METEOROLOGISCH - GEOPHYSIKALISCHES KOLLOQUIUM

WS 2019/20

Eine Lehrveranstaltung des Instituts für Meteorologie und Geophysik der Universität Wien

Zeit: Dienstag, 5.11.2019, 12.15 Uhr

Ort: HS 1 (UZA 2, Raum 2A120, Althanstr. 14, 1090 Wien)

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The study of infrasound: on source identification and probing the upper atmosphere

The study of infrasound gained renewed interest as it was chosen as a verification technique for the Comprehensive Nuclear-Test-Ban Treaty in 1996. Treaty verification will be realized with the International Monitoring System (IMS), which will consist of 337 monitoring facilities (seismic, hydro-acoustic, infrasound and radio-nuclide monitoring). Currently, about 90% of the IMS is certified; of the 60 planned infrasound arrays, 51 have been certified. Next to the IMS, a growth in national and regional of infrasound deployments has been observed over the last years.

Infrasound consists of low-frequency acoustical waves which are inaudible to humans. With its typical frequency contents below 20 Hz, infrasound can travel over large ranges (100 to 1000s of kilometers) and reach thermospheric altitudes in the atmosphere. Sources of infrasound are in general large in order to generate the low frequencies, among these are: volcanic eruptions, earthquakes, (nuclear) explosions, meteors, aurora, sonic booms and avalanches. Furthermore, there is an almost continuous background noise of interacting oceanic waves, called microbaroms, i.e., the atmospheric equivalent of microseisms in the solid earth.

The study of infrasound focuses on: (1) source identification and the associated seismo-acoustical coupling of the energy between the different geophysical media and (2) passively probing the geophysical media. Especially, the atmosphere is of interest for the latter, since knowledge on the fine scale spatial and temporal structure of the atmosphere is limited from the stratosphere and upwards. In order to retrieve the atmospheric wind and temperature structure, both ambient noise (microbaroms) and deterministic transient signals (e.g., explosions) are used.

In this colloquium, the measurement, processing and interpretation of infrasound will be presented, in its historical and present day context. Source identification is a key element in using infrasound as a verification technique. This process will be exemplified with some recent natural and anthropogenic sources. Furthermore, the role of the atmosphere in the propagation of infrasound will be addressed and how infrasound can be used to obtain information about the atmospheric structure. Sudden Stratospheric Warmings are presented to illustrate the sensitivity of infrasound to processes in the upper atmosphere.

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