



## **Jet Noise Modification Due to the Presence of Ash in Volcanic Jets**

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Supersonic jet noise is originated in several different sources. Prominently broadband turbulent noise and shock associated noise are distinguished. They can be found also in volcanic jets albeit due to scaling arguments, they might be found shifted into the infrasonic regime. The presence of particles substantially alters both the vortical structures, as well as the shock strength. Additionally particles attenuate sound by scattering. In the present work we investigate a compressible turbulent particle-laden jet in comparison to a clean one. We study this problem using direct numerical simulation and an Eulerian-Lagrangian point-particle approach to model fluid and particle phase. We focus our attention on the modification of the vortical structures due the presence of particles and on the interaction between the shock cells and the particles. For the later case, it was found that the presence of particles reduces the shock strength. Also the vortical structures are altered considerably, both in intensity but also in form. Also statistical quantities change. Consequences for the sound spectra of the volcanic jet are analyzed.