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parameters estimation of the 4th august Beirut explosion using 3D seismic modelling

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On 4th august 2020, A very large explosion blew up the city of Beirut, the capital of Lebanon, causing many casualties and high damage, leaving an estimated of 300000 people homeless. The explosion was caused by a large amount of ammonium nitrate stored at the port of Beirut. The CEA undertook study in order to estimate explosive source parameters – including the yield – based on the analysis of regional seismic waveforms. Data provided by the seismic stations of the International Monitoring System (IMS) have been retrieved and processed, as well as open access regional waveforms provided by IRIS and GEOFON institute. A first approach involves empirical (or semi empirical) source model, corrected of depth effect, as preconized by Ford and Walter (2014). Those preliminary results are investigated using 3D full waveform modelling, focusing on continental regional propagation through middle-east territory. 3D Green's functions are convoluted with source term derived from seismo-acoustic coupling model. The study shows the contribution of simulation for the source analysis and parameters uncertainty mitigation.

Promotional text

Investigation about accidental explosion requires to perform every key-topics of the forensic seismology, including multi-technology analysis, detection, localization, source screening and source modelling.

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