Geophysical Research Abstracts,
Vol. 11, EGU2009-8134, 2009
EGU General Assembly 2009
© Author(s) 2009

Tilt effects of Sudeten mountain blocks produced by motions of tectonic plates -

M. Kaczorowski

Space Research Centre, Department of Planetary Geodes, Warsaw, Poland (marekk@cbk.waw.pl, 0048-39-12)

Since 1974 we observed repeatedly effects of large changes of the horizontal pendulums azimuths of equilibrium. The epoch of changes appeared irregularly in different phases of each year and lasted several dozen days. Magnitude of changes corresponds to hundred miliarcseconds of plumb line variations. Several months after event of strong changes the azimuth of pendulums comes back to old position but in significantly longer time. The construction in 2002 of long water–tube tiltmeter and installation of the system of monitoring temperature, pressure and humidity in surrounding of instruments opened new possibilities of investigation of the anomalous plumb line variations. Due to high resolution and possibility of reduction of instrumental drift, the measurements of plumb line variations carried out with help of new instrument are much more reliable than the pendulums measurements. The measurements obtained during five years with help of long water-tube tiltmeter confirmed existence of strong non-tidal signals. We observed effects of magnitude and time of duration close to magnitude and time of duration of effects registered earlier by horizontal pendulums. Sudeten Mountain area is divided into small blocks. Ksiaz laboratory is located on such block which is at the border of Sudetian area limited from the North-East direction by Sudetian margin fault. Ksiaz block is built with very hard and mechanically resistant rocks consisting of Devonian conglomerates of gneisses not saturated with water. Horizontal sizes of this block amount ten kilometers while it's height exceed twenty or more kilometers. We propose the following model of the block tilting. Narrow pillar is affected by moment of horizontal forces originated by tectonic stresses and simultaneously by friction forces at the bedrock of the block (between the bottom of the block and upper mantle). Coupling of forces causes rotation of the block registered by tiltmeters as plumb line variations. For such model we can expect horizontal surface displacements of the block with the magnitude of ten millimeters.