



Significant statistically relationship between the great volcanic eruptions and the count of sunspots from 1610 to the present

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The assertion that solar activity may play a significant role in the trigger of large volcanic eruptions is, and has been discussed by many geophysicists. Numerous scientific papers have established a possible correlation between these events and the electromagnetic coupling between the Earth and the Sun, but none of them has been able to highlight a possible statistically significant relationship between large volcanic eruptions and any of the series, such as geomagnetic activity, solar wind, sunspots number.

In our research, we compare the 148 volcanic eruptions with index VEI4, the major 37 historical volcanic eruptions equal to or greater than index VEI5, recorded from 1610 to 2012, with its sunspots number. Starting, as the threshold value, a monthly sunspot number of 46 (recorded during the great eruption of Krakatoa VEI6 historical index, August 1883), we note some possible relationships and conduct a statistical test.

- Of the historical 31 large volcanic eruptions with index VEI5+, recorded between 1610 and 1955, 29 of these were recorded when the SSN<46. The remaining 2 eruptions were not recorded when the SSN<46, but rather during solar maxima of the solar cycle of the year 1739 and in the solar cycle No. 14 (Shikotsu eruption of 1739 and Ksudach 1907).
- Of the historical 8 large volcanic eruptions with index VEI6+, recorded from 1610 to the present, 7 of these were recorded with SSN<46 and more specifically, within the three large solar minima known: Maunder (1645-1710), Dalton (1790-1830) and during the solar minimums occurred between 1880 and 1920. As the only exception, we note the eruption of Pinatubo of June 1991, recorded in the solar maximum of cycle 22.
- Of the historical 6 major volcanic eruptions with index VEI5+, recorded after 1955, 5 of these were not recorded during periods of low solar activity, but rather during solar maxima, of the cycles 19, 21 and 22.

The significant tests, conducted with the chi-square $\chi^2 = 7,782$, detect a p-value equal to 0,005. Applying a correction of Yates, p-value assume the value of 0,009.

We affirm therefore that the occurrence of a major volcanic eruption, greater or equal to VEI4 index, during the weak solar cycles, is statistically significant and justifies the hypothesis of large volcanic eruptions in the next decade, with reference not only to the weakness of the current solar cycle SC24, but the probable entrance, in a long and deep solar minimum, during the transition to the next solar cycle SC25. Assumption formulated by many solar physicists.