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-wind effects on infrasound propagation

The cross-wind effect on infrasound propagation has been studied on the seismic array ARCES, Norway, utilizing 30 years of data from explosions at the Hukkakero military blast-site in Finland. Around 99% of the seismically identified explosions at Hukkakero (around 600 in total) are detected as seismo-acoustic signatures around 10 minutes after the arrival of the original P- and S-waves, indicating a good ducting through the stratosphere between the two sites. Despite these observations, ray-tracing of infrasound through reanalysis model atmospheres (e.g., ERA-Interim and ERA5) typically shows that ARCES lies in the shadow zone for these explosions. The total cross-wind effect, throughout the whole propagation path, has instead been estimated along a simplified ray-path model. The observed back azimuth deviation of the infrasound arrivals for each event is then analyzed in light of the calculated cross-wind effect, to get a statistical estimate on the effect the cross-wind has on infrasound propagation. Our results verify that both the tropospheric and stratospheric cross-wind contributions affect the propagation. Therefore, the tropospheric winds need to be considered when using these data to characterize the stratosphere.

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