

## **Estimation of Global Lightning Activity and Observations of Atmospheric Electric Field**

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### **Abstract**

Variations in the global atmospheric electric circuit are investigated using a wide range of globally spaced instruments observing VLF (~10 kHz) waves, ELF (~300 Hz) waves, Schumann resonances (4-60 Hz), and the atmospheric fair weather electric field. For the ELF/VLF observations, propagation effects are accounted for in a novel approach using established monthly averages of lightning location provided by the Lightning Image Sensor (LIS) and applying known frequency specific attenuation parameters for daytime/nighttime ELF/VLF propagation. Schumann resonances are analyzed using decomposition into propagating and standing waves in the Earth-ionosphere waveguide. Derived lightning activity is compared to existing global lightning detection networks and fair weather field observations. The results suggest that characteristics of lightning discharges vary by region and may have diverse effects upon the ionospheric potential.

**Key words:** global electric circuit, lightning discharges, ELF/VLF waves, Schumann resonances.