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When volcanic hazard maps go online - opportunities to involve new and wider audiences.

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For many areas across the globe hazard and risk maps have a fundamental role helping devise a comprehensive and robust plan for risk mitigation as well as, informing and preparing the general public. Moreover, generating hazard maps for potentially active volcanoes is recognized as a fundamental step towards mitigation of risk to vulnerable communities. Hazard maps are communication tools, and although they are simplified, their content embodies a wealth of information about a given volcano. However, hazard maps are often presented as large format paper maps, and/or their equivalent digital products available to download. These methods to communicate, and distribute this knowledge are now a limiting factor in their usefulness. During the past two decades the development and advances in Web-GIS have enabled the advancement of hazard maps as essential tools in the communication of volcanic risk between scientists, emergency managers, local government, NGOS and the public. From this perspective, this presentation will showcase the increased utility and wider relevance of presenting volcanic hazard maps as web-based 3D perspective maps, making them more accessible and useful to those affected by volcanic hazard. We draw on the example of a suite of 3D interactive web maps created for 18 volcanoes around the world, as part of collaborative effort between the University of Edinburgh, a disaster-response NGO - MapAction, and several volcanological institutes.

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Can map-making practices facilitate exchanges between scientific and non-scientific thinking and weave different realities of place together from local to landscape scales?

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As part of the **Ixchel project** exploring disaster risk reduction for communities in the volcanic landscapes of Guatemala, we explore how field-based practices associated with map-making create opportunities for combining knowledges. The focus is on map-making practices than resulting map products, as often these intermediate products and the ground-based activities undertaken as part of the process whichopen this space for articulating between these different knowledges. The maps eventually created are containers which may then be populated with elements selected from both knowledge types. We draw on the process-oriented approach to GIS, sometimes termed pGIS (Harris & Weiner, 1998), widely used in disaster risk management as a means to empower greater participation of local communities.

Examples of map-making practices and the dialogues they facilitate include: 1**.** Use of satellite imagery/aerial photography /airborne video (how the aerial view opens discussions about the nature of their activity spaces) 2 Use of GPS waypoints and tracks/transects as places for idea sharing - walking interviews. Waypoints defined by community members as features of interest. Tracks/Routes portraying a human scale of activity in expansive volcanic landscapes. 3 Layering – (effect of superimposing evidence of past events on present day activity/living spaces. 4 Boundaries: administrative boundaries, protected areas; a composite view of private vs public spaces. 5 Annotations - choice of routes, features and place names on the base map. 6 Perspective - effect of using 2.5D compared to 2D mapping; seeing 'the view *from* the volcano' as opposed to 'the view *of* the volcano'.

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The Volcanic Hazard Maps Database Map Menu and Map Builder: Tools for Community Engagement in the Map-Making Process

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The IAVCEI Commission on Volcanic Hazard and Risk (CVHR) Volcanic Hazard Maps Database (VHMD) is a searchable, updated, global library of volcanic hazard maps. It grew from several related efforts in conjunction with CVHR State of the Hazard Map workshops. The primary purpose of the VHMD is to serve as a resource for map makers (or other interested parties) to explore how common issues in hazard map development have been addressed at different volcanoes, in different countries, for different hazards, at different times, and for different audiences. The VHMD can be searched via the website (https://volcanichazardmaps.org/) using a variety of map metadata.

We are now developing several online, interactive tools to help map makers engage with map users more effectively. The *Map Menu* tool would allow map makers to build shareable “menus” of example hazard maps from around the world. The *Map Builder* tool would allow map makers to build custom cartoon versions of maps with different hazard zone presentations, spatial scales, uncertainty visualization styles, color schemes, basemaps, layouts, and cartographic elements. These tools would serve as a community engagement resource to explore map user preferences and needs for volcanic hazard maps.

This presentation serves as a call for feedback from stakeholders of all types! Map makers: What features would you like to see in community engagement tools? Would you prefer interactive, online tools or something printable? Map users: What types of map options would you like to choose between? Is it useful to see real or cartoon map examples?

