9/56 YEAR CYCLE: RECORD US EARTHQUAKES.

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A 9/56 year cycle was detected in the timing of US & Western European financial panics over recent centuries (Home). This cycle was then hypothesised to be also applicable to major seismic events. Remarkably, a 9/56 year seismic cycle was established for most of the countries around the circum – Pacific belt (McMinn, 2004). The only exceptions were historic quakes in Japan, Taiwan and Kamchatka 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 the record events in US seismic history.

9/56 Year Seismic Cycle - California

The US Geological Survey listed earthquakes occurring in California, Nevada and Baja California for the period 1769 to 2005. This included *"known earthquakes with a magnitude of at least 6.0 and selected smaller events"*. Of the 27 major quakes (mag => 7.0) in the 1800-2005 period, 9 took place in the 12 months ended December 21 of those years in the four 56 year sequences in Table 1 (Sqs 34, 43, 52 & 05).

Table 1

9/56 YEAR CALIFORNIA SEISMIC CYCLES

Sq 34		**Sq 43**		**Sq 52**		**Sq 05**
		1803	+ 9	**1812** **	+ 9	1821
1850	+ 9	1859	+ 9	**1868** *	+ 9	1877
1906 *	+ 9	**1915** **	+ 9	1924	+ 9	**1933** *
1962	+ 9	1971	+ 9	**1980** *	+ 9	**1989** *

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

Within these four sequences, 7 quakes took place in the three months October to December, whereas a mere 0.5 could have been expected by chance. The only exceptions were the April 18, 1906 San Francisco quake and the 1932 event (Cedar Mountain, Nevada. mag 7.2.). The latter happened on December 21, 1932, a year earlier than most of the other earthquakes. Importantly, these four sequences also experienced several record events in south western USA.

* Sq 34 – The biggest northern Californian quake (San Francisco. mag 8.25. April 18, 1906).
* Sq 34 – Record quake for New Mexico (Socorro. Mag 5.8. Nov 15, 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 historic volcanic eruption in the western states (Mt St Helens, May 18, 1980).

The record quake for Arizona is debatable. The Arizona Earthquake Information Center listed some 30 Arizona earthquakes (mag =>4.9) that have occurred since 1870 of which four were of mag =>5.5.

1906 January 1	6.2	Flagstaff
1912 August 18	6.2	Lockett Tanks
1910 September 24	6.0	Cedar Wash
1959 July 21	5.5	Fredonia

The 1906 earthquake was equal first rank and occurred in Table 1. Even so, the USGS listed the 1959 earthquake as being the record quake for New Mexico. Thus there is a discrepancy between the two sources.

The record event for southern California (Fort Tejon. mag 7.9. Jan 9, 1857) happened within 9/56 year patterns as presented in Table 2.

The record quake in south east USA (Charleston. mag 7.0. Sep 1, 1886) took place in a little outside the four sequences in Table 1.

Sq 34		**Sq 43**		**Sq 52**		**Sq 05**		
		1803	+ 9	1812	+ 9	1821	+ 9	1830
1850	+ 9	1859	+ 9	1868	+ 9	1877	+ 9	**1886**
1906	+ 9	1915	+ 9	1924	+ 9	1933	+ 9	1942
1962	+ 9	1971	+ 9	1980	+ 9	1989	+ 9	1998

Other record US and European seismic events occurred in the 4 sequences – 4.5 months ended April 3 of those years in Table 1.

* Sq 52 – Record quake in Western Europe (Lisbon. mag 9.0. Nov 1, 1755).
* Sq 52 – Record quake in north east USA (Boston. mag 6.5. Nov 18, 1755).
* Sq 52 – Record quake in central USA (New Madrid. mag 7.9. Feb 12, 1812).
* Sq 52 – Record Hawaiian quake (mag 7.9. Apr 3, 1868).

Canada. Of the regional record Canadian quakes, the North West Territories event (Baffin Bay. mag 7.3. Nov 20, 1933) occurred within the four sequences in Table 1. The western Canadian record earthquake (Queen Charlotte Island. mag 8.1. Aug 22, 1949) happened within Table 2. The exception was eastern Canada (Offshore Newfoundland. mag 7.2. Nov 18, 1929).

