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Variability of global lightning on different time scales as shown by Schumann Resonances

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A lightning discharge can be considered as a natural broadband transmitter radiating electromagnetic waves in a wide frequency range. The electromagnetic waves in the ELF (Extremely Low Frequencies: 3 Hz to 3 kHz) range are mostly confined by the spherical cavity formed by the Earth's surface and the lower ionosphere. Propagation of ELF waves is characterized by low attenuation, especially in the Schumann resonance (SR) frequency range (5 Hz to approx. 100 Hz). As a result, an effective interference between the "direct" and the "around-the-globe" waves occurs, in a phenomenon known as the Schumann resonances (SR). The lowest, fundamental resonance mode has frequency of about 8 Hz, which corresponds to the wavelength approximately equal to the Earth's circumference. In principle, continuous observations of the Schumann resonance parameters (modal amplitudes, frequencies, and quality factors) provide invaluable information for monitoring the worldwide lightning activity from a single SR station. Both the intensity and position of lightning activity vary on the different time scales as shown by Schumann resonances observed in the Széchenyi István Geophysical Observatory at Nagycenk, Hungary and some other SR stations in the world.