Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Anomalous ionospheric conductivities caused by plasma turbulence in high-latitude E-region ionosphere[1] YAKOV DIMANT, MEERS OPPENHEIM, Boston Univ — During periods of intense geomagnetic activity, electric fields penetrating from the Earth's magnetosphere to the high-latitude E-region ionosphere drive strong currents named electrojets and excite there plasma instabilities. These instabilities give rise to plasma turbulence that induces nonlinear currents and strong anomalous electron heating. This increases the ionospheric conductances and modifies the global energy flow, affecting behavior of the entire near-Earth plasma. A quantitative understanding of anomalous conductance and global energy transfer is important for accurate modeling of the geomagnetic storm/substorm evolution. Our theoretical analysis, supported by recent 3D fully kinetic particle-in-cell simulations, shows that during strong geomagnetic storms the inclusion of anomalous conductivity can more than double the total Pedersen conductance - the crucial factor responsible for magnetosphere-ionosphere coupling through the current closure. We have started incorporating the effects of anomalous heating and nonlinear conductivity into existing global magnetosphere-ionosphere-thermosphere codes developed for predictive modeling of Space. In our presentation, we will report on the latest progress in this modeling.

[1]Work supported by NASA Heliophysics GCR Grant NNX14AI13G

Yakov Dimant
Boston Univ

Date submitted: 24 Jul 2015 Electronic form version 1.4