survey](http://earthquake.usgs.gov/regional/sca/ca_eqs.php)