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Ambient noise recording and H/V analysis through Arduino Due and Matlab

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Ambient noise recording and the subsequently application of the H/V method have become a common procedure for microzonation studies, especially for those carried out in urban areas. For the noise measurements, a three-component sensor and the associated acquisition equipment are used for recording about 30 minutes or more, depending on the kind of sensor and the expected resonant frequencies. Once recorded all the signals, these are analyzed later in the laboratory. In this way, any problem with the acquisition equipment or the deployment of the sensors will provide unsuitable signals that will be only detected in the laboratory, when the analysis is carried out. In this work, we have achieved two different aims related with the H/V measurements. First, we have developed a low-cost acquisition system based on the Arduino Due board. Secondly, we have developed a Matlab program to establish the communication with the acquisition system and carry out the H/V analysis at the same time that the noise is recorded. In this way, any problem with the noise recording or the H/V analysis will be detected immediately in the field and might be solved.

The complete prototype has been tested in sites where previous H/V measurements had been carried out with other commercial equipment in the past, providing a perfect agreement respecting to the estimated resonant frequencies. It is important to note, that it is an open software and hardware, what means that it is opened to future improvements by any user. At the same time, the simplicity and the low cost of the developed system makes it suitable also for educational purposes.