

EGU23-3173, updated on 18 Apr 2024

<https://doi.org/10.5194/egusphere-egu23-3173>

EGU General Assembly 2023

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



3D Acoustic reconstruction of lightning by two dense acoustic networks 14 km apart

Thomas Farges, Pierre Letournel, Alexis Le Pichon, and Constantino Listowski

CEA DAM DIF, Arpajon Cedex, France (thomas.farges@cea.fr)

Lightning emits electromagnetic (radio and optical) or acoustic waves, commonly called thunder. In recent years, studies have shown the contribution of acoustic measurements for the 3D reconstruction of cloud-to-ground or intracloud discharges. These acoustic reconstructions are in good agreement with LMA measurements and classical lightning location systems. Recent developments allow to infer the acoustic power of the source and its variability from one flash to another as well as within a flash.

In spring 2022, we set up a measurement campaign where four dense microphone arrays were deployed in the southeast of France. These arrays were composed of nine sensors distributed in a 3x3 matrix of a 20 meter square area. The signals were sampled at 100 Hz and time-stamped with the GPS reference. A thunderstorm occurred on April 23, 2022 and was observed by three of these four arrays. Comparisons with detections at a four array elements of comparable aperture highlights the contribution of denser networks in terms of detection and location capabilities. The storm of April 23 passed between two arrays 14 km apart. This campaign is a very good opportunity to demonstrate how lightning locations can be reconstructed by combining detection results at two acoustic arrays. We detail these new contributions in our presentation.