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Seismic Microzonation using 6C Measurements

Sabrina Keil, Joachim Wassermann, and Heiner Igel
Geophysik, Ludwig-Maximilians-Universität, München, Germany

Microzonation is one of the essential tools in seismology to mitigate earthquake damage by estimating the near surface velocity structure and developing land usage plans and intelligent building design. The number of microzonation studies increased in the last few years as induced seismicity becomes more relevant, even in low risk areas. While of vital importance, especially in densely populated cities, most of the traditional techniques suffer from different short comings. The microzonation technique presented here tries to reduce the existing ambiguity of the inversion results by the combination of single-station six-component (6C) measurements, including three translational and three rotational motions, and more traditional H/V techniques. By applying this new technique to a microzonation study in Munichs (Germany) inner city using an iXblue blueSeis-3A rotational motion sensor together with a Nanometrics Trillium Compact seismometer we were able to estimate Love and Rayleigh wave dispersion curves. These curves together with H/V spectral ratios are then inverted to obtain shear wave velocity profiles of the upper 100 m. The resulting 1D velocity profiles are used to estimate the local shaking characteristics in Munich. In addition, the comparison between the estimated velocity models and the borehole-derived lithology gives a positive correlation, indicating the applicability of our method.