to be surprisingly highly correlated with Φ (KRM), as Φ (IMF) $=29.8+0.999$. Φ (KRM), although the Φ (IMF) is systematically larger than the Φ (KRM) by 30kV, suggesting the possibility that the theoretical method overestimates the cross-polar cap potential difference. During steady southward IMF periods during which steady Φ (IMF) is expected, significant fluctuations in Φ (KRM) are observed. Since the decrease in Φ (KRM) appears to be closely associated with enhancements in auroral particle precipitation during the periods, a highly correlative relation between Φ (KRM) and Φ (IMF) cannot be expected unless the phases of substorms are taken into account.

The Sunspot Cycles Revisited

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Among many astronomical observations, the sunspots are one of the most straightforward data obtainable and yet bear plenty of astrophysical meanings to investigate. Including ancient records, these observations would pertain more than a thousand years. Ever since J. R. Wolf's introduction of the sunspot number index in 1848, many different sunspot observations can now be mutually adjusted for consistency of scientifically useful sunspot numbers that now covers for nearly three centuries. Here I describe the discovery of a logn-term modulation of *a period of* 92^{+21}_{-13} *years* with the "time-delay correlation" method on the sunspot data compiled over the last a total of 289 years. This period falls well within the Gleissberg (1971, *Solar Phys.*, **21**, 240.)cycle 80~100 years and clearly contrasts with the 55 year grand cycle which Yoshimura (1979, *Ap. J.*, **227**, 1047.) claimed.

For the origin of the sunspot periodicity, though solar physicists are not now convinced that the Sun follows such a strict periodicity (somewhat *Chaotic* in behaviour), planetary tidal forces on the Sun are simulated over the last 300 years, in which the simulated locations of planets are accurate within 10^{-6} or so. This experiment indicates that there seems no correlation between them. However, positional variations of Sun's barycenter (which period is about 100 years) appear to be somewhat large enough that planetray configurations cannot entirly be ruled out for their being influential on the solar convection: via exerting extra Coriolis forces due to wobbling of the body. Dynamics of this phenomena is currently being undertaken.

Zenith Distance Dependence of the Atmospheric Diffuse Light

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In order to understand the empirically determined distribution of the atmospheric diffuse light (ADL) over zenith distance, we have solved the problem of radiative transfer in an anisotropically