

Listening to the Atmosphere

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The continuous monitoring of potential nuclear tests is performed by the Austrian National Data Center (NDC-AT). The Comprehensive Test-Ban Treaty (CTBT) forwards data from a worldwide network of different sensors to all signatory states. This measure ensures that all member states of the treaty are able to monitor its compliance. One technology used to monitor atmospheric explosions is infrasound. To study its attributes and to understand the behaviour of infrasound propagation in mountainous regions, an infrasound test array was installed at the beginning of 2021 at the Trafelberg in Lower Austria.

Infrasound signals range from 0.01 to 16 Hz. Most known phenomena generating infrasound are atmospheric explosions, volcanic eruptions, thunderstorms, bolides, supersonic flights and launches of space shuttles. Strong earthquakes can also generate infrasound signals. Infrasound propagates through the air across several thousands of kilometers. The position, where the signals originated, is determined using arrays of sensors (minimum 3). Such an array allows to calculate the azimuth (= vector direction) and celerity thus permitting to localize the source.



Figure 1: One element of the newly deployed infrasound array at the COBS.

Each element consists of a recording unit (digitizer, GPS antenna) and a microbarometer. Figure 1 shows a Peli Case box which contains the recording unit. The box is connected with a cable to the microbarometer which is placed inside the bucket. Pressure data are collected via eight porous hoses attached to the sensor.

An infrasound array consisting of four sites was installed

at the Trafelberg in early 2021 (Figure 2). The array aperture is approximately 1000 m. All sites are equipped with Hyperion IFS 3000 sensors and sara® dataloggers. Power is supplied by a fuel cell and solar panels. The data is locally saved and stored on USB sticks, as well it is transferred in real-time to the Headquarter of ZAMG in Vienna. The data is recorded in miniseed format and processed and analyzed manually by using the dtkGPMCC- and dtkDIVA-Software, developed by CEA/DASE (Commissariat à l'Énergie Atomique/Département analyse, surveillance, environnement, France).

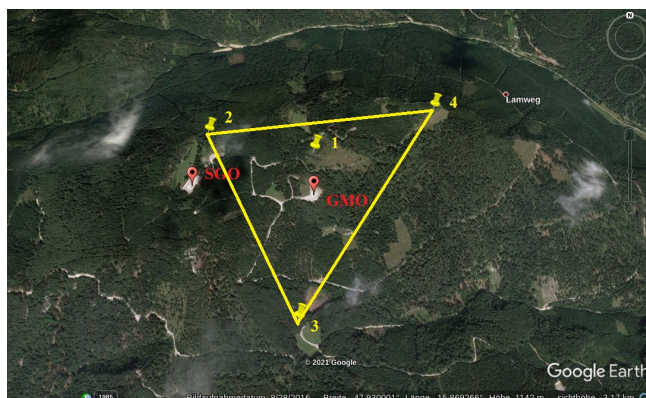


Figure 2: Location of the four elements of the Austrian infrasound array.

The mobile array is part of the Central Eastern European Infrasound Network (CEEIN) which was established in 2018 by Rumania, Czechia, Hungary, Ukraine and Austria. Due to seasonal variations of the stratospheric wind, studies will last for a minimum of one year. After that time it will be possible to evaluate the network quality for analysing infrasound signals from remote areas.

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