

## 9/56 YEAR CYCLE: CALIFORNIAN EARTHQUAKES

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Remarkably, a 9/56 year seismic cycle was established for most 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.

### 9/56 Year Seismic Cycle

The US Geological Survey listed 26 major quakes (mag => 7.0) occurring in California, Nevada and Baja California during the 1800-2008 period. Of this figure, 9 took place in the 12 months ended December 21 of those years in Table 1, where as 1.9 could have been expected by chance. Table 1 comprised only four 56 year sequences and only 7% of the complete 9/56 year grid. However, it contained:

- \* 35% of all major Californian earthquakes.
- \* 58% of Californian earthquakes taking place in October to December.

<b>Table 1</b>						
<b>THE FOUR KEY 56 YEAR SEQUENCES &amp; MAJOR CALIFORNIAN EARTHQUAKES</b>						
<b>Sq 34</b>		<b>Sq 43</b>		<b>Sq 52</b>		<b>Sq 05</b>
		1803	+ 9	<b>1812</b>	+ 9	1821
				**		
1850	+ 9	1859	+ 9	<b>1868</b>	+ 9	1877
				*		
<b>1906</b>	+ 9	<b>1915</b>	+ 9	1924	+ 9	<b>1933</b>
*		**				*
1962	+ 9	1971	+ 9	<b>1980</b>	+ 9	<b>1989</b>
				*		*

Years in **bold** contained major quakes (mag => 7.0) in the year ending Dec 21.

\* Asterisks denote the number of quakes in a given year.

Crucially, three 56 year sequences in Table 1 (Sqs 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 - Record quake for Baja California (Volcano Lake. 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 quake for southern California (Fort Tejon, mag 8.25. Jan 9, 1857).

### Moderate Californian Earthquakes

The US Geological Survey listed some 42 Californian moderate earthquakes ( $\Rightarrow$  6.5 to  $\leq$  6.9 mag) for the 1800 to 2004 period. Of this figure, 17 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 (6.5 to 6.9 mag)**

				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  $\Rightarrow$  7.0 mag.

\* Denotes moderate earthquakes  $\Rightarrow$  6.5 to  $\leq$  6.9 mag.

**Source of Raw Data:** US Geological Survey.

Major earthquakes (mag  $\Rightarrow$  7.0) 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. This 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 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 grids. In Sequences 52 and 05, two important quakes occurred in the 36 days to January 26.

<b>Sq 52</b>		<b>Sq 05</b>
1700	+ 9	1709
<b>Jan 26</b>		
1756	+ 9	1765
1812	+ 9	1821
1868	+ 9	1877
1924	+ 9	<b>1933</b>
		<b>Dec 21, 1932</b>
1980	+ 9	1989

In Sequences 41 & 50, major Californian quakes happened in January, while in Sequences 12 and 21 they took place in the month to June 15.

<b>Sq 41</b>		<b>Sq 50</b>
1857	+ 9	1866
<b>Jan 9</b>		
1913	+ 9	<b>1922</b>
		<b>Jan 31</b>
1969	+ 9	1978

<b>Sq 12</b>		<b>Sq 21</b>
1884	+ 9	1893
<b>1940</b>	+ 9	1949
<b>May 19</b>		
1996	+ 9	<b>2005</b>
		<b>Jun 15</b>

Three Californian earthquakes were timed between September 1 and November 30 in the following grid. This included two lesser events (mag < 7.0).

\* November 23, 1873 mag 6.8. Owens Valley.

\* November 26, 1976 mag 6.8.

<b>Sq 48</b>		<b>Sq 01</b>		<b>Sq 10</b>
		1761	+ 9	1770
1808	+ 9	1817	+ 9	1826
1864	+ 9	<b>1873</b>	+ 9	1882
		<b>Nov 23</b>		
1920	+ 9	1929	+ 9	1938
<b>1976</b>	+ 9	1985	+ 9	<b>1994</b>
<b>Nov 26</b>				<b>Sep 01</b>

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

<b>Sq 34</b>		<b>Sq 43</b>		<b>Sq 52</b>
1850	+ 9	1803	+ 9	1812
<b>1906</b>	+ 9	1859	+ 9	1868
<b>Apr 18</b>		1915	+ 9	1924
1962	+ 9	1971	+ 9	<b>1980</b>
				<b>May 18</b>

### 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 [USGS](#) listed 15 major quakes on the island of Hawaii (see Appendix 2). Of this figure, 8 took place in the 11 months ended August 22 of those years in Table 3, whereas 1.5 could be expected by chance.

