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Using photographs and video from local observers to inform GVP's Bulletin of the Global Volcanism Network

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The Smithsonian Institution's Global Volcanism Program (GVP) produces the Bulletin of the Global Volcanism Network (BGVN), which provides an important, long-form narrative structure of volcanic activity covering generally a six-month timeframe. Primary sources, such as official volcano observatories and satellite data, provide most of the information for these reports. Local observers, such as residents, tourists, and visiting researchers, who share personal photos or videos on social media, can fill critical gaps in the official published record that might otherwise be lost. These photos and video are supplemental data that add value to Bulletin reports, as they describe and capture personal experiences with eruptive activity which might not be formally documented in observatory reports. Bulletin writers take advantage of social media platforms to find and preserve these data and, after professional evaluation, add them to the eruption history before it is irretrievable from the online source. Observations that are often used in Bulletin reports are photos or videos that include clear date and timestamps, location information, cardinal direction, and proper credit attributed to the original photographer or videographer. Local observations contributed by non-professionals can provide useful additional context and visual evidence during volcanic eruptions that may be missing in official reports.

ID: 78

Utility of a new global database of subaerial erupted mass from 1980 to 2019 (EMaP_v_1)

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We describe a new database of the subaerial global mass flux of lava, volcanic ash and explosive pyroclastic deposits and how it varies with space and time from 1980 to 2019. We identified 1064 magmatic eruptions from the Smithsonian Global Volcanism Program database and record both the total erupted mass and its partitioning into the different volcanic products. The global mass of magma erupted in each analysed decade ranged from 1.1-4.9x10^{13} kg. Although usually under-appreciated because of the low values of Volcano Explosivity Index, lava is the main subaerial erupted product representing ~57% of the total erupted mass of magma. The products related to the biggest eruptions (Magnitude ≥6), with long recurrence times, can temporarily make explosive products more abundant than lava. Twenty-three volcanoes produced ~72% of the total mass, while two different sets of 15 volcanoes erupted >70% of the total mass of either effusive or explosive products. Arc volcanoes erupted ~68% of the total subaerial mass from 1980 to 2019. Volcanic provinces like Central America show an almost constant erupted mass from 1980 to 2019, while other provinces show important changes. A mass balancing between the erupted mass reported in our database and the intruded mass estimated from geophysics and/or geochemistry could provide information of whether a volcano or a magmatic province is accumulating magma, potentially increasing future eruptive hazards on a decadal timescale. Combined with already available datasets, our database furthers future investigations on the impact of the erupted mass on the Geospheres.

ID: 527

Volcano Observations Thematic Core Service (EPOS-ERIC) supports open science by accessing to European volcanological databases

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The Volcano Observations Thematic Core Service (VOLC-TCS) is one of the TCSs forming the EPOS European Research Infrastructure Consortium (EPOS-ERIC; https://www.epos-eu.org/epos-eric). The overarching objective of the VOLC-TCS is the implementation of the technical and legal framework consistent with EPOS infrastructure for both coordinating the European volcanology community and giving access to data and services relevant to the volcanoes located in the European countries and their overseas territories, provided by Volcano Observatories (VOs) and Research Institutions (VRIs).

Thousands of operating stations located around European volcanoes collect numerous seismic, geodetic, electromagnetic, geochemical, and environmental data. The VOLC-TCS consolidates this multidisciplinary data and offers scientists access to a portfolio of data, products and services, through the EPOS Data Portal (https://www.ics-c.epos-eu.org/), to improve their knowledge of volcanic processes by discovering, visualizing and downloading data.

Integrating the multidisciplinary data and scientific products in EPOS will ensure sustainability and foster open science. The knowledge gathered and distributed by the VOLC-TCS will be also valuable for governmental and private decision-makers, which must be thoroughly informed about the volcanological hazard in Europe.

Another important ongoing task is the implementation of the community Gateway which is aimed at allowing services not fully compliant with EPOS or implemented by institutions outside the EPOS perimeter, to be visible in EPOS and creating the conditions to interface the VOLC-TCS with data infrastructures operating at global level (e.g., WOVOdat).

