

Explosions help probe elusive atmospheric waves

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Infrasound waves can probe some of the most complex weather patterns hidden to normal observations, but finding a powerful enough source of infrasound waves can be a challenge unless there is a munitions factory

nearby.

During the 182nd Meeting of the Acoustical Society of America, Stephen Arrowsmith, from Southern Methodist University, will discuss a method for using infrasound pulses from detonated munitions to probe atmospheric phenomena. His presentation, "The use of infrasound from repeating explosion sequences in Oklahoma to probe the atmosphere," will take place May 25 at 10:55 a.m. Eastern U.S. at the Sheraton Denver Downtown Hotel.

Infrasound waves are [acoustic waves](#) at frequencies too low for humans to hear, but they can be invaluable for studying atmospheric phenomena. One example is gravity waves, which are small-scale waves in the atmosphere driven by buoyancy. These waves are small and transient, making them challenging to study with traditional methods. Infrasound waves have the speed and resolution to track those gravity waves.

"The sound that we record propagates upward into the atmosphere and is refracted back down to the ground," said Arrowsmith. "The information they provide on the [upper atmosphere](#) can tell us about the winds aloft, and these can affect the weather at the ground."

These infrasound waves need to be strong enough to reach the atmosphere and bounce back, which requires a sizeable source. Fortunately for Arrowsmith, an Oklahoma munitions factory routinely sets off large explosions multiple times per day. He and his team set up detectors in the area around the factory to measure infrasound reflections from the troposphere and stratosphere.

They were able to use the data to study short-term atmospheric fluctuations and tie those fluctuations to [gravity waves](#) and other events. They then compared their data across multiple days to study longer-term trends and compare those to meteorological models.

Arrowsmith intends this result to serve as a demonstration of the power of infrasound to probe the atmosphere and study some of its more elusive elements. He hopes [infrasound](#) could one day be used as a tool to better understand and predict weather patterns.

More information: acousticalsociety.org/asa-meetings/

Provided by Acoustical Society of America

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