Five Hawaiian quakes occurred in the 3 months ending June 27 of those years in the 56 year sequences in Table 3, while coincidence would give about 0.3. The record quake for Hawaii (April 2, 1868) also fell within these 6 sequences, as did the most recent major quake in on October 15, 2006. A 9/56 year effect was also apparent in the timing of the beginnings of Hawaiian volcanic eruptions ([David McMinn](#)).

**Table 3 HAWAIIAN ISLAND QUAKES & 9/56 YEAR CYCLES**

		<b>Sq 52</b>	<b>Sq 05</b>		
		<b>1868</b>			
		<b>0328</b>	1877	1886	1895
		<b>0402</b>			
1906	1915	1924	1933	<b>1942</b>	<b>1951</b>
				<b>19410925</b>	<b>0422</b>
					<b>0821</b>
<b>1962</b>	1971	1980	<b>1989</b>	1998	<b>2007</b>
<b>0627</b>			<b>0625</b>		<b>20061015</b>

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.

### Lunar Tidal Effects

The obvious question arises - what activates the 9/56 year seismic cycle? The Moon, Sun and lunar north 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 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 9 Californian earthquakes in Table 1 occurred with the lunar north node sited in two very narrow segments of the ecliptical circle:

\* 310 – 345 E° - a 035° 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, by inference, these forces may help explain why Californian earthquakes fall asymmetrically in 9/56 and 18/56 year patterns.

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

**Apogee** is the point (given in ecliptical degrees) 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 and 56.0 divided by the apse cycle gave 6.33 (6 plus one third). For apogee, there was an emphasis on the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> harmonics in the 9/56 year grid and this should be expected to show up in tidal cycles.

## Conclusions

Major earthquakes (mag =>7.0) in California – Nevada – Baja California fell preferentially in patterns of the 9/56 year cycle in Table 1. This particularly applied to events in the 2.7 months to December 21. Three 56 year sequences (Sqs 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 seismic events.

The findings strongly indicated that the 9/56 seismic cycle arose from Moon Sun tidal influences. How the tidal effects actually function remains the 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.

## References

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## Appendix 1

### MAJOR CALIFORNIAN EARTHQUAKES: 1800 – 2008 (a)

Year	Mth	Dy	Mag	Location
<b>1812</b>	<b>12</b>	<b>8</b>	<b>7.0</b>	<b>Wrightwood</b>
<b>1812</b>	<b>12</b>	<b>21</b>	<b>7.0</b>	<b>Santa Barbara Channel</b>
1838	06	00	7.0	San Francisco Peninsula
1857	01	09	8.25	Great Tejon earthquake
<b>1868</b>	<b>10</b>	<b>21</b>	<b>7.0</b>	<b>Hayward Fault</b>
1872	03	26	7.6	Owens Valley
1892	02	24	7.0	Laguna Salada, BC
1899	04	16	7.0	West of Eureka
<b>1906</b>	<b>04</b>	<b>18</b>	<b>8.25</b>	<b>Great San Francisco earthquake</b>
<b>1915</b>	<b>10</b>	<b>03</b>	<b>7.3</b>	<b>Pleasant Valley, Nevada</b>
<b>1915</b>	<b>11</b>	<b>21</b>	<b>7.1</b>	<b>Volcano Lake, BC</b>
<b>1922</b>	<b>01</b>	<b>31</b>	<b>7.3</b>	<b>West of Eureka</b>
1923	01	22	7.2	Cape Mendocino
1927	11	04	7.3	South West of Lompoc
<b>1932</b>	<b>12</b>	<b>21</b>	<b>7.2</b>	<b>Cedar Mountain, Nevada</b>

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, Nevada
<b>1980</b>	<b>11</b>	<b>08</b>	<b>7.2</b>	<b>West of Eureka</b>
<b>1989</b>	<b>10</b>	<b>18</b>	<b>7.1</b>	<b>Loma Prieta</b>
1991	08	17	7.1	West of Crescent City
1992	04	25	7.2	Cape Mendocino
1992	06	28	7.3	Landers
1999	10	16	7.2	Hector Mine
2005	06	15	7.2	Offshore Northern California

(a) Includes earthquakes in Nevada and Baja California.

Events in **bold** fall in the 12 months ending December 21 of those years in the 9/56 year cycle in Table 1.

**Source:** [US Geological Survey Californian Earthquake History: 1769 to Present.](http://pasadena.wr.usgs.gov/info/cahist_eqs.html) [http://pasadena.wr.usgs.gov/info/cahist\\_eqs.html](http://pasadena.wr.usgs.gov/info/cahist_eqs.html)

## Appendix 2 MAJOR HAWAIIAN QUAKES: 1865-1990

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

Years in **bold** contained major Hawaiian earthquakes in the 11 months ending August 22 of those years in Table B. Source of Raw Data: [USGS](http://www.usgs.gov)