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Global map of thunderstorm activity based on GEON and its relationship to the solar activity

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Hokkaido University developed a global ELF observation network, named GEON, which provides very unique information of each cloud-to-ground lightning discharge (CG), as well as Schumann resonance (SR) power, a proxy of global energy proxy of lightning discharge. From the standpoint of the relationship between the effect of solar activity to the climate of Earth, lightning activity estimated by data obtained by GEON and the outgoing longwave Radiation (OLR), an indicator of cloud amount, are examined for their periodicity and phase in the periodic range of about one month. SR power shows about 27-day periodicity in solar maximum years and it becomes elongated toward solar minimum. On the other hand, OLR shows same kind of 27-day periodicity in solar maximum years, but only in the Western Pacific Warm Pool area. Both the spectra of SR and OLR have a peak around 35-day in solar minimum years. The average spectrum of OLR in solar maximum years also shows an enhancement in the range of 50-60 days corresponding to the main MJO period. In this presentation the relationship between the thunderstorm activity inferred from global lightning distribution observed by GEON and OLR are discussed in detail, comparing the solar activity.

Keywords: lightning, thunderstorm, OLR, solar activity, GEON