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First kind plume analysis of volcanic blast: Application of an indigenous model

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Abstract:

The control of air pollutants from anthropogenic sources seem almost impossible due to numerous influencing factors present in the atmosphere. This study carried out a virtual mathematical experimentation using Matlab and analytical approximation to estimate the dimensional impact of initial pollutant plume cloud from a sudden volcanic blast and the dynamics of its wind field. The impact concentration (β) at the point source by the end of the first second (1.0s) was $3.0 \times 10^5 \mu\text{gm}^{-3}$ which implied a 99.5% sudden decay when compared to 0.01s concentration value at the emission point source, the corresponding vertical profile of aerosol content is $1.0 \times 10^{32} \mu\text{gm}^{-3}$. The study observed that air pollutants release from explosives/blasts get transported into the atmosphere in the first few seconds by forceful injection instead of by gradual dispersion as is the case with normal air pollutants plume releases. A mathematical control process was propounded (which is still subject to further research) to reduce the quick flow of air pollutants to immediate eruption vicinity.

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