Record Earthquakes By US State

The USGS presented a listing of the record quakes for each of the 50 US states, of which 21 occurred in the 9/56 year patterns as shown in Table 2. This compares with the

expected frequency of 12.5, a finding that was significant ($p < .01$). A few states were entered twice as some states experienced two quakes of the same magnitude.

Table 2 9/56 YEAR CY7LES & RECORD EARTHQUAKES BY US STATE

					Sq 52	**Sq 05**			**Sq 32**	**Sq 41**	**Sq 50**	**Sq 03**	**Sq 12**
					1756	1765	1774	**1783** *	1792	1801	1810	1819	1828
1767	1776	1785	1794	1803	**1812** *	1821	1830	1839	1848	**1857** *	1866	1875	1884
1823	1832	1841	1850	1859	**1868** *	**1877** *	**1886** *	1895	**1904** *	1913	1922	**1931** **	**1940** **
1879 *	1888	**1897** *	**1906** **	**1915** *	1924	1933	1942	1951	1960	**1969** *	1978	1987	1996
1935	**1944** *	1953	**1962** *	1971	**1980** *	1989	**1998** *						

Calendar years containing a record US quake are presented in **bold**.
The number of record earthquakes by US state are denoted by an *asterisk.
Source of Raw Data: USGS The Largest Earthquakes, State by State.
http://neic.usgs.gov/neis/states/state_largest.html

The Remarkable Sequence 52

Sequence 52 was the only notable 56 year sequence in US - Western European earthquake activity, as follows:

Sequence 52	**Location**	**Mag**
January 26, 1700	Great Cascadia quake	9.0
November 1, 1755	Great Lisbon quake	9.0
November 18, 1755	Boston quake.	6.0-6.5
Dec1811 to Feb 1812	New Madrid quakes	7.6-7.9
April 3, 1868	Hawaii	7.9
1924	No event	
May 18, 1980	Mt St Helens	na

Until 1868, all major earthquakes in Sequence 52 happened in the 6 months ending April 15. They were also the greatest events recorded in their respective regions since 1700. There were no other obvious 56 year sequences in seismic history and thus a 9/56 year cycle would never be easily detected in earthquake activity. The first breakthroughs came with the study of financial cycles, which were then extrapolated to earthquakes. The May 18, 1980 Mount St Helens eruption also took place in Sequence 52 and was the greatest historic volcanic event in the contiguous 48 states.

Moon - Sun Tidal Effects

Any events falling with selectively within 9/56 year patterns will always correlate with the ecliptical position of the north (ascending) node (see Diagram 2.2, McMinn, 2004). 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 node occurs where the Moon passes from below the ecliptic to above. All 9 Californian earthquakes in Table 1 occurred when the lunar north node was within two narrow segments approximately opposite in the ecliptic circle:

* 310 – 340 E ^{o} - a 30^{o} segment
* 130 – 180 E ^{o} - a 50 ^{o} segment.

There were no exceptions, a factor very unlikely to arise by chance.

As to be expected, all 21 US record earthquakes in Table 2 had the north node located in limited ranges on the ecliptical circle.

* 305 – 010 E ^{o} - a 65^{o} segment
* 115 – 190 E ^{o} - a 75 ^{o} segment.

The lunar nodes have been strongly associated with Moon – Sun tidal effects, which are hypothesised to give rise to 9/56 year seismic patterns. How these tidal effects actually function remains a great unknown.

Conclusions

Record earthquakes in the USA and Canada fall preferentially in patterns of the 9/56 year cycle. The most astonishing feature was the four sequences (Sqs 34, 43, 52 & 05), in which numerous record events in US seismic history. The 9/56 year effect arises because of Moon – Sun tidal influences, a finding strongly supported by the links between lunar nutation and the 9/56 year seismic cycle. These findings are preliminary and more research is essential in this area.