



Magnetic effects of plasma pressure gradients in the upper F region

Karl M. Laundal, Spencer Hatch, and Therese Moretto

Bergen, Dept. of Physics and Technology, BCSS, Bergen, Norway (karl.laundal@ift.uib.no)

The *Swarm* satellites fly at altitudes which at polar latitudes are generally assumed to only contain currents that are aligned with the local magnetic field. Therefore, disturbances along the main-field direction are mainly signatures of auroral electrojet currents, with a smooth structure due to the distance from the currents. We show that, superimposed on this smooth signal is an irregular pattern of small perturbations which are anti-correlated with the plasma density measured by the Langmuir probe. We show that the perturbations can be remarkably well reproduced by assuming they represent a $\mathbf{j} \times \mathbf{B}$ force which balances the plasma pressure gradient implied by the density variations. The associated diamagnetic current, previously reported to be most important near the equator, appears to be a ubiquitous phenomenon at all latitudes. A spectral analysis indicates that the diamagnetic effect dominates magnetic field intensity variations at small small scale sizes, at ~ 10 km