



Rainfall induced volcanic activity on Montserrat: Meteorological monitoring of an active volcano

J.E. Johnstone, A.J. Matthews and J. Barclay

School of Environmental Sciences, University of East Anglia, Norwich, UK
(j.johnstone@uea.ac.uk)

Several recent volcanic dome collapses at the Soufriere Hills Volcano on Montserrat have been immediately preceded by intense rainfall (Matthews et al. 2002 and Carn et al 2003). During the dome collapse on the 29th July 2001 this rainfall came from a large scale weather system which was identifiable in satellite images and predicted by meteorological forecasts issued 60 hours prior to the volcanic activity. In contrast, the rainfall preceding the dome collapse on the 20th March 2000 was due to a short lived and highly localized convective weather system over Montserrat that was essentially unpredictable.

I am currently working on quantifying the relationship between rainfall and volcanic activity (dome collapse, pyroclastic flows and lahars) on Soufriere Hills Volcano, Montserrat using MVO seismic data as a proxy for volcanic activity. This is part of an ongoing project on Montserrat in collaboration with the Montserrat Volcano Observatory (MVO), measuring rainfall with a spatial network of gauges around the SHV.

A detailed analysis of both rainfall and seismic data sets (used as a proxy for volcanic activity) from Montserrat has shown a significant correlation between rainfall and volcanic activity with a lag time of magnitude 2 hours to 1 day.

The Eastern Caribbean experiences a bimodal April to November rainfall season with a subsidiary peak in May and a larger longer peak centered on September. There were eight instances in my period of study where primary volcanic activity was associated with or attributed to rainfall, 6 were associated with Synoptic scale weather systems and all occurred on or around peaks in the annual rainfall cycle.

A goal of current and future work is to provide a comprehensive regional and

mesoscale forecasting study of the rainfall around Montserrat in order to assess our ability to forecast intense rainfall (and hence potentially heightened volcanic activity).

This will also be expanded upon this using data archives such as the daily TRMM rainfall data for precipitation and a database of global volcanic activity (Smithsonian archives) to look at volcanoes across the globe with the aim of incorporating rainfall and weather forecast information into volcanic hazard prediction models.