[JJ] Evening Poster | S (Solid Earth Sciences) | S-EM Earth's Electromagnetism

[S-EM17]Geomagnetism, Paleomagnetism and Rock Magnetism

convener:Nobutatsu Mochizuki(Priority Organization for Innovation and Excellence, Kumamoto University), Hisayoshi Shimizu(Earthquake Research Institute, University of Tokyo)

Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

We are going to discuss the issues on the magnetic fields of the Earth and planets, paleomagnetism, rock-magnetism, and their applications. This session includes the following topics: (1) observation and analysis of the magnetic fields of the Earth and planets, (2) paleomagnetic field variations obtained from natural and archaeological materials, (3) numerical simulations on the magnetic fields of the Earth and planets, (4) measurements and theories of magnetic properties of rocks, minerals, meteorites and other materials, (5) climate changes and global and local surface tectonics based on the paleomagnetic measurements of rocks and sediments, (6) observations of the magnetic anomalies and the crustal magnetization models of the Earth, planets and satellites, and (7) developments of the experimental method and data analysis. The presentation and discussion will be made in Japanese or English in this session.

[SEM17-P01]Preliminary analysis of a jerk-like magnetic field variation detected in a numerical dynamo model

*Yoshiki Manabe[1], Futoshi Takahashi[1] (1.Kyushu University)

Keywords:geomagnetic jerk, dynamo, numerical simulation

The geomagnetic field, which is generated by the geodynamo, varies in a wide range of time scale. Focusing on short time scale variation, it is well known that a sudden and abrupt change in the first time derivative of the geomagnetic field (a V-shape-like change) occurs in typically one year. This abrupt change is called the geomagnetic jerk. Although we don’t fully understand the mechanism of the geomagnetic jerk, it is said that the geomagnetic jerk is of internal origin in a broad sense.
In this study, we use a numerical dynamo modeling to see whether or not any jerk-like magnetic field variation can result from a dynamo model at a reasonably low Ekman number. The adopted values of the Ekman number in the model is 3×10^{-5}. We investigate three components of the dynamo-generated magnetic field at the core-mantle boundary and the model Earth’s surface truncated at spherical harmonic degree 12 according to geomagnetic observations. In time series at a selected position, we find some V-shape changes in secular variation accompanying rapid changes from negative to positive values and vice versa in secular acceleration. Such variation is not always observed in three components, and shows some delay in a certain component. These variations occur typically in 5×10^{-4} in magnetic diffusion time unit. Although it should be kept in mind that secular variation time scale in the dynamo model may not correspond to that in the geomagnetic field mainly because of vast difference in the Ekman number, these features are similar to those of the geomagnetic jerk. The results suggest a possibility that numerical dynamos could generate even rapid magnetic field variation such as jerk, and also that some geomagnetic jerks might be purely of core origin.