# Simulation study on the Earth's magnetic field and its variatiions

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The geomagnetic field and its variations provide powerful clue on the dynamical process of the Earth's mantle and core. The dynamo action in the liquid electrically conducting outer core generates the main magnetic field of the Earth. Understanding of the geodynamo is inherent to clarify the dynamics of the core. On the other hand, the rapid time variation of the external field causes induced currents through the interior of the earth. Observation of the induced field can be used to estimate the electrical conductivity structure of the mantle. Since our present knowledge of the interiors of the earth comes primarily from the elastic properties obtained by seismology, the observation of the conductivity heterogeneities can add powerful clue on the dynamical state of the mantle. For these investigations, large-scale numerical simulation studies are indispensable. In the present talk, we summarize the present state of the simulation study on the dynamo action in the core and the electromagnetic induction process in a 3-D heterogeneous earth by utilizing the Earth Simulator.