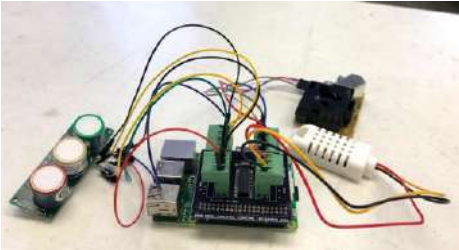
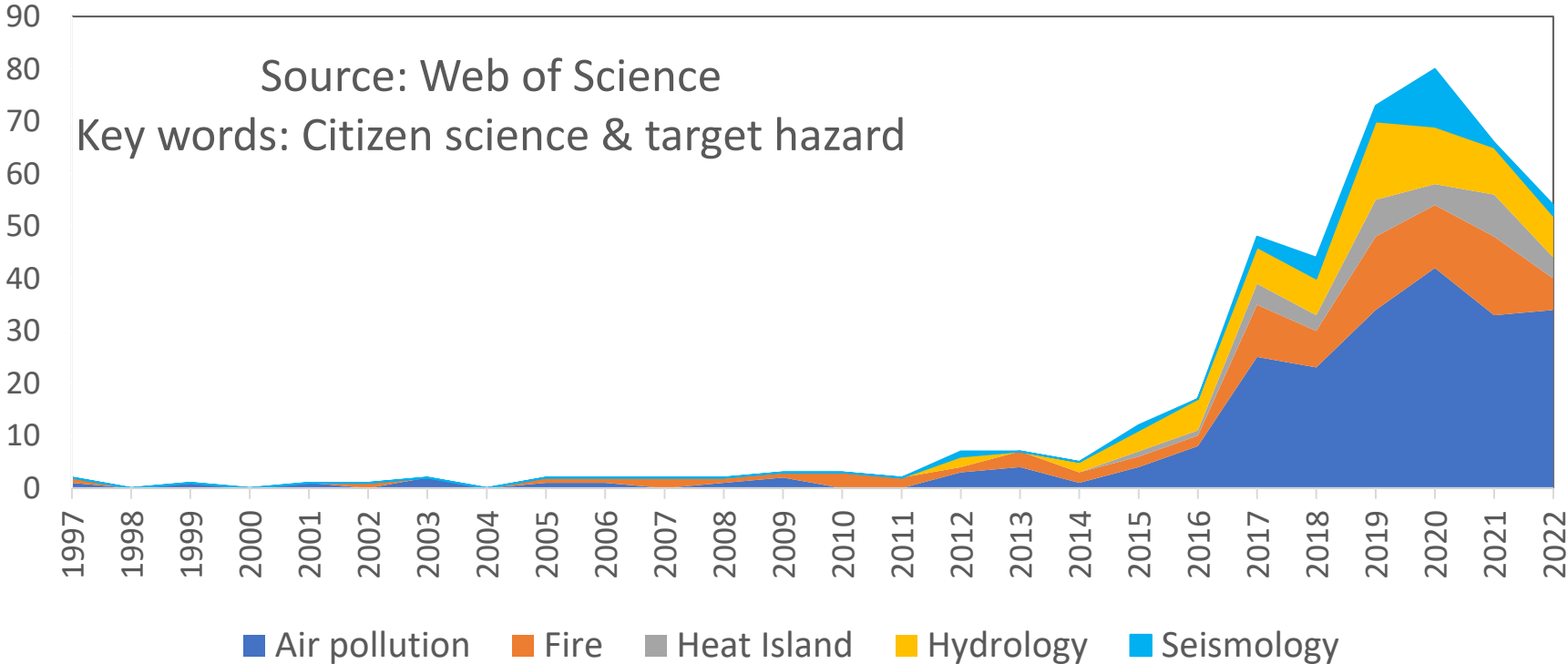


Les capteurs low-cost de plus en plus «citoyens»



Explosion du nombre de publications exploitant les données des capteurs low-cost «citoyen»



Des capteurs sismologiques low-cost : Exemple des capteurs à base de Raspberry Pi

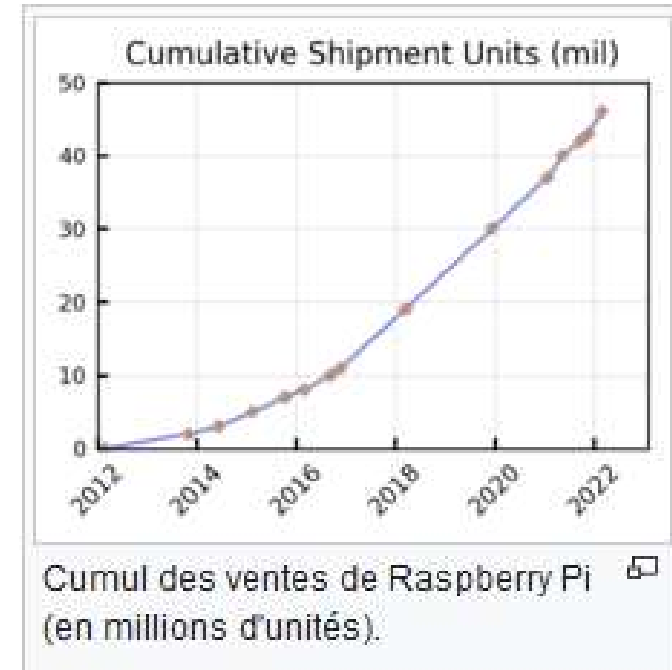


Raspberry Pi 4
Modèle B (4 B)
179,99 €
Amazon.fr
Livraison gratuite

Le **Raspberry Pi** est un **nano-ordinateur monocarte** à **processeur ARM** de la taille d'une carte de crédit conçu par des professeurs du département informatique de l'**université de Cambridge** dans le cadre de la **fondation Raspberry Pi**³.

