



Ebreichsdorf 2013 Earthquake Series: Relative Location

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Eastern Austria is a region of low to moderate seismicity, and hence the seismological network coverage is relatively sparse. Nevertheless, the area is one of the most densely populated and most developed areas in Austria, in particular Vienna and its surroundings. The largest instrumentally recorded magnitude is around 5, and the Vienna Basin fault system (VBFS) occasionally shows earthquakes with magnitudes larger than 4.

In this study we focus on recent moderate-size earthquakes in the Southern Vienna Basin, focusing on the 2013 series of two earthquakes with local magnitudes ~ 4.2 , and their aftershocks. Additionally, we compare them with a similar group of events that has occurred in 2000. Different to the earlier datasets from 2000, the 2013 dataset allows relocating the two main shocks of 2013 together with their aftershocks. We use the HypoDD algorithm, which supplements the phase arrivals with “double-difference-times”, hereby reducing the influence of unmodeled velocity inhomogenities. Furthermore, we employ velocity models with different degrees of complexity (1D to 3D) and verify the stability of the results with different sets of initial locations.

After relocation the main shocks are located 40 m from each other; the collocation is confirmed by the high inter-event coherence. The aftershocks show a clear pattern with larger events having deeper hypocenters, located further to the South West.

We also locate the two main shocks from a similar cluster in 2000 - relative to the main shocks in 2013 using S-P-times. This shows that the 2000 main shocks are located 4 km to the North East of the 2013 main shocks and show less waveform similarity between them.

This suggests that the earlier notion of “event clustering” in the Southern Vienna basin need to be reconsidered, since at least some of the earthquakes seem to occur between the clusters that have been proposed previously.