

/GeoAc: An Open Source Infrasonic Ray Tracing Tool

Modeling infrasonic propagation in the atmosphere can be a computationally intensive exercise due to the dynamic and non-stationary nature of the propagation medium. Propagation simulation tools often utilize mathematical approximations to the acoustic wave equation to make obtaining a prediction for propagation effects more feasible. Scientists at Los Alamos National Laboratory (LANL) have developed a robust ray tracing tool kit, InfraGA/GeoAc, that models the propagation of infrasonic signals through the atmosphere in the limit of geometric acoustics. Such ray tracing methods provide highly efficient means to estimate infrasonic arrival characteristics for a given atmospheric state. The methods in InfraGA/GeoAc utilize an inhomogeneous, moving propagation medium model and Cartesian (2D or 3D) or spherical coordinate propagation schemes to model propagation at local to global scales. The software utilizes a set of auxiliary parameters that define geometric spreading effects along individual ray paths. Eigenray methods leveraging the auxiliary parameters are included and provide a means to efficiently identify propagation paths for specific source-receiver geometry even in the case that propagation is not contained within an azimuthal plane.

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