Statistical model of secular variation arising from the dipole dominant paleomagnetic field

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A very simple statistical model of paleosecular variation is proposed. The model is consist of a single dipole moment, in which random fluctuation is given to not only its magnitude and direction but also its position around the earth's center. Fluctuation in the position, however, is confined in the equatorial plane to explain the latitude variation of angular dispersion in the paleomagnetic field. This model also explains other features of paleosecular variation such as larger circular asymmetry in the field directions than in VGPs.

The powers for degree 1 and 2 from this model are the same level as the present-day field, while decreases much more quickly for higher terms. Possible indication of this is that fluctuations in the dipole and nondipoles are independent.

A very simple statistical model of paleosecular variation is proposed. The model is consist of a single dipole moment, in which random fluctuation is given to not only its magnitude and direction but also its position around the earth's center. Fluctuation in the position, however, is confined in the equatorial plane to meet with the larger variation in degree 2 order 1 terms which is necessary to explain the latitude variation of angular dispersion in the paleomagnetic field.

This model also explains other features of paleosecular variation; larger circular asymmetry in the field directions than in VGPs at low latitude, non-Fisherian distribution of VGP positions at high latitude, log-normal distribution of VDM at low to middle latitude. This model has a geophysical picture easy to understand and the most natural to the established dipole hypothesis for the time-averaged paleomagnetic field.

The power spectrum from this model gives the powers for degree 1 and 2 which are the same level as the present-day field, while decreases much more quickly for higher degrees. Possible indication of this is that fluctuation in the moment and position of the dipole is independent from the fluctuation of non-dipole field which arises near CMB.