

-acoustic signals of the Baumgarten (Austria) gas explosion detected by the AlpArray seismic network

On December 12, 2017 a devastating gas explosion occurred at the Baumgarten gas hub in Eastern Austria. We detected the resulting seismo-acoustic signal on permanent and temporary broadband seismic stations at distances between 30 and 175 km from the gas hub, most prominently in the 2-4 Hz range. Two distinct phase arrivals correspond to acoustic waves traveling through the troposphere and stratosphere. The passing of a cold front shortly before the explosion created several temperature inversions at low altitude, and acoustic waveguides within the troposphere that facilitated our infrasound detections at distances as close as 50 km from the source, in addition to the commonly observed stratospheric reflections. 3D acoustic raytracing using temperature and wind velocities from the high-resolution forecast model of the European Center for Medium Range Weather Forecast has allowed to precisely relate the spatial distribution of our detections with calculated surface bounce points of infrasound rays. This has provided a precise and independent estimate of the time of the accident, to be used in forensic investigations. After the first explosion signal, we also detect a prolonged coda of elevated noise, which is probably due to ongoing gas release and/or the fire from the escaping gas.

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Track Classification: Analysis of Sources and Scientific Applications