Geophysical Research Abstracts
Vol. 15, EGU2013-6167, 2013
EGU General Assembly 2013

Detection of variations of VLF/LF signals generated by lightning strokes and its analysis

Bo Ram Lee, Claudia-Veronika Meister, and Dieter H.H. Hoffmann

Technische Universität Darmstadt, Institut für Kenphysik, Darmstadt, Germany
(c.v.meister@skmail.ikp.physik.tu-darmstadt.de)

Lightnings which are produced in the Earth's atmosphere during thunderstorms are known to generate currents of 200 kA per stroke and cause broadband radio signals acting on antennas at the Earth's surface. In the present contribution, the newly developed theory of cosmic ray shower-runaway breakdown in thunderclouds predicted by Gurevich et al. is reconsidered and possible changes of the degree of ionization in thunderstorm regions are discussed. Moreover, estimates of the variations of electrical conductivity and electric fields during the electron avalanche are performed. The changes of the plasma parameters of the Earth's atmosphere may be strong enough, so that the altitudes, at which artificial VLF/LF signals are reflected in the atmosphere, are modified. Consequently, also the amplitudes and phases of the VLF/LF signals detected by radio stations may show observable variations. For instance, they should be detectable by the VLF/LF radio station VADar of the University of Technology Darmstadt constructed to predict possible earthquake precursors in Europe. First results of the analysis of VADar observations during thunderstorms using the Hilbert-Huang method are presented.