

Source Characterization and Screening with Moment Tensors: Case Study of the mb 4.7 Mining Event in Kiruna, Sweden, on 18 May 2020

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On 18 May 2020, a seismic event with mb 4.7 and MS 3.9 (International Data Centre) occurred in Kiruna, northern Sweden, at an active iron mine (Luossavaara-Kiirunavaara AB, LKAB). This event was widely observed at broadband seismic stations throughout Nordic countries and as far away as Iceland, Greenland, the UK and continental Europe. Both the operating mining company and various seismological agencies have reported the event as induced or anthropogenic. However, screening procedures at the International Data Centre reported an MS/mb score of -2.03, and as a result the event could not be screened out as non-nuclear in origin. Using waveform data from all possible International Monitoring System stations and openly available seismic stations, we estimate moment tensors with uncertainties for this and other events using the methodology of Alvizuri et al (2018) which has proven successful in characterizing and screening various other events, including the six nuclear tests in the Democratic People's Republic of Korea and a collapse event eight minutes after the 2017 nuclear test at the same location. The results for the nuclear tests reveal mechanisms with positive isotropic parameters, while collapse events as observed at Kiruna and the Democratic People's Republic of Korea reveal negative isotropic parameters, which suggest that future screening criteria would benefit from using moment tensors and source-types.

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Promotional text

The 18 May 2020 mine event in Kiruna, Sweden (mb 4.7) was widely observed at regional stations and determined as a collapse. Screening procedures at the IDC could not screen the event as non-nuclear in origin. Moment tensor analysis, however, suggest a robust screening criteria.

Oral preference format

in-person

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