Source: wikipedia

- coût réduit du Raspberry Pi
- logiciels libres



Des capteurs sismologiques low-cost : Exemple des capteurs à base de Raspberry Pi



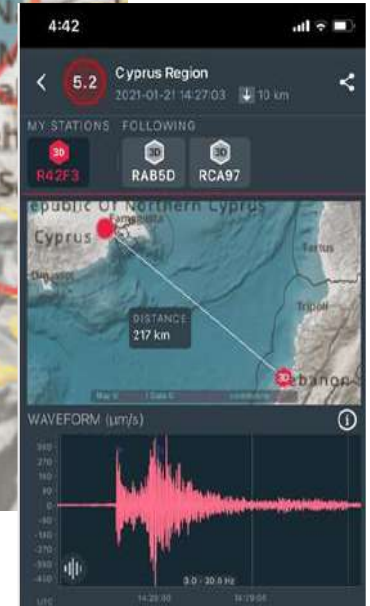
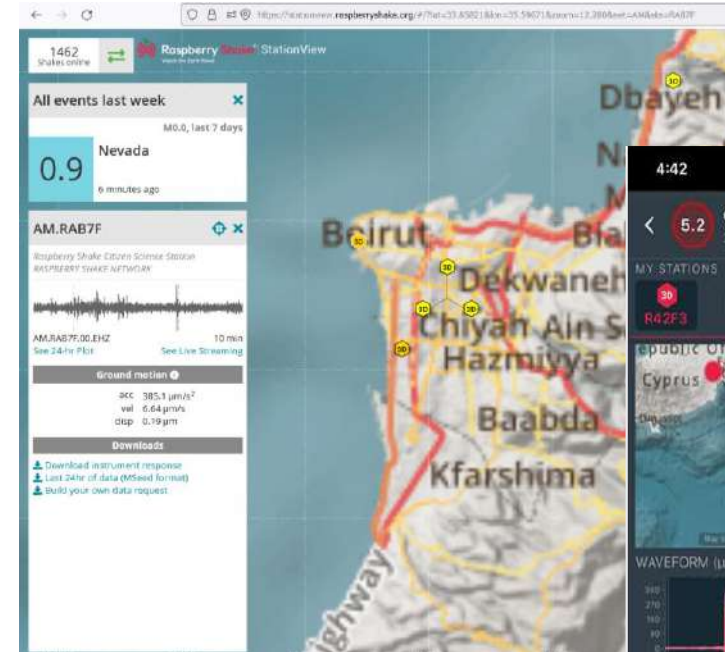
Début en 2016



