Geophysical Research Abstracts
Vol. 21, EGU2019-4172, 2019
EGU General Assembly 2019

Reconstruction of global lightning activity based on multi-station Schumann Resonance measurements

Tamas Bozoki (1,2), Erno Pracser (1), Gabriella Satori (1), Earle Williams (3), Anirban Guha (4), Haiyan Yu (5), Mike Atkinson (6), Rollin McCraty (6), and Boris Fain (6)

(1) Geodetic and Geophysical Institute, RCAES, HAS, Sopron, Hungary (bozoki.tamas@csfk.mta.hu), (2) University of Szeged, Hungary, (3) Parsons Laboratory, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA, (4) Department of Physics, Tripura University, India, (5) Institute of Information Science and Engineering, Harbin Institute of Technology, Weihai, China , (6) HearthMath Institute, Boulder Creek, California, USA

Lightning activity is getting increased attention in the research community as it is now recognized as a climate variable indicating the changing climate of the Earth. Here, we present an inversion algorithm designed to reconstruct global lightning activity in quasi-real time from multi-station Schumann resonance (SR) measurements. SRs are the electromagnetic resonances of the Earth-ionosphere cavity with characteristic peaks at 8 Hz, 14 Hz, 20 Hz, etc. In this specific frequency band lightning-radiated electromagnetic waves travel several times around the globe before losing most of their energy and all individual lightning discharges (intracloud and cloud-to ground alike) contribute to the measured electromagnetic field. Based on theoretical models for wave propagation in the Earth-ionosphere cavity, the distribution and the average charge moment change of lightning activity can be estimated in absolute unit (C^2km^2/s) from the SR electromagnetic field components measured at a few (6 in this case) distant observation sites on the globe. We summarize the main characteristics of the applied inversion and show tests about its applicability based on synthetic data. The first few days of inversion results based on real observations will be also presented.