Eruption of crystal-rich basalts following a large sector collapse: Evidence from IODP cores sampled offshore Montserrat

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Recently sampled IODP leg 340 cores sampled offshore Montserrat in the Lesser Antilles have recovered a large amount of marine sediment, which is intercalated with tephra fallout deposits, reworked volcaniclastic and bioclastic turbidites sequences resulting from large landslides. This information will provide a wealth of information about the mechanisms of these volcanic island landslides as well as the evolution of the style and composition of the volcanoes through time. In recent years we have discovered more about Montserrat's geomorphological, chemical and eruptive history through information gained from shallow marine cores, subaerial work and now deep IODP cores. Montserrat comprises 4 volcanic centres dating back to 2.6 Ma, including the presently active, Soufrière Hills volcano. As with most subduction zone volcanoes, the majority of the volcanoes on Montserrat erupt andesite, which has ideal density and viscosity qualities which facilitate ascension and eruption of this intermediate composition. The presence of a basaltic volcanic centre at Montserrat at 130 ka (South Soufrière Hills) is therefore puzzling. However new data from the IODP cores find thick basaltic (46% SiO_2) fallout units, which overly one of the largest sector collapses discovered offshore Montserrat (8 km^3). This basaltic unit is crystal-rich and contains normally zoned phenocrysts of plagioclase, olivine and two-pyroxene. This study uses geochemical, textural and petrological work to explore whether this represents an unloading and decompression event, which led to the eruption of these dense and crystal-rich basaltic magmas.