



Use of geodetic information in seismology

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The study of the displacement fields of the Earth surface can be useful in the study of the properties of the past and future potential earthquakes. With the use of Kostrov equation the possible sum of seismic moments can be estimated for a given source zone, if its area is described with the use of geodetic measurements. A further possibility of the use of the geodetic data is connected with the fact that accurate GPS observations are able to detect stress accumulations along seismoactive tectonic faults. Such a detection took place in the case of the North Anatolian fault before the Izmit earthquake in Turkey ($M=7.4$, 17 August 1999). This phenomenon was described by the team of ETH (Zürich) in mid eighties. Anomalous uplift rate and horizontal velocity of the downgoing slab was detected by GPS observations at the Sumatra subducting zone in the vicinity of the giant ($M=9.0$) seismic event of 26 December 2004. The possible displacement fields connected with seismo-tectonic activity for the intraplate part of Central Europe should be estimated with the use of model calculations. The necessity of such a theoretical work is connected with the very long return period of destroying events ($M \geq 6.5$) of this region.

With the use of worldwide GPS network precise time-variation of the Earth's rotation vector can be derived. The investigation carried out in the Seismological Observatory in Budapest with the scientists of the IERS (D. Gambis and Ch. Bizouard) shows that a single earthquake is not able to alter the length of day (LOD). The observed slight correlation can be explained by the influence on the global seismic energy release of the rotational energy variation caused by changes in LOD. The radial component of polar motion (PM) even in the most extreme earthquakes not exceeds 4-5 milliarcseconds. It is difficult to detect such a small PM excitation.