



Capability of the CTBT infrasound stations detecting the 2013 Russian fireball

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The explosive fragmentation of the 2013 Chelyabinsk meteorite generated a large airburst with an equivalent yield of 500 kT TNT. It is the most energetic event recorded by the infrasound component of the CTBT-IMS, globally detected by 20 out of 42 operational stations.

This study performs a station-by-station estimation of the IMS detection capability to explain infrasound detections and non-detections from short to long distances, using the Chelyabinsk meteorite as global reference event. Investigated parameters influencing the detection capability are the directivity of the line source signal, the ducting of acoustic energy and the individual noise conditions at each station.

Findings include a clear detection preference for stations perpendicular to the meteorite trajectory, even over large distances. Only a weak influence of stratospheric ducting is observed for this low-frequency case. Furthermore, a strong dependence on the diurnal variability of background noise levels at each station is observed, favoring nocturnal detections.