



Periods of the Earth's seismicity activation and their relationship to variations in the Earth's rotation velocity

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It is known that Earth's seismic activity (SA) demonstrates distinct roughness (nonuniformity) in time. Periods of intensification of the SA followed by periods of its decaying. For strong earthquakes these periods are continued several decades. It was also noted that there is a pronounced periodic amplification and attenuation of the SA with a period of about 30 years, which is manifested mainly in two latitudinal belts 50°N-30°N and 0°-30°S [Levin, Sasorova, 2014, 2015]. This work deals with the hypothesis that it is the properties of rotating non-uniform rate of the planet may be the cause of the periodicity of manifestations SA. The objective of this work is the searching of the spatial-temporal interconnection between the Earth rotation irregularity and the observed cyclic increasing and decreasing of the Earth's SA. This requires preparation a long series of observations of seismic events with representative data sets (EQ selected from 1895 up to date with a magnitude $M > 7.5$, based on the catalog NEIC). Two sources of data on the angular velocity of the Earth's rotation of (length of day, LOD) were adapted: the world-known database IERS (Annual Report, International Earth Rotation Service) and the data, which were presented in the work (McCarthy, D.D., and Babcock A.K., 1986). The first one contains daily observations from 1962 to 2013, the second one was identified semi-annual observations from 1720 to 1984. It was prepared concatenated data set (CLOD) for the period from 1720 to 2013. Characteristic periods in the time series CLOD: 62, 32, and 23 years have been isolated by the use of spectral analysis. Next, it were used a band-pass filters for the four frequency bands from 124 to 45 years, from 37 do 25 years, from 25 to 19 years, and in the range of less than 19 years. In the frequency bands 37-25 years and 25-19 years marked clear periodic oscillations close to a sine wave. The amplitude of the oscillations with the 1720 to 1790 gradually increases, then decreases until 1860, after which the oscillation amplitude increases again (and amplitude swinging is much stronger than on the stage, from 1720 to 1790). Then correlation and autocorrelation analysis of the CLOD time series for the four bands CLOD and time series of the Earth's SA (density of events) was carried out. The analysis was performed in the range from 1890 to 2013. Significant correlation of seismic activity with a dedicated part of the time series was shown for the frequency band of 37-25 years. The seismic activity maxima correspond to the end of the braking period of the Earth's rotation, and the minimum of the SA occurs at the end of the acceleration process. Previously marked [Levin, Sasorova, 2015] a significant increase in the density of events at the beginning of the 20th century (1900 to 2015). This amplification corresponds to a sharp decrease in the LOD in the late 19th century for the frequency band 124-45 years. The end of the braking process falls on 1905-1912 years.