ID: 569

Infolahar- A database about debris flows and sediment-water mixtures

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Lahar events are one of the most dangerous phenomena in active volcanic terrains. Their mobility and behavior are controlled by multiple factors like triggering mechanisms, terrain morphology, rheology; the latter is a function of several parameters, e.g., sediment concentration, particle size distribution, among others. To achieve rheological characterization, numerous methodologies have been reported in the literature. They include theoretical formulas, empirical relations, and a wide variety of technical instrumentation, from conventional rheometers to specifically designed instrumentation. For example, results point to a strong variation in yield strength and viscosity, up to two orders of magnitude.

Because of the above, this work aims to integrate rheological information about lahars, debris flows, and sediment-water mixtures reported in the literature in a single database called Infolahar. This will allow having a full view of the different models used to interpret rheological data, as well as the instruments used. The database includes information about real lahar and debris flows events: Trigger factors, magnitude, flow characterization, deposit characteristics, and rheological information. The target audience includes volcanologists, numerical modelers, and people interested in the rheology of suspensions. The information collected will provide data to develop and calibrate numerical models to assess the hazard they pose and could also be used for educational purposes.

ID: 157

Leveraging citizen science for eruption observations via old and new pathways

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Alaska has more than 50 active volcanoes, some of which are located 1000 km away from Alaska Volcano Observatory (AVO) offices in Anchorage and Fairbanks and require extensive travel to reach. AVO has always relied on citizen scientists to report eruption observations as an important part of our volcano monitoring efforts. Local residents, aviators, and mariners report eruption, ash cloud, and ashfall observations that often include multisensory descriptions (seen, heard, smelled, felt), along with invaluable photos, videos, and samples. These communications are distributed to AVO in near-real-time via internal chat tools. Likewise, these observations are shared with interagency partners who also have hazard notification responsibilities. Concurrent with internal dissemination during eruption responses, these data are ingested into our geologic database (GeoDIVA). GeoDIVA holds photos, videos, sample metadata, and eruption eyewitness accounts, all linked together for analysis, query, and archive.

These citizen science observations come to AVO via many channels, including phone calls, emails, social media (AVO-dedicated social media accounts and other social media pages), our “Is Ash Falling” web application, pilot reports and postal mail. Integrating these observations in the digital age requires careful internal coordination and a willingness to use multiple platforms. Most importantly, our community citizen science efforts would not be possible without AVO’s longstanding investments in community relationships. This presentation discusses the importance of citizen science reports in monitoring remote volcanoes and the challenges in integrating observations with other forms of data.

ID: 329

Improving community volcanic risk awareness through Citizen Science: INGV- Osservatorio Vesuviano Web Form experience.

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Citizen Science includes activities aimed at fostering a stronger connection between public and researchers. In the context of quiescent volcanoes, such as those in the Neapolitan region, it is imperative to engage residents in understanding and maintaining a sustained interest in the unique natural phenomena.

We achieved this goal with the creation of an INGV-Osservatorio Vesuviano web platform in 2015. This platform was designed to activate citizens as valuable sources of information regarding natural events in the Neapolitan volcanic areas.

Populations can actively contribute by reporting observed or felt events through a dedicated web form titled, "Do you want to report an earthquake rumble or a natural event? Since 2015 we collected a substantial volume of data, particularly in conjunction with the increasing of volcano seismicity. During the last two years bradiseismic crisis of the Campi Flegrei we collected more than 200 forms.

The database managed in in GIS environment, allows us to map the specific locations where these reported phenomena were observed and felt. This dataset has a dual purpose: rapid communication with our monitoring team regarding ongoing phenomena; the link between researchers and the resident community. This two-way communication can contribute to reduce fake news spreading.

Furthermore, this work played have contributed to an online tool https://eurovolc.bgs.ac.uk dedicated to citizens' data within the EUROVOLC project.

This peculiar activity has not enhanced the relationship between citizens and scientists, but also constitutes a testimony to the power of Citizen Science in improving awareness of volcanic risk in communities.