Empirical Models for Infrasonic Signal Celerity, Backazimuth and Duration from Ground Truth Data

Recent developments in infrasonic event association and location methods rely on prior probability distributions for infrasound signal parameters. Whilst numerical acoustic propagation modelling through atmospheric specifications may be used to provide both range dependent and time specific priors for signal parameters (e.g., celerity), analyses of ground truth data sets are necessary to validate these models. Previously, we developed a regional range-dependent celerity model for the US summer using both air-to-ground coupled waves and acoustic arrivals at distances < 1000km from summertime explosions at the Utah Test and Training Range during 2004-2008. We have now developed a software suite which allows for consistent analysis of a global ground truth database, allowing estimation of global empirical models for celerity, backazimuth and duration. The results have implications for the prior distributions constructed for the NET-VISA association algorithm (Arora et al., 2013). The major improvement on previous models is that the underlying dataset is not biased by assumptions about the signal property populations.

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