## Analysis of microseismicity in the Fribourg area (Western Swiss Molasse Basin)

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This study presents an analysis of microseismicity in the Fribourg area (Western Swiss Molasse Basin), a region that has recently displayed increased microseismicity (KASTRUP et al., 2007). Arrival time data of these earthquakes were used in a non-linear probabilistic earthquake relocation approach and to refine an existing three-dimensional (3-D) P-wave velocity model of the Fribourg area.

Two mini-arrays (seismic navigating systems/SNS) have been deployed since 2010 to enhance seismic monitoring of the Fribourg Lineament within the Fribourg area. A comprehensive local catalogue of microseismicity was build using recordings of the two SNS and of nine permanent stations of the Swiss Digital Seismic Network and the Swiss Strong Motion Network operated by the Swiss Seismological Service (SED). Events were detected on all traces by sonogram analysis, a non-linearly scaled and noise-adaptive spectrogram (SICK et al., 2012). It allows the detection of very low magnitude events, for which signal to noise ratio is minimal (JOSWIG, 2008).

Events were relocated using the non-linear probabilistic earthquake location software NonLinLoc (LOMAX et al., 2000). This approach requires consistent arrival time picking including uncertainties as well as a velocity model for the area. Initial arrival time picking was done using sonogram analysis. Arrival time picks were subsequently readjusted and its uncertainties were assigned according to New Manual of Seismological Observatory Practice (BORMANN, 2012). An initial 3-D P-wave velocity model was designed on the basis of controlled-source seismology data in the area (MEIER, 2009) and of a 3-D P-wave velocity model of Switzerland (HUSEN et al., 2003).

Since 2001, 314 were events detected in the Fribourg area, of which 112 events were detected routinely by the SED. In total 185 high-quality events were integrated in a local earthquake tomography analysis to refine the initial P-wave velocity model. Relocation of the events using the new tomographic model, yields on average smaller location errors as given by the volume of the 68 % confidence ellipsoid. Most of the events locate in the sedimentary cover, at depths shallower than 2500 m in the NNW and 4500 m in the SSE of our study region. The number of events located in the sedimentary cover is increasing by at least 3.5 % using our approach.

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