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Strong earthquake activity influenced by solar flare intensity

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Based on the comprehensive earthquake catalogue USGS (HYPERLINK https://earthquake.usgs.gov) the paper demonstrates that strong earthquake activity, seismic events with M≥6, exhibits a seasonal trend. This feature is the result of analyses of earthquake data for the N- and S- Earth Hemisphere in period 2010-2019. It can be shown also for single earthquake prone regions as well, like Japan, Eurasia, S-America.

Any seasonal effect suggests an external influence. In that regard, one can think also of a solar-terrestrial effect, that is suggested already in several studies (e.g M.Tavares, A.Azevedo, 2011; D.A.E. Vares, M.A.Persinger,2014; G.Duma, 2019). This assumption leads to the question: Which dynamic process can cause a trigger effect for strong earthquakes in the Earth's lithosphere.

In this study the intensity of solar flares and the resulting radiation, the solar wind, towards the Earth was taken into account. An appropriate parameter which has been regularity measured and reported for many decades and which reflects the intensity of solar radiation is the magnetic index Kp. It is measured at numerous geomagnetic observatories and describes the magnetic disturbances in nT within 3 hour intervals, respectively. Averages of all the measured 3-hour values are then published as Kp, therefore considered a planetary parameter (International Service of Geomagnetic Indices ISGI,France).

The temporal variations of strong earthquake activity over 10 years and their energy release was compared with the above mentioned index Kp. Actually, a distinct correlation between the two quantities, Kp and earthquake frequency, resulted in cases of different regions as well as globally. Another essential result of the study is that maxima of Kp preceed those of earthquake activity by about 60 to 80 days in most cases. The mechanism has not yet been modeled satisfactorily.