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-field source localisation of Greenland glaciers at infrasound station I18DK

This paper considers infrasonic characterization of run-off and calving events from glaciers using I18DK data (Qaanaaq, Greenland). We seek to localise observed near-field sources of infrasound. The estimated curvature of the spherical wavefront may provide information on the location of the source. We suggest the Q-tau parameter as a tool to discriminate between far-field (plane) waves and near-field (spherical) waves. This parameter measures the misfit in time difference of arrivals (TDOA) compared to a plane wave. The sources are then localised using linear inversion based on the TDOA, as well as with a forward approach. Both algorithms produce accurate source location estimates when applied to synthetic data. The Q-tau values suggest a near-field glacier source located north-east of the station. The inverse source localisation shows a clear source direction, however, it is challenging to estimate exact locations. By comparison, the forward problem approach provides directions in agreement with the localisation. We conclude that the Q-tau parameter is meaningful when discriminating near-field from far-field sources. A localisation based on the TDOA and the forward approach is only possible near the station. Higher sampling rate, larger arrays and a modified array orientation will enhance the discrimination of spherical waves and the localisation.

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