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Electromagnetic Measurements to Infrasound Signals

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Measurements of electromagnetic (EM) fields have been proposed as a means of supporting and aiding infrasound signal analysis. As opposed to nuclear explosion, other natural and man-made infrasound sources don't produce an EM signal. Thus, if an IS signal isn't accompanied by an EM pulse, it's known that it's not originated from a nuclear explosion.

Lightning discharges are the main source of EM pulses. Due to their high abundance, fortuitous coincidence of lightning with an infrasound signal are a common situation. These events may be mistakenly assumed as a nuclear explosion. To avoid this obstacle, a reliable method for lightning detection and identification is required.

EM events were detected and recognized using spectrogram. From each segmented event, both time and frequency domain features were extracted. Based on these features, and using machine learning algorithms, all the detected events could be classified as either lightning or not lightning event with high reliability. Then, the non-lightning events were matched with infrasound events. The results show that coincidences of an unrecognized EM signal with an infrasound detection are rare and thus do not impose a real limitation. We conclude that information from EM measurements may enhance and ease the analysis of infrasound signals.

Promotional text

Measurements of EM fields may serve as a means of supporting infrasound signal analysis. Nuclear explosion is the only EMP source which produces also long range infrasound signal. The results show that coincidences of an unrecognized EMP with IS is rare.

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