

27-day variation in cloud amount and lightning activity and relationship to the solar cycle

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Connections between solar activity and the earth's climate have been investigated for many years. The 11-year cycle in solar activity evident in sunspot numbers is the most examined example of periodicity, and it is clearly recognized in variations in the thermal structure and dynamical motion of the stratospheric atmosphere. However, for short period, such as an order of one-month, no quantitative evidence indicating a relationship to the tropospheric phenomena. Motivated by one-month periodicity in lightning activity, we examined a 27-day variation in OLR, representing the cloud amount, in the region of the Western Pacific warm pool, which is only seen in the solar maximum years of the 11-year cycle. The average spectrum in solar maximum years also shows an enhancement in the range of MJO period. Long-term variations in the tropospheric phenomena, including the 11-year cycle, are generally investigated based on monthly or even yearly averaged data, but the present results may suggest an alternative possibility: short-period variations could modulate longer periodic phenomena. We also examined the one-month variation of lightning activity for different longitudes. It was found that the lightning activities sometimes show synchronized variations between the regions.