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Solar influence on the Tunguska area, Iceland and Alaska

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Abstract

We have developed the hypothesis of connection between the Sun's activity and the Earth's tectonics. Especially we pay attention to the Tunguska-1908 phenomenon and to the Iceland volcanoes. Some aspects of the de Vries solar cyclicity are discussed.

1. Introduction

Lunisolar tides related to the earthquakes because the important changes in tectonic eruptive behaviour occurred usually close to the solstice and equinox periods [4]. It concerns more the tidal forces of gravitation. But, for example, on Alaska in year 1957, i.e., in the year of the solar maximum of Hale cycle, three largest earthquakes (of the magnitude ~9.1) for all 20th century have been registered. Although mud volcanoes have until recently remained an enigmatic geological phenomenon as well as and mantle Iceland's volcanoes, it was reported that fluid dynamics of mud volcanoes is closely related to solar activity [3]. It is clear, that for tectonic events both reasons - external (cosmic), and internal (terrestrial conditions of faults) - play the important role. There were attempts, using the data of the Sun-interplanetary magnetic field (IMF)-magnetosphere-ionosphere-core/mantle-lithosphere chain to predict tectonics [12]. Does the correlation between the Sun's activity and tectonic events really exist?

2. Tectonic events and the Sun

There are geoeffective areas on the Sun. Field lines passing Earth actually start near the western limb of the Sun. When sunspots or coronal holes are inside of these regions and active, coronal mass ejections (CMEs) and/or the high speed particle streams must travel toward the Earth. The general duration for the solar wind to travel from the Sun to the Earth is days. However, during the Carrington event in 1959 between the time of the solar eruption and the onset of the magnetic storm only ~17,5 h elapsed (a speed of 2300 km/s). There are not excluded CMEs events with speed >2400 km/s [6]. Recently it was proven that the IMF interacts with the geomagnetic field and causes it to oscillate in resonance with the characteristic of solar *g*-modes waves [13] (moreover, according to hypothesis of R. Dicke, 1964, the Sun can emits scalar waves in a long range). Solar energetic particles precipitate from the Earth's radiation belts to an area of magnetic anomalies what leads to 'flowing down' of a solar plasma along the magnetic field lines. As shown by E. Mustel [9], a considerable drop of pressure following geomagnetic disturbances registers at the Iceland. This fact can be regarded as enhancement of the baric feature due to solar activity. Hence it had been supposed the existence of specific zones in the atmosphere where the effect of solar activity is the largest [8]. These heliometeorologic zones have geographic coordinates (10-20 W, 60 N; 160 W, 45 N; and 80-120 E, 60 N [8], i.e., correspond to Iceland, Alaska and Eastern Siberia (Turukhansk, and epicentre of the Tunguska-1908 event).

The deep solar minimum of 2008-2009 has come to an end, a new solar cycle is gaining strength and on 20 March, 2010 the Iceland's volcano Eyjafjallajokull erupted for the first time in 190 years. Further, it was registered following [10]: (a) the beginning of a major solar wind storm was marked on 4 April, 2010, (b) CMEs hit Earth's magnetic field on 11 April; the impact caused a G2-class geomagnetic storm and, for the first time 2010 year, ignited auroras, (c) one of the biggest prominences in years erupted from the Sun on 13 April, and (d) as final, major explosions of the Eyjafjallajokull volcano took place and clouds of ash were drifting across Europe on 14 April, 2010 (in addition, the earthquake of the magnitude 7.1 occurred in China). But, well-known that major earthquakes do occur during new/full moon phases, and we underline, that on 14 April, 2010 the lunar phase was a new-moon. For example, the auroral emission and the explosion of the Iceland volcano Hekla were observed simultaneously both in 1991 (at new-moon phase), and in April, 2001. It is clear that auroral effects are highly dependent on the Earth's magnetic field in the at-

mosphere and that in its turn is influenced by solar activity. On May 25, 2010 the solar X-37B flare occurred, and after that the Pacaya volcano in Guatemala on May 27, 2010 erupted; CMEs hit Earth's magnetic field during the early hours of 28 May, 2010 and the Tungurahua volcano in Ecuador erupted violently. However, on 28 May, 2010 the lunar phase was a full-moon as well.

According to the European-Mediterranean Seismological Centre data, after almost 200-year quiet period, there were earthquakes in many geographical points of the Earth in 2010. The influence of de Vries solar cyclicity (~200 year) on climatic parameters has been established [9]. It had been supposed that the Sun is entering now a de Vries repetition of the Dalton Minimum of 1800-1820. Whether it is possible to assert that explosion of the Iceland volcano in April 2010, and recent earthquakes with of 200-year quiet period - indicators of the beginning of repetition of the Dalton Minimum? Tectonic event should depend on many factors, and a solar activity probably is one of them only. Processes of convection on the core/mantle boundary D" (where mantle volcanoes have origin) can be cau-sed by means of the simultaneous influence of gra-vitational and geomagnetic/geoelectric solar-lunar fields.

Because of the established connection with solar vortex structures [2], the explosion of the Tunguska paleovolcano on 30 June, 1908 has been probably triggered by the Sun and by the Moon's tide simultaneously. Paleo-cosmic ray evidence suggests that there was a greater production of impulsive solar energetic particle events in the solar cycles of reduced solar activity 1880-1910 [5] (probably at the minimum of the 50/80-years Gleissberg cycle). We would like to pay attention that the Baikal-Turukhansk direction going through lake Cheko corresponds to the so-called Tunguska 'meteorite' Krinov-trajectory along which in area Nizhne-Karelino the strong thunderstorm with hailstones has been observed on 30 June, 1908 [2]. In addition, we suppose that the volcanic waves of the terrestrial activity (including the Tunguska event year), which have been discovered by V. Aueur [1], have been connected with behaviour of the Sun as well.

3. Summary and Conclusions

We suppose that solar activity and the lunisolar tides influence tectonics together. The Tunguska-1908 tectonic phenomenon, just as the Alaska 1957 earthquakes and recent volcanic events in Iceland - some evidences of existence of heliometeorologic zones [8] in Eastern Siberia, Iceland, and Alaska. Despite reduced solar activity 1880-1910, it is not excluded that the Tunguska-1908 tectonic phenomenon related to impulsive solar energetic particle events in the solar cycle 14.

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