

3D Elliptic Equations for GEMINI

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This document describes the mathematical formulation of the ARCS scenario 1 data inversion problem. The measurements being made for scenario 1 will result in production of maps of magnetic field fluctuations $\Delta\mathbf{B}$, and flows \mathbf{v} . These will be converted, as part of standard data processing, into parallel current density and electric field:

$$\mathbf{J} = \nabla \times \left(\frac{\Delta\mathbf{B}}{\mu_0} \right) \quad (1)$$

$$\mathbf{E} = -\mathbf{v} \times \mathbf{B} \quad (2)$$

1 Physical constraints

1.1 Parametric approximations of ionospheric conductivities

1.2 Ionospheric potential problems sans source terms