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INFLUENCE OF INSTRUMENTS ON H/V SPECTRA OF AMBIENT NOISE

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Microtremor measurements are commonly used in microzonation studies for hazard assessment and engineering purposes. In this respect a very widely used methodology in recent years is the computation of H/V spectral ratio of ambient excitations. SESAME project aims to investigate the reliability of this technique, both from the experimental and theoretical point of view. The first step is to check the stability and reproducibility of the measurements. Before testing the experimental conditions that may influence the H/V ratio, a workshop was devoted to perform a set of tests in order to compare the performance of different equipments currently used (13 digitizers and 15 sensors). All data collected for instrument tests were converted into a common format and processed using a common software for homogeneity. The first set of tests was devoted to analyse the physical properties of the digitizers (internal noise, time stability, sensitivity, channel consistency) and the minimum noise value able to be recorded for different gains and with different sensors. The second set of tests was dedicated to the sensor analysis. We check the performance of each sensor connected to the same digitizer. The last set of tests consisted of simultaneous measurements of noise by all the systems (digitizer-sensor combinations), performed on a concrete pier coupled directly with the bedrock in the laboratory, as well as outside in the free-field, in two different ground coupling conditions (grass and concrete). The preliminary results indicate that significant differences may occur between the different systems, depending upon the digitizer-sensor combinations. In general, the digitizer tests showed consistency with the manufacturers specifications. However, the combination with different sensors yielded variable results, indicating the importance of the system performance as a whole and the level of sensitivity required for the type of data collected. The sensor tests revealed the importance of the sensitivity required by the input ambient excitations at frequency levels down to 0.1 Hz. Broad-band sensors gave higher resolution at lower frequencies, but they are difficult to implement in a microtremor experiment, due to stability and portability problems. In general, sensors with 1-5 sec period are more suitable for microtremor measurements. The H/V spectral ratios performed on the simultaneous measurements, showed clear limitations on some of the sensor-digitizer combinations.