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On searching applicants for mechanism of solar-lithosphere relations

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It is actively discussed at present a question on possible influence of solar activity (high-speed solar wind streams bearing the "frozen" magnetic field lines of the Sun) on the stress status of the lithosphere and, consequently, on the Earth's seismic activity (e.g. Zhang, 1998, Acta Seismologica Sinica; Khachikyan et al., EGU2016-2754-1; IUGG2015-3132). There are at least two ideas on possible applicants for physical mechanism of solar-lithosphere relations: (i) - the muons of cosmic rays, which can penetrate the Earth's crust to a depth of at least the first ten kilometers and in tense seismic environment generate nuclear-electromagnetic cascade which energy can be a trigger of earthquake (Tsarev and Chechin, 1988, Preprint № 179, Physical Institute after Lebedev, Moscow); (ii) - the geomagnetic storms (Sobolev et al., 1998, Physics of the Earth #7) when the high-frequency oscillations of the geomagnetic field during the main phase of the storm generate significant induction currents which electric energy entering into the crust can be converted into mechanical energy increasing the stress status of the lithosphere (Sobolev and Demin, Mechano-electric phenomena into the Earth. M . Nauka. 1980). Besides this, among the possible cosmogenic factors changing the stress state of the lithosphere, could be the variation of the angular velocity of rotation of the Earth (e.g. Bostrom, 2000. Tectonic consequence of the Earth's Rotation), if it depends on solar activity variations. More of 50 years ago, Munk and Donald (The Rotation of the Earth, Cambrige University Press, 1960) suggested that the interaction between solar wind and geomagnetic field would probably influence the short period variation of angular velocity of the Earth. In this work, we check up this suggestion on the base of very precise data on the length of day (LOD) from 1986 to the present, which are presented by the International Earth Rotation and Reference Systems Service (IERS). Using the methods of spectral analysis, we studied the temporal variations in amplitudes of short period variation of the LOD and compared them with the temporal variations of the solar activity data. The obtained results are presented in this report.