Roles of the Conductance in Making Sense of High-latitude Geospace Observations

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Assimilative Mapping of Ionospheric Electrodymanics

[Richmond and Kamide, 1988]

Inverse procedure to infer maps of

$\vec{E}$, $\Phi$, $\Sigma$, $\vec{J}_||$, $\vec{J}_\perp$, $\Delta \vec{B}$

linear relationship (for a given $\Sigma$)

$$\vec{E} = -\nabla \Phi$$

$$\vec{J}_|| = \nabla \cdot \vec{J}_\perp$$

$$= \nabla \cdot (\Sigma \cdot \vec{E})$$

$$\nabla \times \Delta \vec{B} = \mu_0 \vec{J}$$

From observations of

SuperDARN plasma drifts
Iridium/AMPERE magnetic fields
Ground-based magnetic fields
DMSP auroral particle precipitations
AMIE Nextgen - SuperDARN, Iridium/AMPERE & DMSP data

Results from both hemispheres from an example snapshot (29 November, 1500 UT) are shown in Figure 7, following the format in Figure 3. The IMF is $B_y$ dominated at this time, and both the convection pattern and the dayside FAC distribution have different morphologies in the two hemispheres, as expected [e.g., Feldstein et al., 1984; Heppner and Maynard, 1987]. The electrostatic potential and FAC density values are larger in the South than in the North, and the Poynting flux is significantly enhanced in the South, especially in the polar

Figure 8. Distributions of electrostatic potential, FAC density, and Poynting flux for 0900–0910 UT, 29 November 2011, following the format in Figure 7.

[Matsuo et al., 2015; Cousins et al., 2015; Mcgranaghan et al., 2016]
Assessing AMIE Nextgen Improvement

[Cousins et al., 2015]

[Mcgranaghan et al., 2016]