Characterization from Repeating Seismoacoustic Events: Exploiting the Synergy of Seismic and Infrasound Data

Remote event detection and location using infrasound requires high quality temporal and spatial atmospheric models. Large industrial blasts and military explosions are tightly constrained in time and space using seismic data and can generate infrasound recorded both regionally and globally. The most useful seismo-acoustic sources are repeating sources with relatively frequent explosions, sampling the infrasonic wavefield over many time-scales. An extensive database of explosions from many sites in Fennoscandia and northwest Russia has been compiled, dating back to the late 1980s. Each event is associated confidently with a known source, with an accurately determined origin time, usually by applying waveform correlation or similar techniques to the characteristic seismic signals generated. For selected repeating sources and infrasound arrays, we have assessed the variability of infrasonic observation: including the documentation of lack of observed infrasound. These observations provide empirical celerity probability distributions. Such empirical distributions have been demonstrated in numerous recent studies to provide infrasonic event location estimates with significantly improved uncertainty estimates. Tropospheric, stratospheric and thermospheric returns have been observed, even at distances below 200 km. This information is now providing essential input data for studies of the middle and upper atmosphere.

Primary author: GIBBONS, Steven John (NORSAR)

Presenter: GIBBONS, Steven John (NORSAR)

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