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Potential collapse mechanisms for 12 July 2003 collapse of Soufrière Hills Volcano, Montserrat

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The 12 July 2003 collapse at Soufrière Hills Volcano, Montserrat is thought to be the largest dome collapse in historical record, with an estimated collapse volume of 120 million m^3 [*Edmonds et al.*, 2004]. This collapse was preceded by a period of intense rainfall (86 mm) immediately prior to the collapse. The three previous major collapses on Montserrat were 3 July 1998, 20 March 2000 and 29 July 2001, all of which have been associated with high precipitation prior to the collapses [*Matthews et al.*, 2002]. These collapses are assumed to have been triggered by the rainfall. However, in the case of 12 July 2003 collapse there was also an increase in seismic activity, in the form of hybrid earthquakes. Hybrid swarms began to develop three days prior to the collapse, which merged to form continuous tremor in the hours preceding the collapse [*Edmonds et al.*, 2004]. This implies that there were also internal mechanisms, which may have attributed to the July 2003 collapse. We examine in detail the potential collapse mechanisms for the complete collapse history, from the initial talus collapse through to the catastrophic collapse of the dome.

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