

GLOBAL EPISODES OF EXPLOSIVE VOLCANISM: EVIDENCE FROM ODP LEG 165

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Early in DSDP and ODP, it was discovered that explosive volcanism is highly episodic on Earth, however, the cause of this episodicity remains an enigma. Silicic volcanic ash layers are widespread in the ocean basins, often several tens of centimeters thick and thousands of kilometers from their source, but their temporal distribution in the sedimentary record is very uneven. These ash layers have the characteristics of co-ignimbrite ash fallout, and their sources are in major ignimbrite-forming explosive eruptions, primarily in volcanic arcs at continental margins. These findings raise two important questions: Are major volcanic episodes synchronous across the globe? And, what is the geologic mechanism which generates regional or global explosive volcanic episodes? During ODP Leg 165 in the Caribbean, we recovered sediment cores with 2,000 ash layers, which demonstrate that the Central American arc has produced two volcanic episodes in the Cenozoic (middle Miocene and Late Eocene), exceeding all others in terms of production of ash fallout. In his talk, Dr. Sigurdsson will discuss results emerging from Leg 165, including evidence that explosive volcanism in Central and North America is strongly episodic but not synchronous. One likely mechanism is the episodic rise of mantle diapirs above the subduction zone, with underplating and crustal melting of overlying continental lithosphere by basaltic magmas. Dr. Sigurdsson sailed as co-chief scientist on ODP Leg 165 in the Caribbean region.