S014-04 - Comparing Single-station 6C Measurements and Array Measurements for Seismic Microzonation

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Abstract

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. For example, array methods are well established and give reliable results, however, their installation and maintenance are very complex. Compared to this, single-station approaches are easier to conduct but often give non-unique results. In this study we want to compare the array approach of frequency-wavenumber analysis with a new microzonation technique, which combines single-station six-component (6C) measurements, including three translational and three rotational motions, and more traditional H/V techniques. The measurements were performed in Munich´s (Germany) inner city using an iXblue blueSeis-3A rotational motion sensor together with a Nanometrics Trillium Compact seismometer and a geophone array with a maximum radius of 50m. From the ambient noise measurements we were able to estimate Love and Rayleigh wave dispersion curves, which are then inverted to obtain P- and S-wave velocity profiles of the upper 100m. In case of the 6C approach the dispersion curves are complemented with H/V spectral ratios to compensate for missing information in the lower frequency range. Both methods give comparable results, indicating the potential of this single-station microzonation approach.

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