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Spatial Coherence Structure of Infrasonic Waves in the European Arctic from Regional Events

The spatial correlation of infrasound signals influences both infrasound array design and signal detectors. Previous atmospheric acoustic studies have identified anisotropic coherence loss across infrasound arrays, with greater loss for sensor-separations perpendicular to the direction of propagation than parallel. A recent study confirmed this anisotropy for International Monitoring System (IMS) infrasound array data. It is, however, difficult to identify the source of the coherence loss due to the differences in source-to-receiver paths. Therefore, we investigate the coherence structure of multiple signals recorded between one ground-truth source (munitions explosions in Hukkakero, Finland) and one station (the 10 element array at IS37, Norway). The source-to-receiver range is 320 km, with signals expected to be first bounce stratospheric. In agreement with previous studies we observe anisotropic coherence loss across the array. Initial results suggest coherence loss increases with decreasing celerity: lower celerities correspond to longer paths and hence greater coherence loss. The coherence loss for this range agrees well with the global study results that suggest the coherence loss depends on source-to-receiver range. The relationship between the boundary layer windspeed and coherence loss will also be investigated.

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