Offre de Stage

Base de données sur les éruptions volcaniques (EIVE) : gestion, collecte de données et analyse comparative

Objectif du stage

Une base de données historiques sur les conséquences économiques des éruptions volcaniques a été élaborée dans le cadre du projet Cap 20-25 de l'Université Clermont-Auvergne et de son Centre International de Recherche 4 (https://cap2025.fr/recherche/challenges-scientifiques/risques-naturels-catastrophiques-et-vulnerabilite-socio-economique/). Voir annexe sur les réalisations.
Le projet a entre autres pour prochaines étapes :

- Continuer à compléter la base de données, pour les 55 éruptions déjà enregistrées, en recherchant des sources originales de données (par exemple, en identifiant et contactant des spécialistes), et compléter avec d'autres éruptions, qu'elles soient récentes (Stromboli 2019, Whakaari 2019, Taal 2020, La Soufrière Saint Vincent 2021, Nyiragongo 2021, Cumbre Vieja 2021, Hunga Tonga 2022), ou historiques.
- Conduire une analyse comparative sur les conséquences des éruptions enregistrées (utilisant des données qualitatives et quantitatives, sur les caractéristiques physiques et leurs conséquences socio-économiques).

Le ou la stagiaire apportera son soutien à la gestion de la base de données, à la collecte de données et d'informations et à leur traitement, alimentant la base de données et le site internet (éruptions récentes, historiques, et si possible nouveaux types d'informations). Il ou elle aidera à préparer et conduire l'analyse comparative ; aidera à identifier et contacter les spécialistes intéressés.

Profil

- Etudiant en master 1 ou 2 en économie, sciences sociales, ou statistiques ou sciences de la terre.
- Intérêt pour le domaine et le projet (connaissance serait appréciée mais pas indispensable)
- Rigueur scientifique, autonomie, bon relationnel.
- Maitrise de l'anglais

Lieu du stage : Centre d'Études et de Recherches en Développement International (CERDI), Université Clermont Auvergne, Clermont-Ferrand
Durée : 4 à 6 mois de mars à septembre 2022 (à convenir). Gratification (approx. 600 euros / mois).
Contacts : Les candidatures comprenant un CV détaillé (y compris références), et une lettre de motivation, doivent être adressées **d'ici le 15 février 2022** par mail à : michael.goujon@uca.fr et raphael.paris@uca.fr

Annexe - A new database of the economic impacts of historical volcanic eruptions (EIVE)

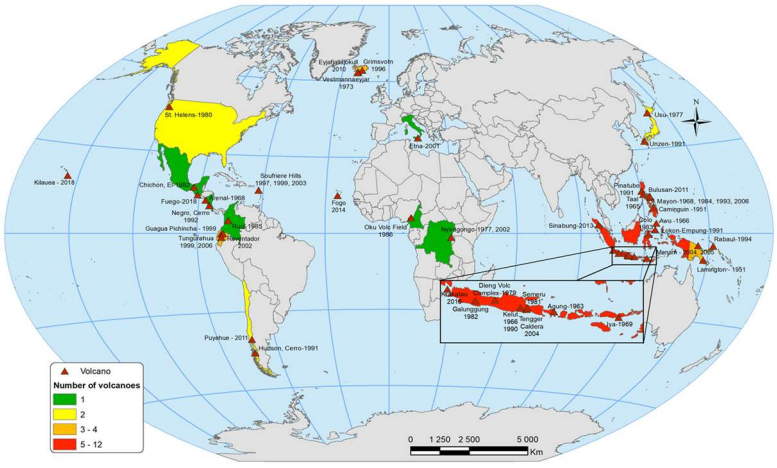
The socioeconomic impacts of eruptions are diverse and complex. There exist different types of eruptions causing different direct hazards (eruptive process) and indirect hazards (lahar, tsunami, earthquake) and cascading effects. Some eruptions can last for years, have long-term impacts, and/or with regional or global impacts in cases of major historical eruptions. Many of them are not very deadly, but they have significant, and diverse / complex, socio-economic impacts, which can be direct, indirect, tangible or intangible, short-term or long-term, depending on the hazards and on the exposure and vulnerability of people and economic activities (location, characteristics). There is a need for a database gathering information on both the physical characteristics and the socioeconomic impacts of historical eruptions, to increase our understanding and identification of vulnerability and resilience factors (to future events). However, existing databases gather partial information, biased towards recent eruptions and occurring in developed countries; They not follow (visible) homogenous methodology, with no tracking of the sources of information and triangulation. Accordingly, the objectives of the EIVE project was to build a new database, being as exhaustive as possible, avoiding selection bias, by tracking data sources, and triangulate information.

The EIVE database project started effectively in December 2018. It involved Hajare El Hadri (post-doc CERDI, Dec 2018-Feb 2021), Michaël Goujon (CERDI), Raphaël Paris (LMV). Axel-Cleris Gailloty (Msc student, Anger Un., April-July 2020) built the EIVE website. Olivier Santoni (CERDI-Ferdi) also took part in the collection of geographical data and produced the maps. This project and its results were presented at the Challenge 4 cap20-25 seminar in June 2019, at the CERDI webinar in December 2020, and lastly at the Colloque de restitution CIR4 in November 2021.

