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Seismo-acoustic analysis of explosions in the Netherlands

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Large explosions are known to generate both seismic and acoustic -infrasound- signals. Source characteristics are derived by fusion of seismic and infrasound signals in a seismo-acoustic analysis. The combination of both techniques leads to a more accurate source identification in terms of eg. origin time, yield and type of source. Furthermore, the application of infrasound and seismic measurements as monitoring technique is assessed in relation to the Comprehensive Nuclear-Test-Ban Treaty (CTBT).

In the Netherlands, a unique network of four infrasound arrays is operated next to a seismic network of surface and borehole seismometers. The infrasound arrays consist of six to sixteen microbarometers in arrays ranging from 30 to 1500 meters in aperture. Seismo-acoustic sources are for example bolides, sonic booms, oceanic waves, military practices and explosions. Here we will concentrate of a specific case studies of a gas pipeline explosion in Belgium on 2004, July 30. Seismic signals were recorded nearby the explosion site while infrasound was detected at ranges from 150 to 750 km. Seismic signals reveal details on origin time and types of excited energies. The analysis of infrasound signals with Fisher statistics, FK-analysis, beamforming and tau-p raytracing will be explained. The atmosphere is a dynamic -highly anisotropic- medium due to wind and temperature contrast, therefore, infrasonic waveforms vary at each array site. The use of infrasound in source identification will be illustrated, especially with respect to yield estimates.