SeismoCitizen : A project combining seismology and human science approaches based on a deployment of a dense low cost seismic network hosted by citizens.

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Introduction

After a first deployment of 8 low cost seismic stations in 2017 around Strasbourg, we launched end of 2018 a multidisciplinary project of seismology called SeismoCitizen. It associates Seismology with Social/Human science research. It is intended to build a real network of observation sites in urban and peri-urban areas, based on internet-connected stations hosted by volunteer citizens, who will also participate in a survey conducted by sociologists.

Low-cost stations characterization

First, during November 2018, the instrumental response of the 27 Raspberry Shake station were simultaneously fully characterized in respect to a reference permanent BB station at the instrumental testing plateform of EOST (See EGU proposal BedDellere et al.).

Deployment in North-East France

Then the stations have been deployed during the winter 2018-2019 in a intra-continental region, Mulhouse at NE France, were the seismicity is moderate in terms of number and magnitude (the Saintent earthquake in 1960, M 4.1 is the most recent one with Mw>6 but which has been the site of one of the largest event in western Europa, the Basel earthquake of October 1356 with a Mw estimated at ≈ 6.5). It is an intense industrialized region with high environmental potential (made of steel and iron works, energy industry, chemical industry and pharmaceutical industry).

Construction of the SeismoCitizen sample

Location of participants imposed by seismic stations criteria. Profiles of participants imposed by sociological criteria.

Protocol

November 2018: definition of the strategy / drafting of the interview guide and communication documents / characterization of instrumental response of low-cost seismic stations.

December 2018 - February 2019: constitution of the sample & realization of the first set of interviews (T0) / installation of the low-cost station & integration of station data in near real time to BCSF-RENASS observatory activities.

July 2019 - October 2019: realization of the second set of interviews (T 6-8 months)

October 2019: analysis of the results based on interviews transcripts / analysis of instrumental data (quality, contribution to improve seismic observations, etc.).

The Social/Human Science study and interviews

It aims at observing and analyzing the effects of a citizen engagement in scientific research (via hosting a seismometer) on the perception and representation of seismology and micro-seismicity phenomena. Therefore the volunteer citizens will participate to 2 interviews: at the time of the installation and 6-8 months later.

Organization of the first set of interviews

Objective: => to characterize the participants (sociocultural and approach) => Sensibility to the environment, industrial projects, science, seismology

Practical aspects

=> Possibility of answering alone or as a couple => Informed consent (ethics / anonymity of respondents)

Results:

=> 20 interviews carried out (at end of February)

=> Duration: 50mn to 1hour

=> More than half responded as a couple

Analysis of the seismica data

First analysis of the seismic data

Analysis of the seismic data

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Contribution expected from low-cost stations to BCSF-RENASS seismic observatory activities and seismologists

This dense low cost seismic network makes it possible to densify the mesh of the permanent French institutional observation network (RESIF). It is intended to improve the seismological imaging, in particular by passive methods based on the analysis of seismic noise.

This dense low cost seismic network makes it possible to densify the mesh of the permanent French institutional observation network (RESIF). Thus it improves the French monitoring activities of BCSF-RENASS characterization of the seismicity at location, depth, discrimination and global analysis. Therefore the volunteer citizens will participate to 2 interviews: at the time of the installation and 6-8 months later.

The French institutional observation network (RESIF) is a network of approximately 100 strong-motion stations and some 1000 broadband stations which cover the whole French territory.

The French strong-motion (BB) stations are permanent network of stations installed on building to monitor the intensity of earthquakes and record the signals of the earthquake.

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References

A schematic of the strong-motion station (BB) [Labelled] and broadband station (BB) [Labelled] at the site of the different stations.

Took for us an heavy stone on the top of the station to improve the stability and the precision of the seismic signal.