JOINT ASSEMBLY
Montreal, Canada • 3-7 May 2015
AGU-GAC-MAC-CGU
RÉUNION CONJOINTE
Montréal, Canada • 3-7 mai 2015
AGC-AGU-AMC-UGC

Plasmasphere refilling rates as deduced from Ukraine incoherent scatter radar data by FLIP simulation for the last solar minimum

*Dmytro V. Kotov[1], **Philip G Richards**[2], Vladimir Truhlik[3], Stanimir M Stankov[4], Oleksandr Bogomaz[1], Leonid Chernogor[1] and Igor F. Domnin[1], (1)Institute of Ionosphere, Kharkiv, Ukraine, (2)George Mason University, Fairfax, United States, (3)Academy of Sciences of the Czech Republic, Prague, Czech Republic, (4)Royal Meteorological Institute, Brussels, Belgium*

Contact First Author: *Dmytro V. Kotov; dmitrykotoff@gmail.com*

Abstract ID#: 36399

English Abstract: During the last solar minimum, anomalously high nighttime H^+ densities was observed over the Kharkiv, Ukraine incoherent scatter radar (49.6° N, 36.3° E, L=2.1). The standard physical model underestimates the H^+ densities by a factor of 2 in March 2006 and a factor of 3 in March 2009. The calculations indicate that the higher measured topside ionosphere H^+ densities are most likely due to higher neutral hydrogen densities. It could be the result of weaker than usual magnetic activity, which would reduce the energy input to high latitudes. Prolonged low activity periods could cause a global redistribution of hydrogen and also allow more neutral hydrogen to settle down from the exosphere into the mid latitude ionosphere. The finding of the need for higher H densities agrees well with recent H-alpha airglow measurements and it is important for accurate modelling of plasmasphere refilling rates. Our calculations with the FLIP model show that the refilling rate is increased by a factor of 2 when the NRLMSISE H density is increased by a factor of 3 and no other changes made to the model inputs. These refilling rates agree well with those observed at geosynchronous orbit (L=6.6) after a magnetic storm in June 2007. We have also found that the refilling rate varies significantly with longitude. Simulations in the American sector would underestimate the maximum refilling rate observed at geosynchronous orbit by more than 50%.