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Safety in sight "Hazard Map"

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"Safety in Sight: A Hazard Map for [Region]" is a comprehensive geospatial assessment that offers invaluable insights into the diverse spectrum of natural and human-induced hazards facing the [Region]. This meticulously crafted hazard map serves as a vital tool for risk mitigation, emergency preparedness, and informed decision-making.

Covering a wide array of potential threats, including earthquakes, floods, wildfires, industrial accidents, and more, this hazard map employs state-of-the-art geographic information systems (GIS) technology to visualize the distribution, intensity, and frequency of these hazards across the region. By incorporating historical data, scientific models, and real-time monitoring, it provides a dynamic and up-to-date resource for residents, emergency responders, policymakers, and researchers alike.

One of the distinguishing features of "Safety in Sight" is its user-friendly interface, making the information accessible to a wide audience. Interactive maps, clear risk classifications, and intuitive legends enhance comprehension, ensuring that individuals can readily identify hazards in their vicinity and take appropriate precautions.

Moreover, the hazard map's spatial analysis facilitates targeted planning and resource allocation for disaster management agencies, fostering more effective response and recovery efforts. It also supports urban planners and developers in making informed decisions to enhance resilience and sustainability.

"Safety in Sight: A Hazard Map for [Region]" is not just a static document but a living resource, continuously updated to reflect evolving conditions and new data. It is a testament to our commitment to safeguarding lives, property, and the environment in the face of adversity, ultimately guiding the [Region] toward a safer and more resilient future

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High-resolution seismic microzonification in urban areas of the Canary Islands

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The Canary Islands have experienced, in the last 500 years, some destructive earthquakes, mostly related to volcanic activity. Previous studies have evaluated the seismic hazard of the archipelago as moderate. However, the nature of volcanic seismicity with moderate magnitude (M<5) but very shallow epicentres makes the correct seismic hazard evaluation more difficult. In particular, the complex geology of the area requires a detailed assessment of the local seismic response.

Since 2019, INVOLCAN has carried out dense seismic microzonification surveys in three areas of Tenerife and La Palma. The first was the city of San Cristóbal de La Laguna in Tenerife. This city was selected because of its peculiar architecture, which made the town to be declared a universal heritage by UNESCO and because of its local geology. The city was built over lacustrine deposits, known to amplify locally the seismic shaking. We performed a survey with a total of 453 points for an area of 13.4 km^2, revealing strong site effects in most of the town.

The second area was La Orotava Valley in Tenerife, which is densely populated and hosts relevant touristic infrastructures. In this area of 10.1 $km^{2,}$ we realized a survey of 236 points, and we found that site effects are significant only in a few isolated spots.

The last selected area was the Aridane Valley in La Palma, severely affected by the 2021 Tajogaite eruption. In this area of 94 km^2, we realized 200 measurements finding a few zones with strong local site effects.

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Cohabitando territorios: Cartografías Ancestrales y Resiliencia Comunitaria

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En el corazón de las comunidades originarias, los mapas son memorias históricas tejida con la energía de la tierra. Su creación se convierte en un acto político y una manifestación de resistencia desde su territorio. A lo largo del tiempo, las comunidades han enfrentado desafíos, especialmente en territorios con presencia de volcanes. Estos mapas, tejidos con el corazón, llevan el camino de generaciones su creación muestra la persistencia de las comunidades ante los desafíos impuestos. Van más allá de los límites físicos y reflejan la esencia de su territorio, cargado con la energía de quienes lo han cohabitado. La elaboración de mapas se vuelve un acto sagrado, una conexión entre el pasado y el presente, entre el territorio y el alma de sus habitantes. Rompe con la convención de los mapas y abre oportunidades para entender la relación entre el territorio, las actividades volcánicas y la reducción del riesgo de desastres. Estas cartografías del corazón y la memoria invitan a explorar métodos que honren la riqueza espiritual e histórica de las comunidades originarias. Reconocen la sabiduría que marca cada línea trazada y nos invitan a abrazar el territorio impregnado de vida, conciencia y alma, donde los volcanes son parte integral de resiliencia. El 'Proyecto Ixchel' ha permitido dialogar con la comunidad de Panabaj (Santiago Atitlán, Guatemala) y comenzar a soñar con otros mapas que nos hablan de amenazas y futuros posibles desde otra perspectiva.

