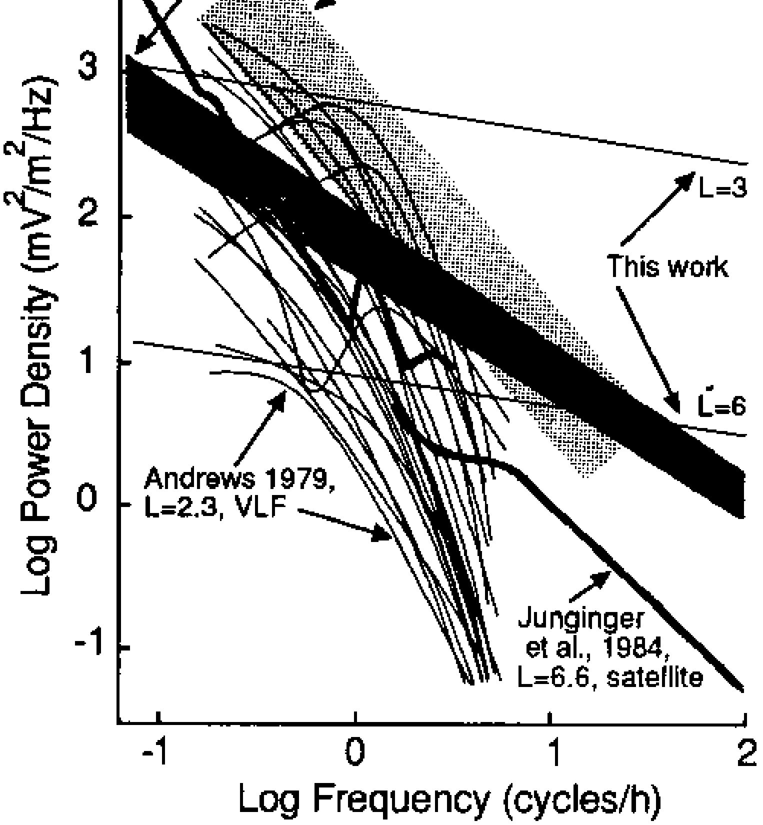

Figure 7. Derived and measured electric field power spectra. (a) from balloon, $L > 6$ [*Mozer*, 1971]; (b) from balloon, $L > 6$ [*Holzworth and Mozer*, 1979]; (c) from whistler duct convection, each curve represents one duct, $L = 2.3$ [*Andrews*, 1980]; (d) from radar, $L = 1$ [*Earle and Kelley*, 1987]; (e) from satellite, $L = 6.6$ [*Junginger et al.*, 1984]; (f) present results.

currents, and therefore affects the high-latitude convection [*Senior and Blanc*, 1984], which may, perhaps through a neutral wind scenario like that of *Blanc and Richmond* [1980] and *Blanc* [1983] be responsible for the day-to-day changes in the low-latitude dynamo. In addition, as the distance between the effective inner edge of the ring current and the ionosphere decreases, the diamagnetic effect of the ring current magnetic field increases, as well as the energy input in the form of precipitating energetic neutrals [*Tinsley*, 1979].

If any of these (admittedly small) inputs modify the ionospheric electric fields sufficiently, then this feedback mechanism may account for some of the fluctuation power of the dynamo fields. One possible scenario would begin with a high-latitude electric field penetrating to low latitudes and enhancing the azimuthal electric field either globally or locally. This static field would cause the ring current to move inward, enhancing the diamagnetic effect as well as the precipitating neutral flux. Both effects would increase the ionospheric conductivities, which in turn reduce the dynamo electric field strength. The net result is that a pulsation of the electric field is generated, increasing the internal contribution of the electric diffusion coefficient, and intensifying the inner edge of the ring current. Thus the next electric field pulsation would create an even greater response. Future research might be aimed at analyzing such processes.

possibly contribute greatly to the transport of the quiet t
ring current during the solar minimum period of 1985–1
We have concentrated on data in the ~30–300 keV en
range, where diffusion, not convection, is the dominant tr
port mechanism. We have used a semi-empirical deriva
of the presumed ionospheric origin electric diffusion c
ficient to fit the data using a maximum likelihood met
We also found that above L~6, externally driven field f
tuations dominate the diffusive transport, but below thi
shell, internal origin electric field fluctuations cause n
of the cross-L transport. Additionally the deduced ra
gradient of the "internal" fluctuations suggest that either
field fluctuation source itself has strong latitudinal gr
ents and/or that the surmised ionospheric fields appear t
shielded from the magnetosphere. Assuming that magn
field lines are also electric field equipotentials and assun
that diffusion is caused by only the lowest spatial harm
ic, we can estimate the power level of these fluctuation
the ionosphere. We find that this estimate is comparabl
magnitude, though not fully consistent in spectral form v
the few ionospheric measurements that have been made.
speculate that the effects of the ring current–equatorial e
trojet may produce a feedback (or regulation) mechan
that at least in part determine the global equilibrium of
ionospheric current system.

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