New Frontiers of Research towards the Predictability of Hydrological Variability, Earthquakes, and other Geophysical Processes

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In the afternoon of March 27, 1964, the second largest ever recorded earthquake hit Alaska, according to the National Oceanic and Atmospheric Administration (NOAA.) It generated tsunamis, which were recorded throughout the Pacific. It was the most disastrous to hit the West Coast of the U.S. and British Columbia, Canada.

In the aftermath of this disaster, the West Coast & Alaska Tsunami Warning System (WC&ATWS) was established to respond to the need for timely and effective tsunami warnings and earthquake information for Alaska and the northern Pacific (Sokolowski, 2011.)

Nearly 47 years later, in the afternoon of March 11, 2011, one of the largest ever recorded earthquakes hit Japan and generated tsunami waves that reached the coasts of Hawaii and the West Coast of the U.S.

A recent observation from my ongoing research to address uncertainties involved in the study of the impact of climate change on California's water projects suggests that geophysical processes including multidecadal hydrological variability and earthquakes may be predictable by using the transient positions of the moon around the earth and the moon and earth around the sun (Ejeta, 2011a, b.)

These movements can be gauged using solar eclipse trajectories (SETs) as proxies. SETs are based on Saros series and cycles, which have been established by the National Aeronautics and Space Administration (NASA.) My analysis using these proxies shows that two water years that have similar SETs tend to have similar hydrological conditions on earth (Ejeta, 2011b.) Similar SETs indicate that the transient movements of the moon around the earth are at similar distances from the earth at the same time of the given water years. A water year runs from the beginning of October of the previous calendar year through the end of September of the current calendar year.

Using letter codes of T, A, H, and P for Total, Annular, Hybrid, and Partial solar eclipse types and numeric orders for the calendar month in which the eclipse occurred, specific SETs can be established for any given water year. Thus, P1 means a partial solar eclipse event in January and P1-P6 means a trajectory of partial eclipses in January and June of the given year.

To gage the oncoming inertia of the movement of the moon around the earth and the moon and earth around the sun to a given water year, the solar eclipse trajectory of the previous water year may be added to establish a more robust longer SET.

Using this analysis approach, we find that water years 1964 and 2011 have similar SETs of A1-T7-P1-P6-P7. The specific Saros series, eclipse type, and eclipse magnitude data for these SETs are given in Table 1; a list of SETs for the 1903 to 2020 period is posted at http://www.jostationarity.com/VOL1/SETData.pdf (Ejeta, 2011c.)

Obviously, both water years 1964 and 2011 have similar solar eclipse trajectory characteristics. Therefore, this observation appears to suggest that there is an association between the similarities of cyclic SETs and geophysical processes on earth.

Table 1. Comparison of the 1964 and 2011 SETs and their characteristics (NASA, 2011)

Characteristics of 1964 SET (A1-T6-P1-P6-P7)				Characteristics of 2011 SET (A1-T6-P1-P6-P7)			
Date	Eclipse type	Saros Series	Eclipse magnitude	Date	Eclipse type	Saros Series	Eclipse magnitude
Jan. 25, 1963	Annular	140	0.995	Jan. 15, 2010	Annular	141	0.919
Jul. 20, 1963	Total	145	1.022	Jul. 11, 2010	Total	146	1.058
Jan. 14, 1964	Partial	150	0.559	Jan. 04, 2011	Partial	151	0.858
Jun. 10, 1964	Partial	117	0.754	Jun. 01, 2011	Partial	118	0.601
Jul. 9, 1964	Partial	155	0.322	Jul. 01, 2011	Partial	156	0.097

Various other natural events can be associated with the alignments or close alignments of the earth, moon, and sun. For example, on a sunny day on June 3, 2004, the Jones Tract in the Sacramento and San Joaquin River Delta near San Francisco, California, failed due to a higher than normal tide.

About a month earlier, on May 4, 2004, there was a Total lunar eclipse of Saros Series 131. It is plausible to theorize that if this levee's failure was due to an unusual tide during this lunar eclipse, it should have occurred on May 4, 2004, instead of nearly a month, or one lunar cycle later. However, the possibility that the high tide when the moon rotated back to a close location to the eclipse position hit a weak spot, or that it was already weakened enough because of previous high tides and gave in during the subsequent high tide, cannot be ruled out.

As another example, on a full moon day on December 26, 2004, an oceanic earthquake close to the coast of Sumatra triggered the Christmas Tsunami, which indicates the influence of lunisolar forces (Gackstatter, 2007.) Half a synodic month later, on January 10, 2005, which was in a new moon phase, the first extreme proxigean spring tide and the first extreme lunisolar forces in the new millennium

occurred (Gackstatter, 2007.) About two lunar cycles before the Christmas Tsunami, on October 28, 2004, there was a Total lunar eclipse of Saros series 136 (NASA, 2011.)

Newton's law of universal gravitation as it relates to tidal dynamics, which in turn may affect geophysical processes on earth, has been put forward as an area of focus in this further research. Gackstatter (2007) indicates that when the moon is full or new, the gravitational pull of the moon and sun are combined and result in spring tides. According to his insight, high spring tides occur when the moon is close to the earth on its elliptical path because the tide-raising force varies inversely as the third power of the lunar distance.

The focus herein and in Ejeta (2011a) surround the alignments of the earth, moon, and sun as recorded by solar and lunar eclipse events. When these alignments occur, the combined distance between these three celestial objects is the smallest, which translates to pronounced gravitational pull on the earth tides, according to Newton's law of universal gravitation.

While the physics behind the association of SETs and geophysical processes on earth is a subject of further investigation, the body of evidences of the associations is building up strongly.

References

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