



Magnetic field patterns near the polar cap boundary

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We present results about the magnetic field pattern at low earth orbit near the open closed field line boundary (OCB). We try to determine criteria for when and how the OCB can be determined from magnetic field measurements. The OCB is determined from low energy particle fluxes, and the magnetic field measurements are taken from the AMPERE data products derived from the Iridium constellation. Poleward of the OCB we typically have anti sunward flow, while equatorward of the boundary, the flow is typically sunward. The resulting flow pattern makes up the two-cell convection pattern which is due to the Dungey cycle. The ionospheric plasma flow is driven by magnetic tension which is balanced by the frictional force. The tension is imposed by the solar wind and magnetospheric plasma flows. In the simplest picture the magnetic field perturbations are parallel to the flow in the Southern hemisphere and anti parallel to the flow in the Northern hemisphere. In this simple picture the OCB would be located where the magnetic field perturbations change direction. There are at least two complications to this simple picture. The first is that there are other flow cells near the OCB like the lobe cell and viscous cell. These would complicate the flow patterns by causing sunward flow on open field lines and anti sunward flow on closed field lines. The second complication is that the Hall-effect in the ionosphere will cause an additional magnetic field perturbation perpendicular to the plasma flow. With these processes in mind, we try to identify patterns in the magnetic field which are unique to the OCB.