



Infrasound from lightning: characteristics and impact on an infrasound station

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More than two third of the infrasound stations of the International Monitoring System (IMS) of the CTBTO are now certified and measure routinely signals due particularly to natural activity (swell, volcano, severe weather including lightning, ...). It is well established that more than 2,000 thunderstorms are continuously active all around the world and that about 45 lightning flashes are produced per second over the globe.

During the Eurosprite 2005 campaign, we took the opportunity to measure, in France during summer, infrasound from lightning and from sprites (which are transient luminous events occurring over thunderstorm). We examine the possibility to measure infrasound from lightning when thunderstorms are close or far from the infrasound station. Main results concern detection range of infrasound from lightning, amplitude vs. distance law, and characteristics of frequency spectrum. We show clearly that infrasound from lightning can be detected when the thunderstorm is within about 75 km from the station. In good noise conditions, infrasound from lightning can be detected when thunderstorms are located more than 200 km from the station. No signal is recorded from lightning flashes occurring between 75 and 200 km away from the station, defining then a silence zone. When the thunderstorm is close to the station, the infrasound signal could reach several Pascal. The signal is then on average 30 dB over the noise level at 1 Hz. Infrasound propagate upward where the highest frequencies are dissipated and can produce a significant heating of the upper mesosphere. Some of these results have been confirmed by case studies with data from the IMS Ivory Coast station.

The coverage of the IMS stations is very good to study the thunderstorm activity and its disparity which is a good proxy of the global warming. Progress in data processing for infrasound data in the last ten years and the appearance of global lightning detection network as the World Wide Lightning Localisation Network make such studies possible.