Connexion des sismomètres au raspberry Pi

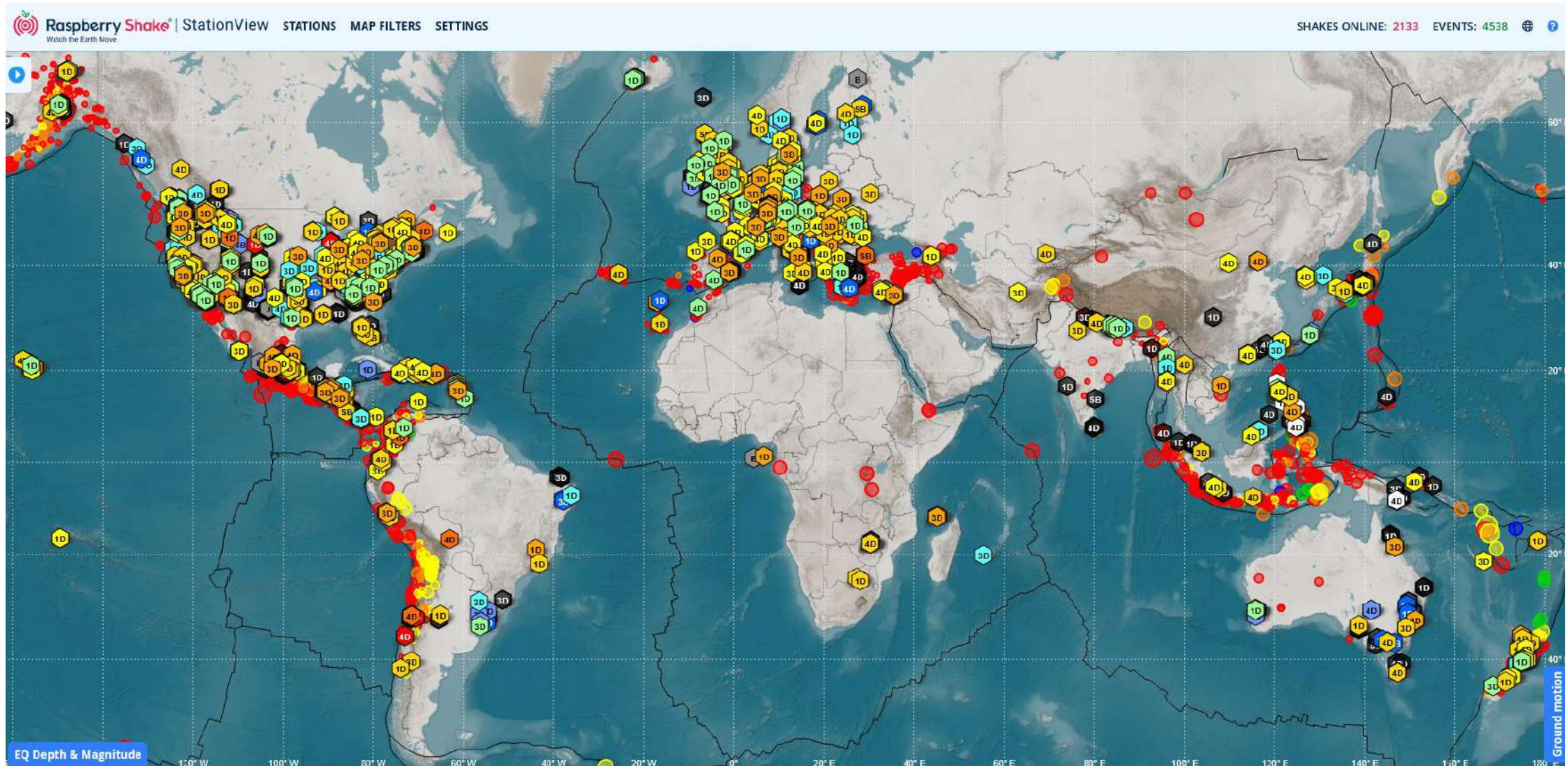


900 – 1400 €

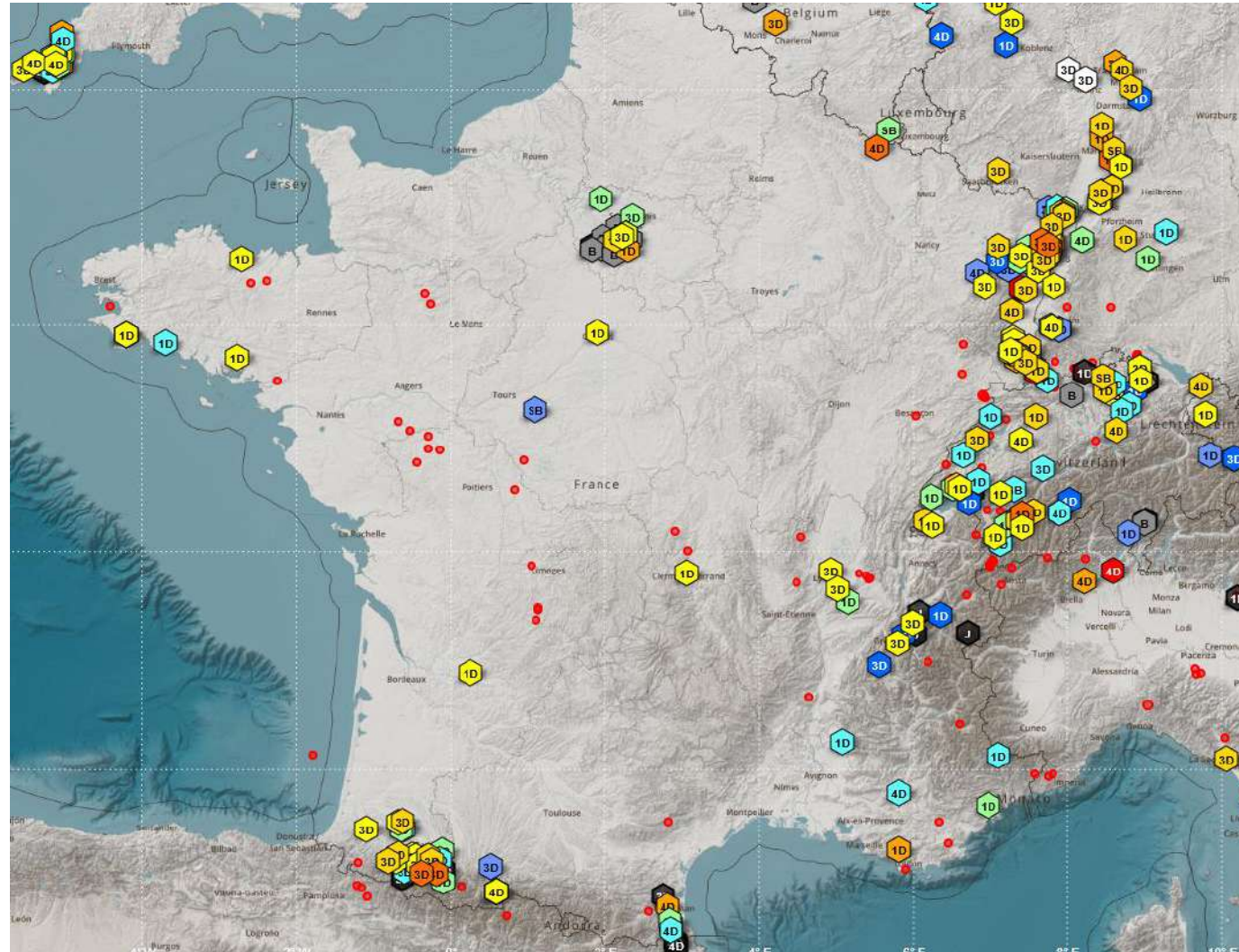


Développement de la chaîne logicielle depuis les données acquises par le Raspberryshake jusqu'aux données brutes accessibles par les portails web et application téléphonique.

Standards sismologiques internationaux (IRIS, FDSN)



