

A MODEL OF ACCOUSTIC FOCUSING IN THE ATMOSPHERE

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An acoustic focusing model is used to provide a methodology which allows an assessment of acoustic focusing hazard in the atmosphere by noise producing installations or when detonating explosives. Acoustic noise or blast energy can travel significant distances through the atmosphere where anomalous overpressure may cause damage or public irritant. The method here has provided an ability to avoid potentially damaging or irritating long range blast effects.

The method employs a graphical package which can process weather data with the altitude profiles of (i) temperature, wind speed and wind direction as a minimum requirement, and (ii) pressure and relative humidity profiles for improved accuracy. The results are expressed in four graphs which can be consulted together in order to predict foci at ground level.

A sound velocity profile is used to determine the type of acoustic refraction in the atmosphere. A ray trace graph is generated to indicate the convergence of acoustic rays in the direction of interest. To eliminate the chance of ray trace artifacts and to evaluate convergences, the foci locations can be cross-referenced with graphs of range vs ray elevation angle (and/or ray arrival time vs ray elevation angle). A focus is indicated where these graphs show a near zero slope which corresponds to the arrival of a set of rays at the same range and arrival time. To enhance the focus, reflections and other ray angles can also be shown to exhibit the same range and arrival time on these graphs.