ID: 257

The Devil in the Details: The Role of Volcanoes in Debates about Risk Reduction, Climate Change, and Neocolonialist Science

Karen Holmberg

Gallatin School, New York University, New York, NY USA

Geological deep time, natural science, climate change, and human technology collide in the 21st century and our imaginations of the human future. This paper is a historical reflection that focuses on the contemporary context of volcanism in these collisions. In this paper I trace some of the most devilish roles of volcanoes in debates over the Earth system to query where they leave us in terms of risk reduction. In the 18th-19th century battles between Neptunists and Plutonists, people had strong opinions regarding the role of igneous versus sedimentary processes. In Faust, Goethe went as far as to voice the argument for the primacy of igneous processes through the devil himself. The wicked problems of anthropogenic climate change go far beyond academic arguments or tragic plays but still heavily invoke volcanoes. In Hawaii, Mauna Loa provides the CO2 readings for the Keeling Curve and Mauna Kea is the contentious Thirty Meter Telescope site that pits “neocolonialist science” against indigenous elders. In the Philippines, Pinatubo and its 1991 eruption provided data that inspired solar engineering or solar radiation modification (SRM) methods proposed to combat global warming. On Mars, Olympus Mons provides the site of a NASA award-winning design plan to 3D print houses from ice to permit our species to be a multi-planet one. Volcanologists lead the scientific community by many decades with experiences trying to communicate environmental risk to complex, cross-cutting communities. No Faustian bargains entailed: volcanologists have a lot to offer.

ID: 365

Volcanic eruptions in 19th Century Ecuador: religious, artistic and scientific understandings

Elisa Sevilla[1], María Antonieta Vásquez[1]

[1]*Universidad San Francisco de Quito*

This presentation will analyse the discussions and representations of volcanic eruptions in scientific discourse, religious belief and morals, as well as their interpretations in art in the 19th Century, especially around the eruptions of Cotopaxi volcano. We will explore naturalists research and theories from Humboldt, Boussingault, Wisse, Wolf, Stübel and Reiss, as well as religious sermons and writings. We will compare how these observations and interpretations used drawings, sketches and paintings as a way to make sense of these phenomena. Those representations were not only made by naturalists, but by professional artists. Humboldt inspired painters like Frederic Edwin Church to explore nature, including volcanoes, through their paintings. Quito artists like Juan Agustín Guerrero depicted the volcanoes he visited, while Rafael Troya was hired by Reiss and Stübel for producing paintings during their study of volcanoes. ¿How different were these intepretations? ¿How were they consulted by inhabitants at risk? ¿What actions were taken by authorities to prevent volcanic catastrophes in light of the way science, religion and art made sense of volcanic eruptions?

We will identify both the controversies, as well as the commonalities between these different ways of understanding volcanic eruptions in the 19th Century, as well as their impact in actions towards preventing risk at the time. ¿How can this inform present day risk communcation?

ID: 528

Dendrochronological evidence for the impacts of the 1902 Santa Maria volcanic eruption on the forests of western Guatemala

Kevin J Anchukaitis[1], Zanubia K Sethuraju[1], Julie Edwards[1], Talia Anderson[1], Diego Pons[2], Ana Isabel Gonzalez Mendez[1], and Matthew Taylor[2]

[1]School of Geography, Development, and Environment and Laboratory of Tree-Ring Research, University of Arizona, Tucson, AZ USA; [2]Department of Geography and the Environment, University of Denver, Denver CO USA

The eruption of the Santa Maria volcano in 1902 in Guatemala was among the largest of the 20th century. Here we use tree-ring data from Guatemalan fir (Abies guatemalensis) trees growing in the western highlands of Guatemala to study the differential impact of the event on forest growth. We expand our existing network of tree-ring chronologies by developing a new series from the flank of the Tacana volcano. We also conduct quantitative wood anatomical analyses at this site in order to provide finer temporal scale information on the timing of the eruption's impact on wood formation. We find that trees at Tacana have a period of anomalously narrow rings immediately after the eruption that persist for nearly a decade, followed by a period of enhanced growth. Some trees at the site show abnormal tracheid formation late in 1902 as well. However, trees from the site of Totonicapan, closer to but northeast of Santa Maria, show no growth anomalies. These findings are consistent with a pattern of the heaviest tephra fall and forest damage to the north and west of the volcano due to the direction of the prevailing winds at the time of the eruption. Our study demonstrates that traditional dendrochronology and quantitative wood anatomy can reconstruct the local direct effects of large eruptions on trees in both time and space.

ID: 565

Is the volcano more dangerous than the social?: Aguacatepeque and its long history next to the Fuego volcano, Guatemala

Diego Vásquez Monterroso[1]

[1]*School of Geosciences, University of Edinburgh, Edinburgh, Scotland, United Kingdom.*

The indigenous populations in what is now Guatemala very quickly understood the benefits - economic, ritual, military - and the dangers of living very close to volcanoes. Some, like Fuego, with a long eruptive history but also long periods of inactivity, could provide control of strategic routes between the Pacific piedmont and the highlands, as well as abundant agricultural resources for both subsistence and luxury exchange.

This talk focuses on one of the most strategic settlements - but also at greatest volcanic risk - that existed around the Fuego volcano: Aguacatapeque. With a history almost uninterrupted for two thousand years, this place served as both a production center and control of important exchange routes between the highlands and the Guatemalan Pacific coast. During that period he was exposed to dangerous volcanic phenomena, but also to very important social changes. It is discussed whether, in the long term, volcanic risk or social transformations are more important in the fate of a community neighboring an active volcano.

ID: 587

The first volcano-seismological observatory on Montserrat: 1936-1946

David Pyle[1], Jenni Barclay[2], Martin Mahony[2], Karen Pascal[3], Thiffanie Williams[3], Jazmin Scarlett[2,4], Bridie Davies[2,5] and Erouscilla Joseph[6]

[1]*Department of Earth Sciences, University of Oxford, Oxford, UK*

[2]*School of Environmental Sciences, University of East Anglia, Norwich, UK*

[3]*Montserrat Volcano Observatory, Flemmings, Montserrat*

[4]*Environment Agency, Bristol, UK*

[5]*Department of Earth and Environmental Sciences, University of Manchester, Manchester*

[6]*Seismic Research Centre, The University of the West Indies, St Augustine, Trinidad and Tobago*

In 1933, residents of the island of Montserrat in the eastern Caribbean began to notice small earthquakes, increased activity at the island's 'soufrières' and the occasional smell of hydrogen sulphide. The evolution of this seismic-volcanic crisis over the subsequent 5 years, and the scientific responses to these events, is recorded in contemporary correspondence, diaries and reports in archives both on Montserrat, and in the UK and US. Our investigations of these records reveal how the Curator of the Grove Agricultural Station on Montserrat and his team of assistants and field officers began systematic data collection and reporting of shocks and other phenomena; and how these efforts were augmented with new instrumental data following support from scientists including Frank Perret (then based in Martinique), and an expedition sent from the UK by the Royal Society in March 1936.

By June 1936, the Grove station was a volcano-seismological hub run by a Montserratian 'Clerk of Instruments', Ian Kelsick. Kelsick had responsibility for a sensitive 2-component seismograph and an island-wide network of shock-recorders, along with a regular programme of temperature and gas measurements at the soufrières, and later ambient air-quality monitoring in Plymouth. This first volcano-observatory on Montserrat operated continuously until 1946. The recognition of the rich history of volcano monitoring in the Caribbean will bring new perspectives to discussions both of the 'official' responses to past volcano-seismic crises, and to how communities have engaged and made sense of these events.