<https://stationview.raspberrypi.org>

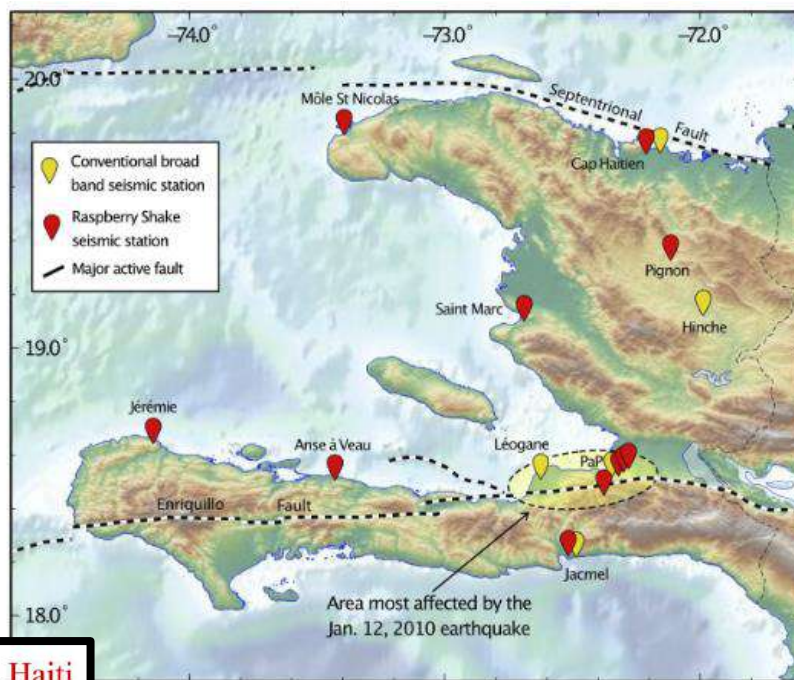


<https://stationview.raspberryshake.org>

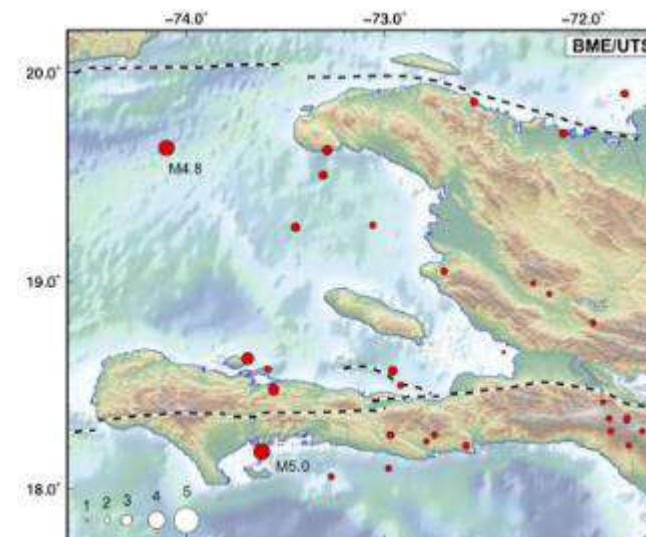
Exemples d'application: suivi de la sismicité

A Socio-Seismology Experiment in Haiti

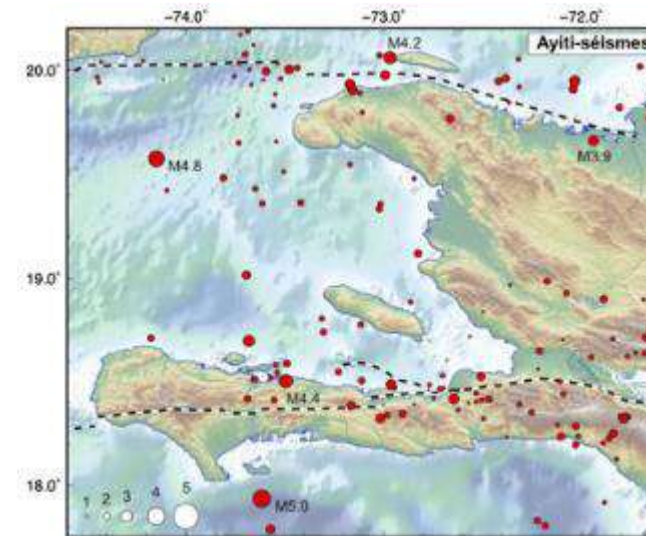
Eric Galais^{1,2*}, Dominique Boisson³, Steeve Symithe³, Claude Prépetit⁴, Bétonus Pierre⁴, Sophia Ulyse⁴, Laennec Hurbon⁵, Alain Gilles⁵, Jean-Marie Théodat⁶, Tony Monfret², Anne Deschamps², Françoise Courboux², Jérôme Chèze², Fabrice Peix², Etienne Bertrand², Jean-Paul Ampuero², Bernard Mercier de Lépinay², Julien Balestra², Jean-Luc Berenguer², Remy Bossu^{7,8}, Laure Fallou⁷ and Valérie Clouard⁹



