



The 2018 seismic activity of West Bohemia – from swarm to mainshock-aftershock sequence

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In May 2018 a new earthquake swarm occurred in the West Bohemia, Nový Kostel area, in four weeks after after 9th May 2018. Precise double difference relocations of 4500 earthquakes with magnitude higher than $M_L=0.5$ showed four major fault segments consecutively activated one by one. The first two segments occurred in depth around 9 km and consisted of swarm-like activity with high event rates up to 150 eq./hour, missing mainshocks, large b-values of 1.6-1.8 for $M_L>1.8$ and monotonous spatial migration of hypocentres with triggering front distance consistent with the square-root law. The activity of the following third segment in depth of 10.5 km can be characterized as a sequence of overlapping mainshock-aftershock series. Then, after ceasing of the segments activity a separate shallow fault patch in depths around 6 km was activated and contained two clearly temporarily and spatially separable mainshock-aftershock sequences with the strongest earthquake of $M_L=3.8$. The mainshock-aftershock fault segments showed low low b-values around 0.9.

Different activity characters (swarm and mainshock-aftershock sequence) and b-values (>1.6 and 0.9) were strictly limited to the identified fault segments. This behavior indicates that changes of seismicity character during the few weeks are reflecting the physical states of the faults. The faults between depths of 10 and 8 km are prone to bear swarm-like activity, while the deeper and shallower ones the mainshock-aftershock activity. Reason for such behavior could be related to the maturity of the faults – mature low-b faults with smooth surfaces tend to produce large earthquakes followed by aftershock sequences. On the other hand, immature high-b faults with rough surfaces are supposed to produce rather large number of weaker earthquakes with no single mainshock. In this view, the immature fault area of 2018 activity is located in the middle of the activated fault zone and from the bottom and from the top it is encompassed by smooth mature faults.