The project followed 4 steps:

Step 1: **We selected 55 eruptions, from 42 volcanoes in 18 developing and developed countries** during the post WW II period, with a Volcanic Explosivity Index (VEI) of 5 or higher; or with a VEI 1 to 4, and for which the cost is fully documented (in EM-DAT or NCEI databases), and/or associated with a heavy human toll and/or of a particular eruption type.

Locations of the selected eruptions



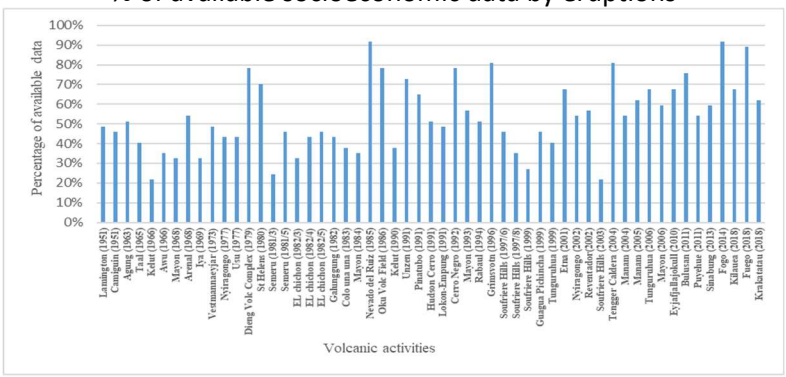
Step 2: we documented the **physical characteristics of these eruptions and volcanoes in 17 items**, such as location, dates, types (10) of the eruption, intensity, volume of products, physical processes (ash falls, lahars, SO2 etc…)

Step 3: we identified **37 items of socio-economic losses and damages**: human toll, displaced persons, and economic damages and losses, being qualitative (description) and quantitative (numbers, surface, kms), etc… and monetary evaluation. We collected exhaustively information on these variables, using various sources (governmental and non-governmental agencies, academic institutions, volcanic observatories, press, etc.) and triangulate and track information.

	Direct Losses (damages)	Indirect Losses (disruptions)
Tangible	- buildings: house, school, hospital - infrastructures: road, bridge, railway, airport, electricity and water - agriculture: crop, livestock and equipment, forest	- production: evacuation of the population, area, duration - public services, transport: damage to infrastructure - others: tourism, industry, etc.
Intangible	- forest	- life quality: damage to school and hospital.

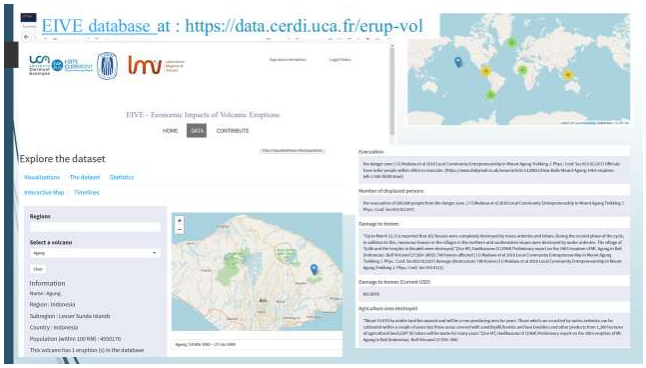
For every information, the database includes a systematic reporting of the reference(s) of the sources. All this information is gathered in an excel file (55 eruptions x (17+37 items) = 2970 cells). 67% of the information (cells) is informed: 94% for physical characteristics, 54% for socioeconomic data (notably because of weak availability of monetary estimates).

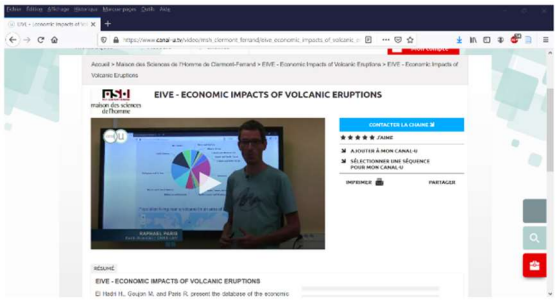
% of available socioeconomic data by eruptions



This is a significant improvement compared to existing databases (in terms of coverage, but also of data tracking and triangulation). The information coverage is heterogeneous, with data availability being biased towards more recent eruptions, occurring in developed countries and associated with a significant human toll (but no bias towards more intense or frequent eruptions).

Step 4: We made the database **accessible through a website** backed by a R-Shiny app developed by A.C. Gailloty, which also allows, thanks to a "contribute" tab, interested specialists to help completing the database for initially selected eruptions but also for additional, historical or future, eruptions.





Delivered products :

- EIVE database, publicly available: https://data.cerdi.uca.fr/erup-vol/
- Working paper: El Hadri H., Goujon M., Paris R.(2021) "A database of the economic impacts of historical volcanic eruptions", Études et Documents,n°14, CERDI. https://hal.uca.fr/hal-03186803/document
- A video (12 minutes) by E. Fayet (MSH) https://www.canal-u.tv/video/msh_clermont_ferrand/eive_economic_impacts_of_volcanic_eruptions.63667