Carte de sismicité **SANS** les capteurs low-cost



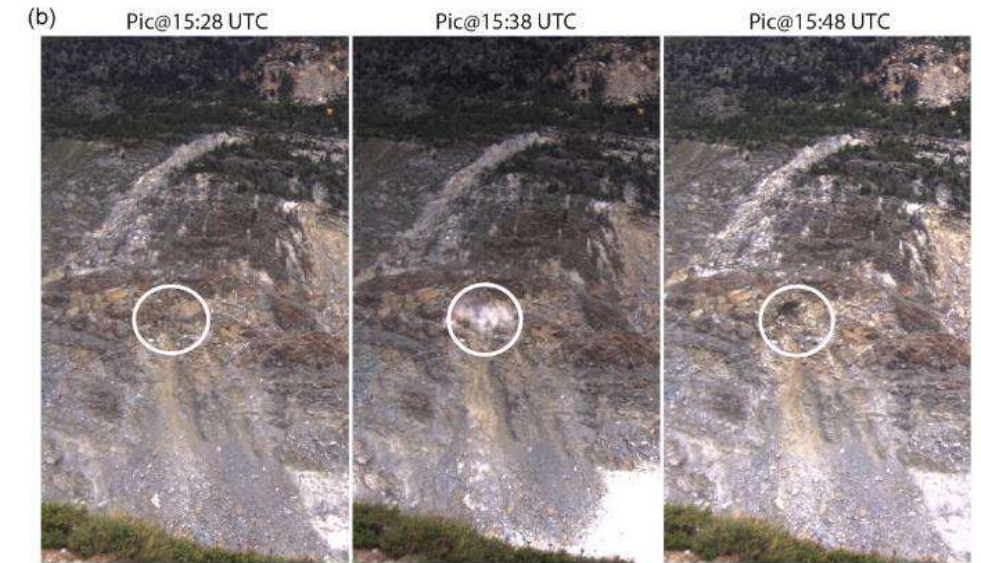
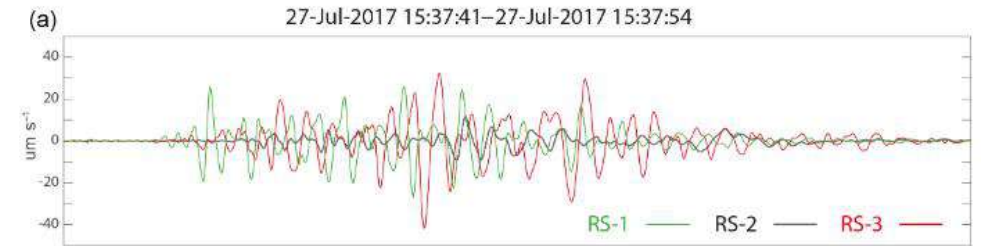
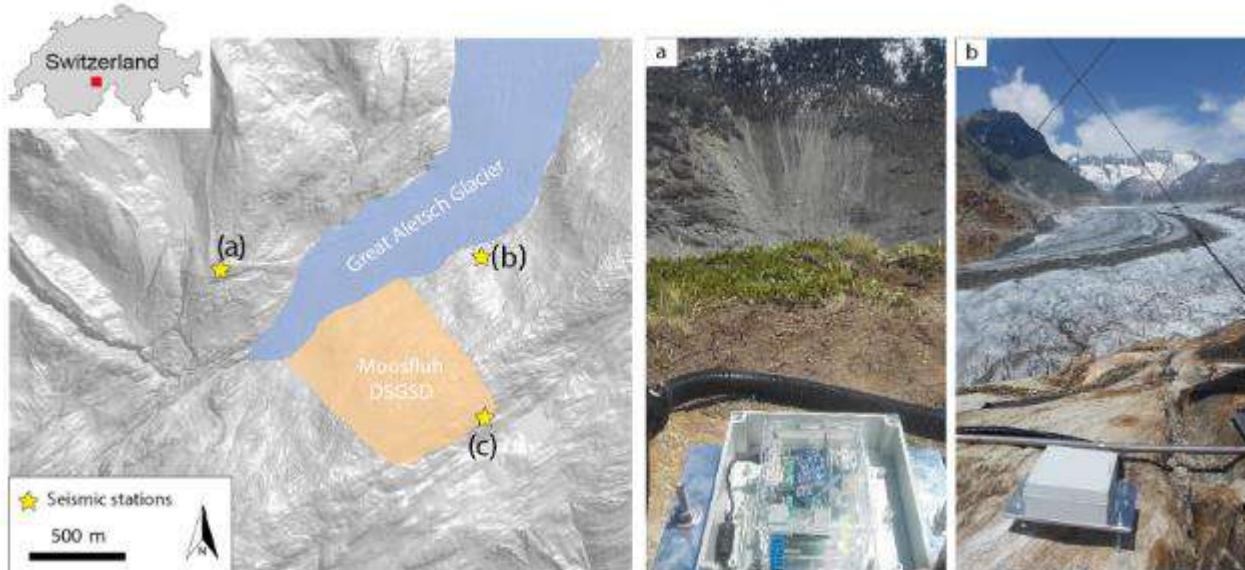
Carte de sismicité **AVEC** les capteurs low-cost



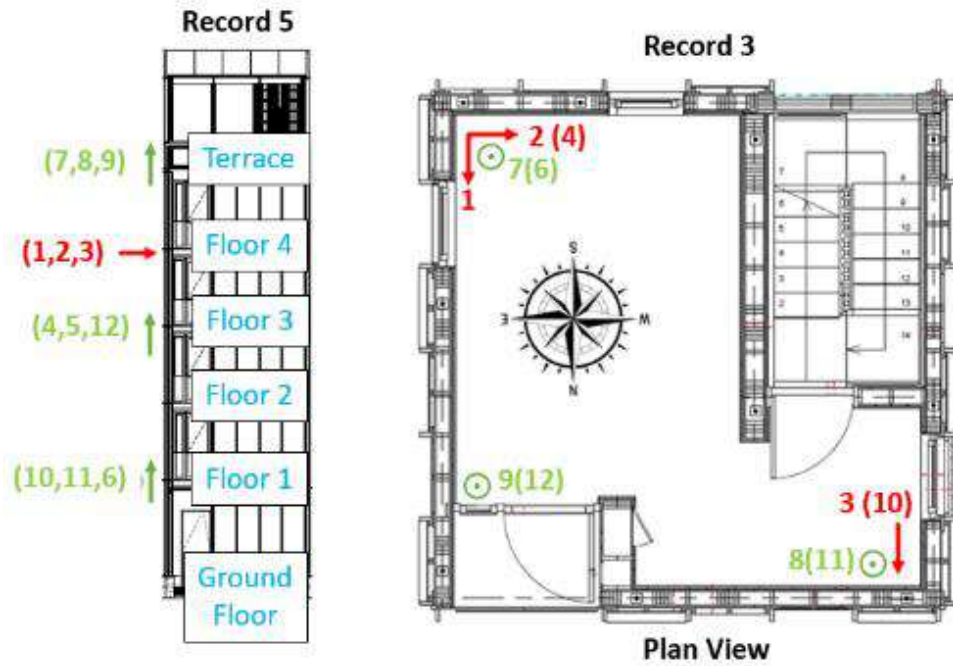
Exemples d'application : suivi des chutes de blocs

