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## infrasound observations from the August 2020 Beirut explosion

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On 4 August 2020, a warehouse of ammonium nitrate exploded in Beirut, Lebanon, leading to loss of life and property. Infrasonic signals from this event have been detected across the Middle East, Europe and North-Africa. The furthest IMS station that detected the signal was IS11 (Cape Verde) at over 6000 km distance.

The features of the observed infrasonic signals were unusual for the time of year. (1) Signals with tropospheric celerities were observed at IS26 and IS48, the nearest IMS arrays to the west and northwest, as well as the national arrays in Hungary (PSZI) and Romania (IPLOR). (2) At IS26 and PSZI, curious trace velocity trends were observed, starting at high values and decreasing along the wave train, contrary to what is typically observed. (3) The fastest arrivals at IS26 and PSZI appear to have significant back azimuthal scatter.

These observations suggest that the propagation conditions were more complex than a single stratospheric duct which is typical for mid-summer conditions in the Northern Hemisphere. It is hypothesized that the tropospheric phases interacted significantly with topography. This hypothesis is supported by wind and temperature forecasts derived from numerical weather prediction models. An analysis of the propagation conditions is presented.

### Promotional text

The tragic explosion that occurred in Beirut, Lebanon on 4 August 2020 generated infrasound that could be observed over 6000 km away. Our analysis of this dataset helps to further improve our knowledge of infrasound and its use in verification monitoring.

**Primary author:** Mr ASSINK, Jelle (Royal Netherlands Meteorological Institute (KNMI), De Bilt, the Netherlands)

**Co-authors:** Mr WAXLER, Roger (National Center for Physical Acoustics, University of Mississippi, MS, USA); BLOM, Philip (Los Alamos National Laboratory (LANL), Los Alamos, NM, USA); Mr EVERS, Láslo (Royal Netherlands Meteorological Institute (KNMI), De Bilt, the Netherlands); Mr SHANI-KADMIEL, Shahar (Royal Netherlands Meteorological Institute (KNMI), De Bilt, the Netherlands); BEN-HORIN, Yochai (Soreq Nuclear Research Center)

**Presenter:** Mr ASSINK, Jelle (Royal Netherlands Meteorological Institute (KNMI), De Bilt, the Netherlands)

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