Silicate Eruption Dynamics on Io: Comparison with Observations.

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Infrared outbursts on Io are of volcanic origin. The implied temperatures are indicative of silicate, rather than sulphur volcanism. Changes in temperature, area and power output from the outburst of January 9th 1990 provide other constraints on the range of eruptive processes taking place on Io. Modelling of this event produces an eruption rate of similar size to terrestrial flood basalt eruption episodes. Using this mass eruption rate as a starting point, the ascent and eruption of silicate magma is modelled, with sulphur as one of a number of possible volatile components. The volcanological model yields eruption parameters such as degree of fragmentation of the magma, pressure in the vent and eruption velocity. The conduit radius (or fissure half-width) is also determined, although this may change through erosion of the vent. This process also reduces eruption velocity as the flow expands laterally. Possible ballistic ranges of associated pyroclastic ejects are calculated. The volatile content of the silicate “material strongly effects eruption behavior, especially eruption velocity.

Modelling of flow formation and cooling of the erupted material is in progress.

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