The impact of strong magnetic storms on seismic noise

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This study is concerned with the behavior of seismic noise in the minute period range as recorded by broadband IRIS seismic stations during magnetic storms. We used the descriptions of 50 strongest magnetic storms with planetary Kp-indexes up to 9 which happened in 1994-2017 years. One-minute values of magnetic field components X, Y, Z were received from INTERMAGNET data based on records made by different observatories. An analysis of seismic noise revealed hundreds of seismic pulses appeared synchronously with rapid changes of the velocities of magnetic components dX, dY, dZ. The pulses had amplitudes about several μm and few minutes durations. Such pulses have been detected on all seismic stations located on continents but have not been revealed on identical stations situated on volcanic islands in deep-water part of Pacific Ocean. Any correlation between amplitudes of pulses and values dX, dY, dZ not have been found. Amplitudes of pulses were approximately the same on the stations placed in seismically active or passive regions. They properties not depend from meteorological conditions also. The physical mechanisms of phenomenon are hypothetically discussed. The transmission electromagnetic energy to elastic response can be attributed to piezoelectric, seismo-electric, piezomagnetic effects, induced polarization and electrochemical processes in lithosphere or electric parameters changes in atmosphere of the Earth. The work was supported by the Russian Foundation for Basic Research (project no. 18-05-00026).