Estimation of geomagnetically induced current levels from different input data

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Pragmatic schemes for estimating geomagnetically induced current (GIC) values using different levels of knowledge about the physical quantities associated with the geomagnetic induction process are studied. The fundamental idea behind the proposed schemes is that as the knowledge about the detailed behavior of the relevant physical quantities decreases, the lack of knowledge is compensated by statistical characteristics of the geomagnetic induction process and GIC.

It is shown that reasonable GIC estimates can be obtained if some information about the state of the geomagnetic environment is available. For example, single values of the time derivative of the magnetic field at the surface of the Earth or even mere single value of the field deflection from the baseline-level can sometimes be sufficient to give a reasonable statistical GIC estimate. It is also shown that the sampling rate of the magnetic field variations used to make the GIC estimates can be lowered down to about 60 seconds without crucially degrading the accuracy of the estimation.