Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03844, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03844
EGU General Assembly 2008

Seismo-acoustic analysis of large explosions in Nortwestern Europe

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Explosions often generate both seismic and infrasound signals and serve as an excellent source for data fusion in a so-called seismo-acoustic analysis. In addition, the location and origin time of natural and man-made explosions are usually known. These ground-truth sources are rare in infrasound and can be used to assess the accuracy of detection algorithms, phase identifiers, localization procedures and propagation models. Results will be shown of seismo-acoustic studies on the explosion of a pipe line in Belgium and a vapor cloud explosion in the UK. Infrasound and seismic signals of these events have been detected all over northwestern Europe. The origin time, location and yield of the source are derived based on infrasound and seismic data as if the source was of unknown origin. Doing so, the skill of these techniques is evaluated for the purpose of nuclear test ban verification. Preliminary results will be presented of a recent collaboration with NORSAR on the analysis of explosions observed at the ARCES seismic array in Norway. Both seismic and acoustic signals are observed from the destruction of old ammunition in Finland. Detections are available from 2001 and onwards and show a huge variation in the detectability of infrasound, the number of arrivals, traveltimes and amplitudes. Efforts are made to understand these observations which are due to the variability of the atmosphere since the seismic signals are undisturbed as function of time. Furthermore, atmospheric models will be validated with this dataset. This study contributes to the knowledge of infrasound propagation through the highly dynamic and anisotropic atmosphere and is therefore relevant to the CTBT.