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# The influence of shallow atmospheric structure on tropospheric ducted infrasound from the Buncefield oil depot explosion

David Green[a], Matthew Hort[b] and David Bowers[a]
[a]AWE Blacknest, Brimpton, RG7 4RS Reading, UK
[b]Met Office, FitzRoy Road, EX1 3PB Exeter, UK

The vapour cloud explosion which destroyed the Buncefield oil depot, UK, on 11th December 2005, has proven to be a benchmark ground truth event for infrasonic studies. The regional infrasonic returns, those that propagated in the stratosphere and thermosphere, have been analysed in detail elsewhere. Here, we present the results of a study into infrasound ducted in the troposphere, recorded within 250km of the source as air-to-ground coupled waves by a dense seismometer network. These tropospheric arrivals exhibit large waveform differences across the UK, both in amplitude and waveform shape. We numerically model these infrasound arrivals using a wavenumber integration method, incorporating a velocity profile derived from the UK Met Office numerical weather prediction model. Although some of the waveform variability is due to ground conditions at the recording site, we show that consistent changes in waveform shape across a 200km swath of stations are correlated with a change in the wind vector in the lowermost 2km of the atmosphere. Also, small amplitude, high-frequency precursors to the dominant acoustic signal, which might be misinterpreted as evidence of a small initial explosion, are shown to be consistent with the dispersion expected from a thin, shallow wind jet.