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Possibility of prediction of strong seismic events in the Middle Odra Fault Zone based on variations of kinematic activity of the Świebodzice Depression

Marek Kaczorowski (1), Damian Kasza (2), Ryszard Zdunek (1), Roman Wronowski (1), and Zbigniew Szczerbowski (3)

(1) Polish Academy of Sciences, Space Research Centre, 18A Bartycka, 00-716 Warsaw, Poland (marekk@cbk.waw.pl, rysiek@cbk.waw.pl, roman@cbk.waw.pl), (2) Wrocław University of Science and Technology, Faculty of Geoengineering, Mining and Geology, 27 Wyb. Stanisława Wyspiańskiego, 50-370 Wrocław, Poland (damian.kasza@pwr.edu.pl), (3) AGH University of Science and Technology, Faculty of Mining Surveying and Environmental Engineering, Department of Mining Areas Protection, Geoinformatics and Mining Surveying, 30 Mickiewicz Av., 30-059 Cracow, Poland (szczerbo@agh.edu.pl)

Książ Geodynamic Laboratory of Space Research Centre is located in the Świebodzice Depression unit. The laboratory was built inside underground corridors made in the castle hill about 50 m below surface. The main instruments which provide us most of information about tectonic activity of Świebodzice Depression are two long water-tubes tiltmeters 65 and 92 meters long (WT). The WT are situated on several rocky blocks which motions provided tectonic signals to WT. The instruments register numerous irregularly occurred epochs of water levels variations in hydrodynamic systems of magnitudes exceeding tidal signals dozens or so times. These observations are interpreted as result of tiltings of foundation and vertical motions of rock blocks. Signals of tiltings of foundation and vertical motions are superposed by the WT registration system. The resultant signals from four channels of WT were defined by us as tectonic activity functions of the massif. Variations of the tectonic activity functions as well as their first derivatives were compared with the seismic activity in Fore-Sudetic Monocline. We found correlation in time and amplitudes domains between extremes and inflection points of the first derivative of the tectonic activity function and the seismic events in the Middle Odra Fault Zone of the Fore-Sudetic Monocline. High correlation concerns only the strong earthquakes the energies of which were larger than 4 MJ. Almost all the high energy seismic events from 2005 to 2015 took place in surroundings of minima, maxima or inflection points of tectonic activity functions when first derivatives were close to zero. In the epochs of large absolute values of amplitudes of first derivatives i.e. during high tectonic activity of Świebodzice Depression, the strong energy earthquakes never happened.
The observation shows that the origin of the low and high energy earthquakes is different. The high energy earthquakes are produced by natural tectonic activity, while the low energy earthquakes are associated with the mining activity. We noticed that specially high probability of occurrence of high energy seismic events takes place just at the ends of long lasting trends of tectonic function several hours or single days after the change of sign of first derivatives on four channels of WT.