A quantitative assessment of Holocene explosive eruption records: Applications to Eastern Pacific and Caribbean volcanic arcs

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The volcanological record of past eruptions provides the data required for understanding the regional characteristics of eruptive activity in the context of global volcanism. Unfortunately, its usefulness is limited by the incompleteness of the record due to underreporting as you go back in time, together with recent advances in dating, monitoring and field techniques. This study sought to assess the legitimacy of existing catalogues of eruption events for giving a balanced interpretation of volcanic activity. Specifically it examined the applicability of trends arising from global datasets to explaining regional variations in volcanism.

The Holocene eruption record for the Americas was compiled from the Smithsonian Global Volcanism Program Database. This data was manipulated in different graphical ways to compare patterns of volcanic activity and magnitude-frequency relationships. The Holocene dataset was found to underestimate the importance of low magnitude events placing undue emphasis on large eruptions. A smaller dataset encompassing the last 300 years gave a more balanced representation of explosive eruptive activity. Using this reduced dataset, differences were found in the explosivity patterns of the arcs studied suggesting variations in crustal dynamics. Overall, the global dataset gave a different trend from the regional datasets suggesting that its use in regional analyses would only hide variations in the Earth's crust.

These results have implications for hazard analysis. Understanding the limitations of Holocene datasets is essential for making unbiased interpretations. Regional variations in volcanism are significant and should deter generalisations about volcanic activity.