AGU.

Seismo-acoustic study of thunder using the AlpArray.

Novoselov, A., Dorninger, M., Bokelmann, G.
Department of Meteorology and Geophysics, University of Vienna, Austria

Lightning has been a topic of fascination for physicists, engineers, and meteorologists and thus lightning has been studied from various perspectives. A lightning electric discharge that involves an object on the ground or in the atmosphere is referred to as a lightning strike. A high-current lightning strike rapidly heats the channel to extremely high temperatures near or above 30,000 K and creates a channel pressure of more than 1 MPa, resulting in channel expansion, intense optical radiation, and an outward propagating shock wave that eventually becomes the thunder.

We obtain a large seismic dataset from the seismic regional network AlpArray and lightning data from the Lightning Location System - ALDIS. We investigate thunder signals recorded with seismic stations in a frequency range of 2-49 Hz. We try to establish whether important information about the lightning flash can be determined independently of optical and electrical measurements, through the means of seismic analysis.

We demonstrate that seismic data provide useful information on thunder and lightning and we observe a correlation between lightning peak current and maximum ground displacement induced by the thunder for positive Cloud-to-Ground flashes of lightning. We also show how one can utilize a 3-component seismic station to reconstruct the lightning channel.

ECS:

Separating and denoising seismic signals with dual-path recurrent neural network architecture

Artemii Novoselov, Goetz Bokelmann