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Inversion of infrasound signals for atmospheric remote sensing

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This paper investigates the utilization of observed long-range infrasound signals to improve our knowledge of upper atmospheric winds and temperatures. A series of numerical experiments designed to provide a mathematical framework for implementation of this idea is presented. The statistical performance of a realistic infrasonic upper atmospheric remote sensing network over a range of different environmental and propagation modeling assumptions, source types, and geophysical variables (season, local-time, latitude, etc) is quantified. For a series of fictitious events, infrasonic observables are calculated with 3-d Cartesian ray tracer and a series of atmospheric profiles spanning the range of geophysical parameters. These synthetic measurements are then inverted to estimate the original atmospheric background fields.