

A Frequency Analysis of the Climatic Effects of Explosive Volcanic Eruptions

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Explosive volcanic eruptions perturb the climate primarily by injecting SO₂ into the stratosphere, where it forms a layer of sulphate aerosols. These interact with incoming solar radiation, and one consequence of this is a cooling of the surface below. This study uses the historical records of eruption events and Northern Hemisphere temperature from Sigurdsson and Laj, (1992), (and others). These are analysed to investigate which magnitude of eruption (in terms of SO₂ mass loading) had the strongest effect on the climate, when frequency of event is taken into account. The results indicate that whilst the highest magnitude eruptions may have had a strong short-term impact on the climate, the somewhat smaller-scale events which occur more often had a more substantial effect over the period of study.