Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09155, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09155
EGU General Assembly 2008

Temporal Morphology of Infrasound Propagation

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Expert knowledge suggests that the performance of automated infrasound event association and source location algorithms could be greatly improved by the ability to continually update station travel time curves to properly account for the hourly, daily, and seasonal changes of the atmospheric state. With the goal of reducing false alarm rates and improved network detection capability we endeavor to develop, validate, and integrate this capability into infrasound processing operations. Numerous studies have demonstrated that utilization of G2S environmental specifications in numerical calculations of infrasound signal travel time and azimuth deviations yield significantly improved results over that of climatological atmospheric specifications, specifically for tropospheric and stratospheric modes. A robust infrastructure to generate G2S coefficients on a real-time basis (every 3- to 6-hours) currently exists. Thus the next requirement in this endeavor is to develop robust numerical procedures to quickly calculate infrasound propagation characteristics for automatic infrasound arrival identification and network detection/location algorithms. We present results from a new code that for any location on the globe given a G2S vector spherical harmonic coefficient set, integrates the local (range independent) tau-p equations for travel time, range, turning point, and azimuth deviation via an accurate numerical technique capable of addressing square root singularities. This program is designed to either be run batch mode via a shell script for all IMS station locations, e.g. following the generation of a G2S coefficient hourly update, or easily invoked by an analyst in interactive mode. For the purpose of understanding the impact of our current working knowledge of the atmosphere and infrasound propagation on our overall objectives, results from

the G2S/TauP calculation system investigating the seasonal variability of propagation characteristics over the course of a five year time series for different IMS stations are presented. The statistical behaviors or occurrence frequency of various propagation configurations are discussed. Representative examples of some of these propagation configuration states will also be shown.