

## **signatures from powerful rocket launches for space missions**

*Thursday, 7 November 2024 15:25 (25 minutes)*

Rocket launches are a source of infrasound detectable at infrasound arrays in thousands of kilometers distance. Recorded signatures originate from the ignition, launch, supersonic movement, stage separation and reentry of rockets within the first about 100 kilometers of altitude in the atmosphere. We use IMS infrasound data to localize and characterize rocket launches all over the world.

During the last 20 years, an increasing number of annual space missions was conducted from various globally distributed space ports. These missions were mainly launched to inject satellites in Earth's orbit, but also for space station flights and the exploration of the Moon and other bodies in the solar system.

We investigate and present infrasound detections of interest, including NASA's Artemis 1 Moon mission using the Space Launch System in 2022, SpaceX's orbital flight tests of Starship in 2023 and 2024 and ESA's first launch of the new Ariane 6 rocket in 2024. Furthermore, we highlight a systematic analysis of infrasound recorded from multiple, regularly launched vehicles like Ariane 5, Falcon 9, and various Soyuz and Long March rocket types.

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**Session Classification:** Sources and Scientific Applications

**Track Classification:** Sources and Scientific Applications