[ENG] At the heart of native communities, maps are historical memories woven with the energy of the earth. Its creation becomes a political act and a manifestation of resistance from its territory. Over time, communities have faced challenges, especially in territories with the presence of volcanoes. These maps, woven from the heart, lead the path of generations. Their creation shows the persistence of communities in the face of the challenges imposed. They go beyond physical limits and reflect the essence of their territory, charged with the energy of those who have cohabited it. The making of maps becomes a sacred act, a connection between the past and the present, between the territory and the soul of its inhabitants. It breaks with the convention of maps and opens opportunities to understand the relationship between territory, volcanic activities and disaster risk reduction. These cartographies of the heart and memory invite us to explore methods that honor the spiritual and historical richness of native communities. They recognize the wisdom that marks each line drawn and invite us to embrace the territory impregnated with life, consciousness and soul, where volcanoes are an integral part of resilience. The 'Ixchel Project' has allowed us to dialogue with the community of Panabaj (Santiago Atitlán, Guatemala) and begin to dream about other maps that tell us about threats and possible futures from another perspective.

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El arte del SIG: explorando la intersección entre los mapas y el arte

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El ser humano siempre ha sentido la necesidad de conocer el lugar donde vive y se desplaza, por esta razón, ha buscado representar visualmente el conocimiento del espacio a través de los mapas, estos despiertan la curiosidad, brindan información y motivan a las personas a descubrir.

Existen miles de mapas con información valiosa, sin embargo, la mayoría de ellos están en desuso o son desconocidos para las personas. El objetivo de este proyecto es que los mapas sean amigables, accesibles y divertidos, convirtiéndolos en productos que generen interés en la población de una forma que los mapas tradicionales no pueden lograr.

Es posible lograr esto utilizando SIG y técnicas de renderizado 3D, estos softwares permiten agregar elementos que otorgan características fotorrealistas a los mapas, como nubes, erupciones volcánicas o cambiar las texturas para transformarlos en por ejemplo legos. Esto permite renovar el interés de las personas por los mapas, revitalizarlos y otorgándoles nuevos usos. Estas reconstrucciones fotorrealistas en 3D aumentan el atractivo visual de la cartografía, al mismo tiempo que mejora la comprensión de la historia y procesos geológicos que estos intentan transmitir. Al agregar una tercera dimensión a los mapas, la información se vuelve más intuitiva y las personas pueden relacionarse con los rasgos topográficos del paisaje. Convertir los mapas de peligro o riesgo volcánico en arte es un aporte para que las geociencias se integren en los hogares como elementos comunes, ayudando en la concientización sobre la importancia de conocer la tierra y sus fenómenos.

[ENG] Human beings have always felt the need to know the place where they live and move, for this reason, they have sought to visually represent the knowledge of space through maps. These awaken curiosity, provide information and motivate people to discover.

There are thousands of maps with valuable information, however, most of them are out of use or unknown to people. The objective of this project is to make maps friendly, accessible and fun, turning them into products that generate interest in the population in a way that traditional maps cannot achieve.

It is possible to achieve this using GIS and 3D rendering techniques. These software allow you to add elements that give photorealistic characteristics to the maps, such as clouds, volcanic eruptions, or change the textures to transform them into, for example, Legos. This allows people to renew their interest in maps, revitalize them and give them new uses. These photorealistic 3D reconstructions increase the visual appeal of the cartography, while improving the understanding of the history and geological processes that they attempt to convey. By adding a third dimension to maps, the information becomes more intuitive and people can relate to the topographic features of the landscape. Converting volcanic hazard or risk maps into art is a contribution to integrating geosciences into homes as common elements, helping to raise awareness about the importance of knowing the earth and its phenomena.