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The 7th July 2011 Abadan, Turkmenistan explosions: A seismoacoustic analysis

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At 11:40 (UTC) on 7th July 2011, a series of accidental explosions occurred in the town of Abadan, Turkmenistan. The Turkmenistan government listed the cause of the accident as the ignition of pyrotechnic matter intended for fireworks, which then spread to military storage areas, where an estimated 5,000 - 50,000 tons of ammunition was stored (Boggs et al., 2013).

The explosions are clearly observed ~11 km away at the International Monitoring System (IMS) seismometer array GEYT (Turkmenistan). A total of 30 individual events can be identified. Yields are estimated using P-wave (Koper et al., 2002) and Rg amplitude (Bonner and Russell, 2013) and range between 0.5 – 45 tonnes (TNT equivalent).

IMS infrasound arrays in Kazakhstan, Russia, and Germany observed these explosions. A yield for the largest explosion(s) (4 – 90 tonnes) is determined using the dominant period of these infrasonic signals (Whitaker, 2006), and is consistent with the yield determined using seismic observations.

Air-to-ground coupled waves at GEYT exhibit downward first motions, consistent with an initial positive blast overpressure. We measure the period and peak-to-peak amplitude of the air-to-ground coupled waves and find amplitude varies with yield but not period.

Promotional text

We analyse the 7th July 2011 Abadan, Turkmenistan accidental explosions through utilising both seismic and infrasound IMS data.

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