Short Communication: Monitoring rockfalls with the Raspberry Shake

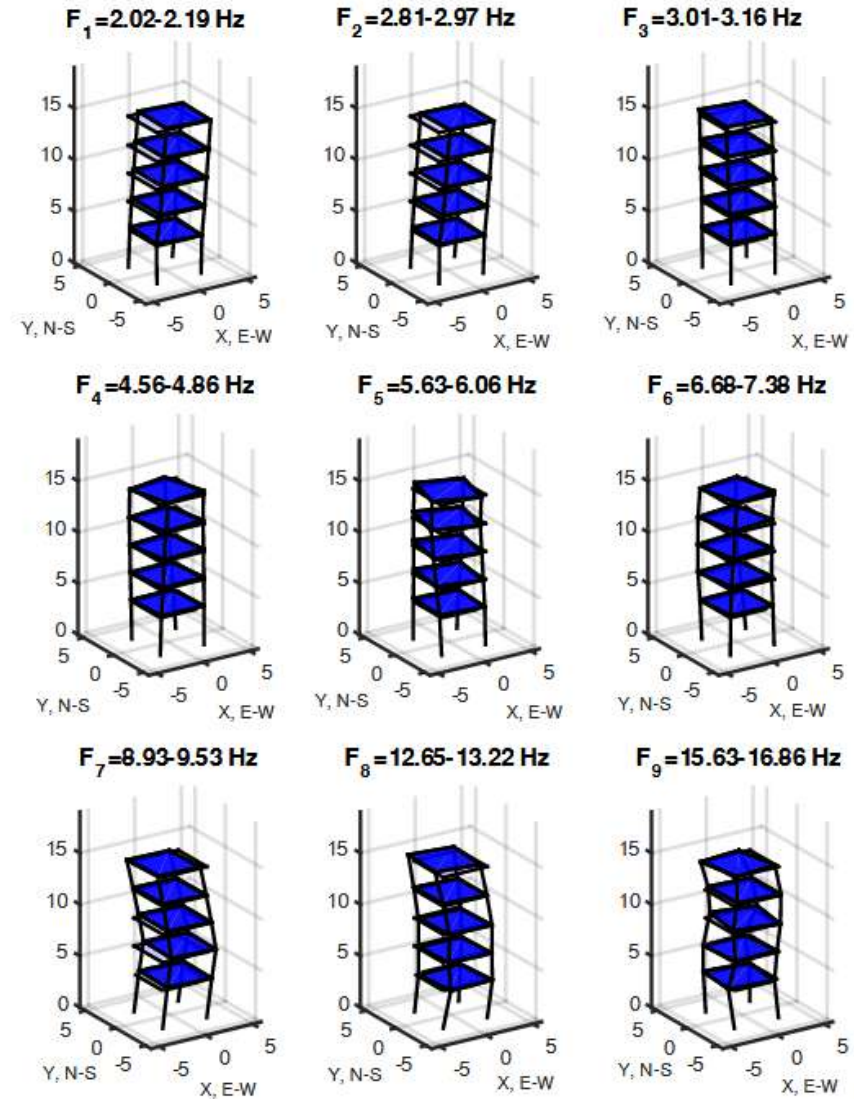
Andrea Manconi¹, Velio Coviello², Maud Galletti¹, and Reto Seifert¹
Earth Surf. Dynam., 6, 1219–1227, 2018



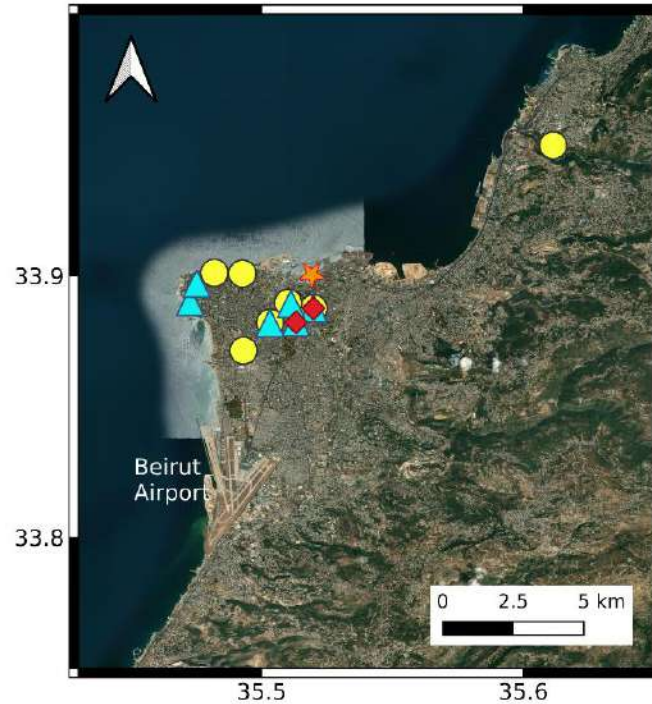
Exemples d'application : comportement des structures



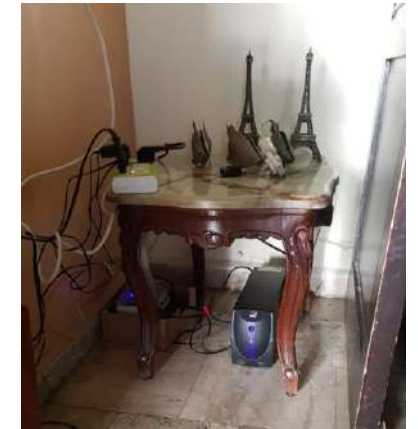
Diaz, M. (2022)



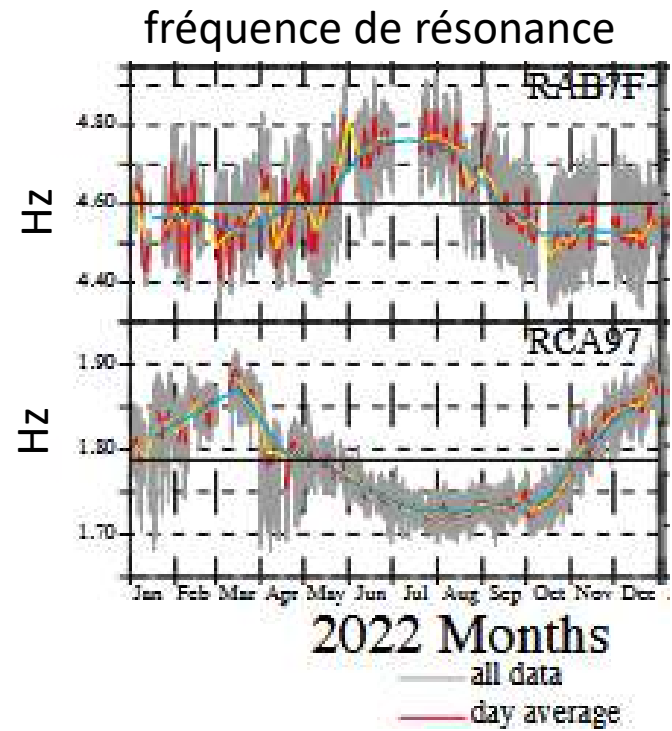
Suivi de la réponse des bâtiments beyrouthins aux forçages environnementaux



