



## **On the annual variations of the Earth's ellipticity by GPS data, and manifestations of this effect in the seismic activity**

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In the last decade, the global network of GPS-stations, which performs measurements within the IGS (International GPS Service), fixes the cyclic change of the radius vector of the geodesic ellipsoid. Such variations of the vertical component of the radius vector of the ellipsoid are characterized by stable period duration 1 year and amplitude of the order of 10 - 20 mm. In the scientific literature, these variations are called "seasonal course" and were explained in a model involving the effects of the atmosphere and hydrosphere of the Earth. The authors carried out analysis of the rotation of the Earth, which is based on the effects of a celestial body ellipticity due to variations in the velocity of rotation. Such a model may be more justified physically. According to the equation of an ellipsoid the small variations of the radius vector of the body depend on the ellipticity of a body. A body ellipticity, in turn, is determined by the angular velocity of rotation of the planet. The relative change of the angular velocity of the Earth's rotation, known according to IERS (International Earth Rotation Service), is approximately equal to  $\Delta\omega / \omega \approx 10^{-8}$  and varies with a period of 1 year. The authors were able to show that relative variations of the velocity of body rotation should lead to variations in the ellipticity of the body, comparable in magnitude. A variation of ellipticity causes deformations in the solid Earth and leads to the accumulation of damage in the rocks. The authors have found that the resulting change in the kinetic energy of the body rotation (due to changes in rotation velocity) reaches a significant value, providing an increase of energy  $\Delta E \approx 10^{21}$  J. annually. This energy is sufficient to ensure the tectonic activity and the occurrence of seismic events. Thus, the existence of variations in the angular velocity of rotation and in the ellipticity of the planet should be considered as one of the possible causes of earthquake generation.