CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)
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Project Number
34512

Project Title
Do Solar/Lunar Positions Influence Earthquakes?

Abstract

Objectives/Goals
The Moon and the Sun have the largest gravitational effects on the Earth of all the celestial bodies. The resulting land tides may have the capability to trigger earthquakes, along with possible electromagnetic influences. The purpose of this project is to find any correlations, patterns, and abnormalities between the positions of the Sun, the Moon, the Earth and earthquakes.

Methods/Materials
To find correlations, patterns, or abnormalities, a master data set was created containing four hundred three earthquakes having magnitudes 4.5 and greater and having occurred between 1901 and 2001. The data were sorted by nearest phase (New Moon, First Quarter, Full Moon, and Third Quarter), and then by proximity to that phase. Each earthquake was recorded with its location including latitude, date of occurrence, day in the lunar cycle, whether or not it occurred on a perigee or apogee, and its magnitude. The data was also counted to find frequency, or, number of earthquake values. After counting, a statistical analysis was created to find discrepancy between the observed and expected frequency values, due to the complex nature of the data and its lack of a control set as this data is built upon earthquakes that had happened, instead of experimental outcomes.

Results
The distribution of the number of earthquakes over the Lunar cycle trended toward a cyclic pattern with a slight decrease of frequency when the Moon#s position approached alignment with the Earth and the Sun (syzygy) and then again when it approached the first quarter. The third quarter was an exception with a slight increase in the number of Earthquakes. Earthquakes occurred 25% more frequently at perigee than at apogee. There was a 75% correlation between the occurrence of earthquakes within the lunar month and the absolute latitude of the same set of earthquakes.

Conclusions/Discussion
This indicates that the greater the number of earthquakes that occur on any day in a lunar month, the farther away from the earth#s equator they will be. The statistical analysis indicated that the farther away a day is from and two adjacent lunar phases across the lunar month, earthquakes will occur 13% about more frequently. There was no significant difference in the distribution of magnitude within the Lunar cycle. Overall, this project supported the theory that the Moon#s position in relation to the Earth and Sun has some connection to earthquake activity.

Summary Statement
The purpose of this project is to find any correlations, patterns, and abnormalities between the positions of the Sun, the Moon, the Earth and earthquakes.

Help Received
Mrs. Sniffen helped in techniques for displaying the data and assembling the board.