



Large volume dome collapse at the Soufrière Hills Volcano, Montserrat, 20 May 2006

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On 20 May 2006, a large volume lava dome collapse at Soufriere Hills Volcano removed the entire lava dome and parts of the crater wall, a total of about 110×10^6 m³ (DRE) over a period of less than 3 hours. This is the second largest dome collapse ever observed worldwide, the largest being the collapse of 12-13 July 2003 at the same volcano. Most of the dome was removed during 34 minutes of intense retrogressive collapse. This included four long period explosion signals generated as the pressurized dome interior was exposed. The ash column associated with these explosions rapidly reached altitudes of 17km, the highest reported ash cloud during the eleven year eruption. The gas cloud was later detected by OMI and AIRS sensors at 20km and contained about 180,000 tonnes of SO₂, the largest volume released during a dome collapse at this volcano, almost twice as much as on 12 July 2003. Pyroclastic density currents impacted a wide area along the NE coast, some generated by hydro-magmatic explosions at the shoreline as the large volumes of hot debris interacted with seawater as in July 2003. A 1m tsunami impacted the coastline of Guadeloupe, smaller swells impacted Montserrat and Antigua. Heavy ashfall downwind of the volcano and rainfall resulted in extensive lahars in all drainages. High SO₂ concentrations at ground level caused discomfort to individuals outside the exclusion zone downwind of the volcano. There was no obvious build up in overall seismicity in the hours or days before the event. Nevertheless, the numbers of rockfalls, long-period rockfalls and long period earthquakes had been elevated since about 10 May. On the 18 May, the highest daily number of long period earthquakes was recorded since the beginning of this episode of dome growth. FTIR measurements were the four highest HCl/SO₂

ratios of the current dome growth episode in the week prior to the 20 May. In the early hours of 20 May the direction of growth of the lava dome changed. These factors all indicate that the dome was 'primed'. There were several episodes of localized intense rainfall over the volcano in the early hours (the first heavy rains of the season), heavy rain was also characteristic of previous large volume collapses.