

## Geodynamo simulations with and without the inner core

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Paleomagnetic results suggest that the Earth's magnetic field existed at least 3.5 Gyr ago (McElhinny and Senanayake, 1980) and there is an evidence of a polarity reversal which occurred 3.2 Gyr ago (Lager et al., 1996). In this very early stage of the Earth's cooling history, there is a possibility that the solid inner core (IC) was absent. The presence or absence of the IC could have a large effect on the convective state of the fluid core because of the differences of the driving sources of convection and the geometry of the fluid core. Therefore, it is presumable that the primitive geodynamo without the IC such as in the Archean age worked considerably differently from the present one.

Here we performed magnetohydrodynamic dynamo simulations with and without the IC to investigate the influence of the existence of the IC on the dynamo processes. Although a similar study was conducted by Sakuraba and Kono (1999), they used hyperdiffusivity because of a difficulty to represent low viscosity of the Earth's core. In this presentation the results in more Earth-like conditions will be shown, and the efficiencies and the behaviors of the dynamos will be compared in the cases with and without the IC. The possibilities of reversals will also be discussed in these cases.