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Seismo-acoustic analysis of Mw 4.2 mining induced earthquake nearby Kiruna, Sweden

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An earthquake happened in 18 May 2020 early morning in the Kiruna underground iron ore mine (Northern Sweden) having a magnitude Mw 4.2. Following the earthquake, the mine was immediately evacuated because of the risk of aftershocks. This event is the largest mining-induced earthquake that has ever taken place in Scandinavia and it produced signals recorded by three infrasound arrays at distances of 7 km (KRIS, Sweden), 155 km (IS37, Norway) and 286 km (ARCI, Norway). We explore seismo-acoustic features of this event recorded in near and far-field focusing on how the signal propagated in the atmosphere and in the solid earth. Our study provides a detailed comparison between observed and predicted wave front characteristics at the arrays. We also conduct a comparison of amplitude corrected for propagation effect versus magnitude and ground shaking amplitude. These results show that infrasound recorded up to ~300 km from a shallow moderate-magnitude earthquake can provide ground shaking information as well as local amplification caused by topographic and geological features.

Promotional text

Infrasound waves are inaudible low frequency sound waves that can be generated during earthquakes. A minequake happened in Kiruna generated infrasound and recorded up to 300 km distance. We investigate waves from different stations and explore what has happened during this quake.

Primary authors: Mr TURQUET, Antoine L. (NORSAR); Mr BRISSAUD, Quentin (NORSAR); Mr KERO, Johan (Swedish Institute of Space Physics, Kiruna, Sweden); Mr NÄSHOLM, S. Peter (Norwegian Seismic Array (NORSAR), Kjeller, Norway); Mr KVÆRNA, Tormod (Norwegian Seismic Array (NORSAR), Kjeller, Norway); Mr LE PICHON, Alexis (Commissariat à l'énergie atomique et aux énergies alternatives (CEA), France); Mr LISTOWSKI, Constantino (Commissariat à l'énergie atomique et aux énergies alternatives (CEA), France)

Presenter: Mr TURQUET, Antoine L. (NORSAR)

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