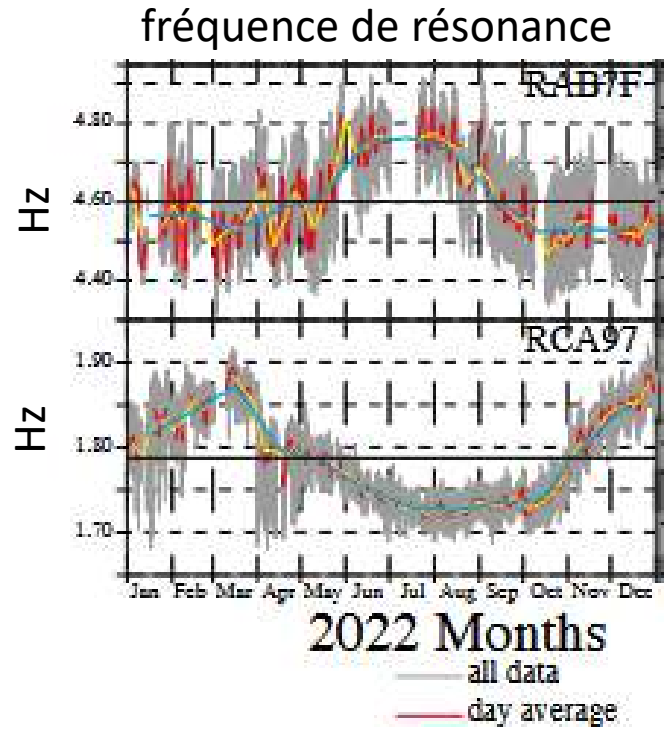
- ◆ Stations environnementales (PLUMB)
- ▲ Stations environnementales (Libelium)
- Stations sismologiques (Raspberry Shake)
- ★ Explosion au port de Beyrouth (4 août 2020)



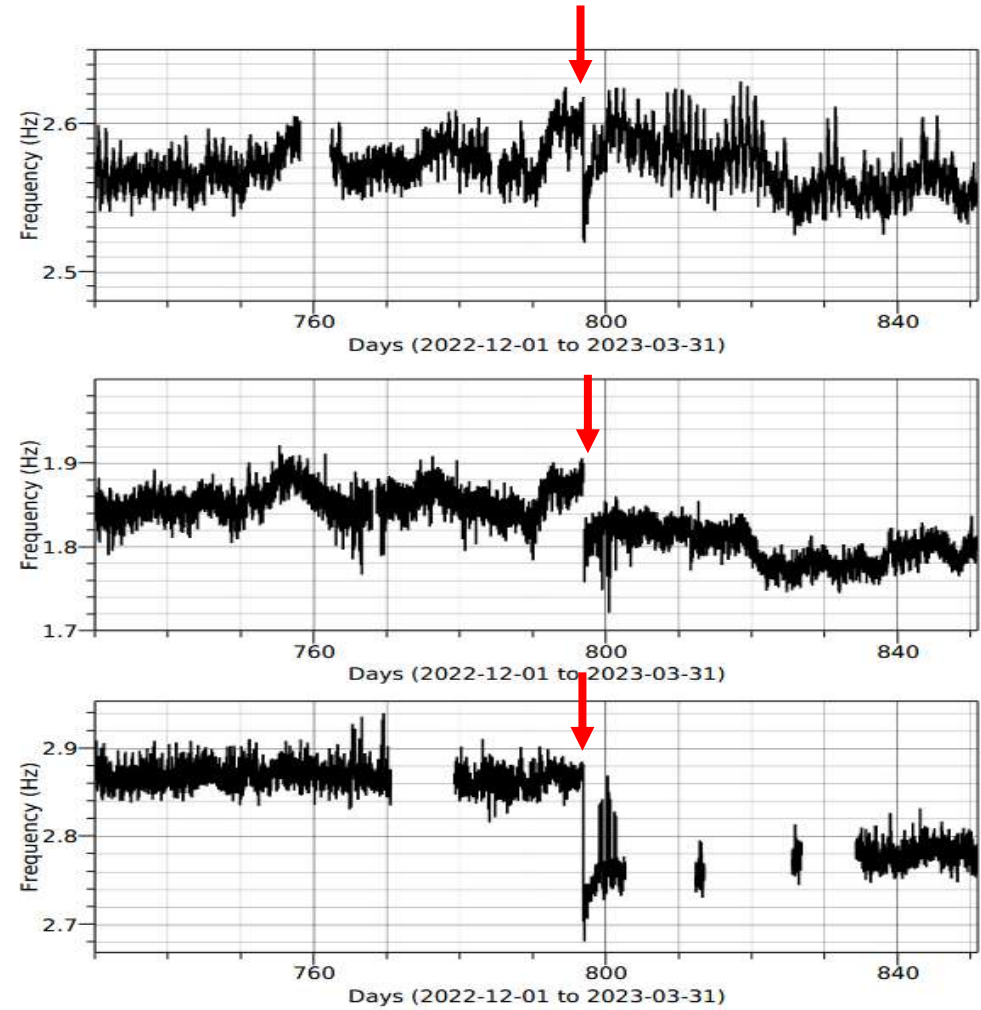
Suivi de la réponse des bâtiments beyrouthins aux forçages environnementaux (température, humidité, vent, ...)



