

Multi-station study of the cross-wind effect on infrasound propagation

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The cross-wind effect on infrasound propagation has been studied at multiple infrasound stations utilizing a ground truth events database. This database consists of nearly 10 000 events from quarries, mines and military blast-sites in northern Fennoscandia, dating back to 1987.

To reduce the variability and complexity, only events occurring in summer time that are recorded as first-bounce arrivals from the stratosphere, have been considered. We put special focus on events occurring after the initialization of the I37NO infrasound station (October 2013).

Mesospheric ray paths show, naturally, a much wider distribution of back-azimuth deviations than stratospheric ray paths, and a cross plot of back-azimuth vs. celerity exhibits a clear brake at a celerity of around 0.27-0.28 km/s. This celerity range is good discriminator between mesospheric and stratospheric ray paths.

We also estimate the cross-wind impact integrated along a simplified ray path between source and receiver using the ECMWF ERA5 reanalysis product wind fields. The observed back-azimuth deviations from the events are then analyzed in view of the modelled cross-wind effect.