



A 3D array for analysis of regional infrasound propagation in the atmospheric boundary layer

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The Royal Netherlands Meteorological Institute (KNMI) operates a 3D microbarometer array at the Cabauw Experimental Site for Atmospheric Research (CESAR) observatory. The array consists of five microbarometers in the meteorological tower (up to an altitude of 200 meters) and 10 microbarometers on the Earth's surface. This unique setup allows for the study of infrasound in three dimensions. The added value of the vertical dimension is the added sensitivity to wind and temperature in the atmospheric boundary layer.

In this study, we analyze infrasound generated by an accidental explosion at the Moerdijk petrochemical plant on June 3, 2014. The recordings of the tower microbarometers show two sequential arrivals compared to the ground recordings. This arrival structure is interpreted to be the upgoing and downgoing wavefronts. The observed upgoing and downgoing wavefronts are therefore an added value of a 3D array and cannot be observed using a 2D array. Observations are compared with propagation modelling results using global scale and mesoscale atmospheric models. Independent temperature and wind measurements, that are available at the CESAR site, are available for comparison.