Suivi de la réponse des bâtiments beyrouthins aux forçages environnementaux (température, humidité, vent, ...)

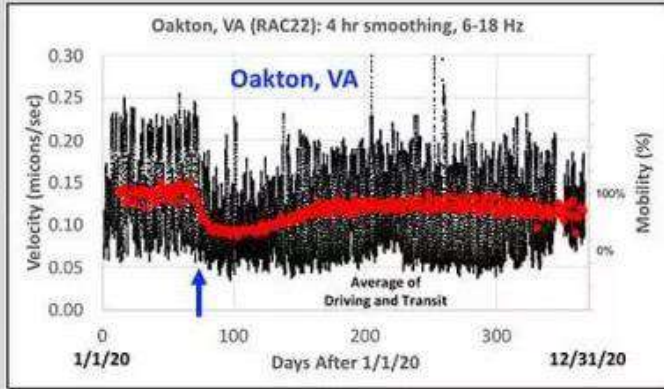


Réponse des bâtiments beyrouthins au séisme de Mw7.8 de Turquie du 6 février 2023



COVID-19 LOCKDOWNS

Seismic Data Recorded with Raspberry Shake Seismograph and Processed with Matlab Software Developed by Jay Pulli



Mobility data from: www.apple.com/covid19/mobility

Kafka and Pulli (2020)

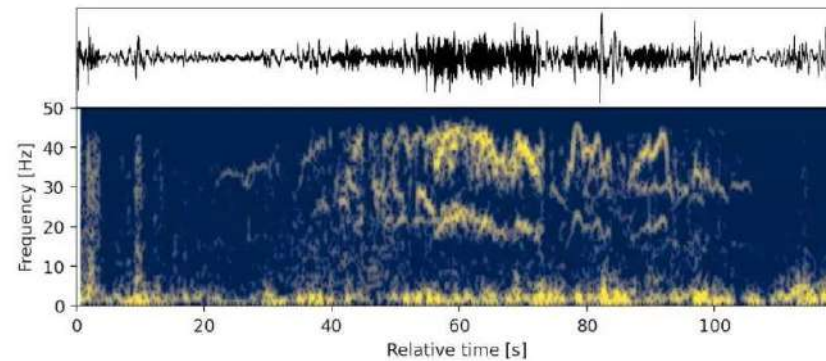
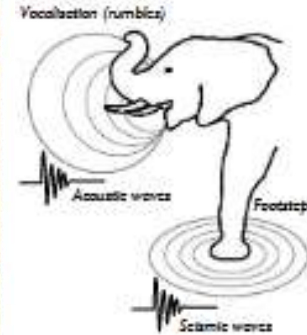
Tracking icequakes in Antarctica



Winter et al, 2021

Autres exemples d'application

RUMBLES ON THE SAVANNAH: TESTING RASPBERRY SHAKE AND BOOMS FOR DETECTING AFRICAN ELEPHANTS



Lamb et al. 2021

Educational seismology

ESPs Grow New Citizen Scientists

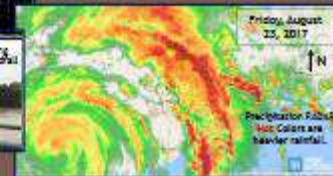
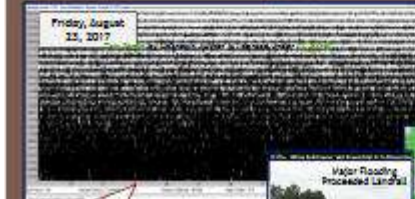
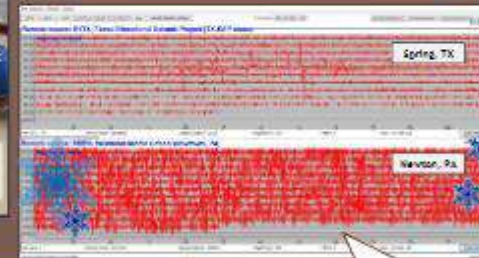


Through our educational partnerships, we make a difference in the lives of citizens and students of all ages and in differing socio-economic circumstances by engaging in hands-on learning opportunities and teaching science as it is actually practiced.

The science of seismology forms an excellent foundation for this endeavor because: (1) It is an interdisciplinary science that requires integration of many STEM concepts, and (2) It teaches how the natural environment impacts our everyday lives (see BELOW).



Monitoring the Weather....



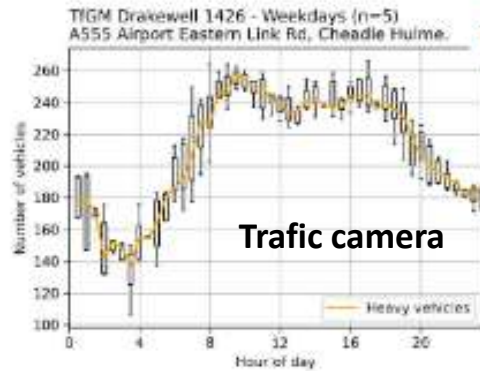
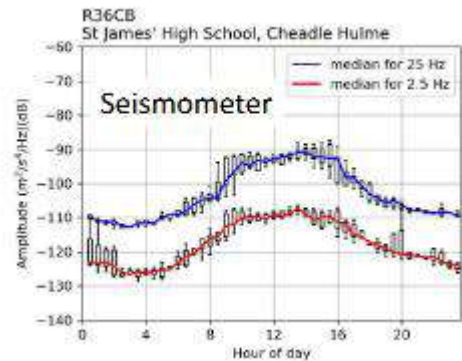
Exemples d'application

Listening to Manchester: using Raspberry Shake seismometers in urban environments to monitor traffic

Dave Healy

School of Geosciences, University of Aberdeen, Aberdeen UK

d.healy@abdn.ac.uk



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