

## ACOUSTICS2008/3518 Origin of the sound produced by volcanic eruptions

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Volcanic eruptions present different regimes, which can be understood and classified in the framework of a two-phase flow, either an annular flow such as in hawaiian fire fountains or a slug flow in strombolian explosions. The gas, exsolved at depth, carries physical information about the dynamics of strombolian activity, which in turn may lead to a better understanding of volcanic systems.

The sound produced by volcanic eruptions is mostly infrasonic, although the landing of magma fragments on the ground is in the audible range. The first cause for sound generation is related to the gas overpressure when the sound waves are produced by a slug breaking at the surface. Gas overpressure induces oscillations of the gas volume and pushes passively the liquid film above the slug, and has been modelled accordingly. Sometimes the overpressure is small and the bubble vibration prior to breaking does not exist. In that case, the sound is produced by the gas escaping through a small hole on the bubble nose and is modelled as an Helmholtz resonator. The second class of sound source is related to the expulsion of a gas-ejecta mixture at a large velocity. Examples of volcanic sound waves will be presented.