GEOMAGNETIC REVERSALS, TECTONICS AND THE CORE MANTLE BOUNDARY TOPOGRAPHY

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Among the main problems in geomagnetism are the reversals, particularly by their long term irregularity, and the existence of superchrons.
In this work we show evidence supporting the idea that geomagnetic reversals, both in frequency and morphology, are controlled by anomalies at the base of the mantle, in particular by large topographic structures. This observation comes from the comparison between observed topography at the base of the mantle, and from rate of oceanic plate spreading (which may be the ultimate cause of topographic anomalies at the base of the mantle) and frequency of reversals.
To explain these facts we use the argument that topographic magnetostrophic waves can generate the alpha effect of dynamo theory. The amplitude of the alpha effect is proportional to the amplitude of the topographic feature. As it has been long known, frequency of reversals depends on the amplitude of alpha.
Then we come to the conclusion that periods with high frequency of reversals are related to epochs when the core mantle boundary is irregular, and periods with low frequency of reversals are associated with a smooth core mantle boundary. Since alpha effect is a source of poloidal field its concentration may cause the observed clustering of VGPs close high amplitude topographic regions.
Finally we show that these long term variations of alpha effect due to variations in the amplitude of topographic features can generate a distribution of polarity intervals similar to the observed one by using a nonstationary stochastic dynamo model.

Geodynamo, tectonics, CMB topography

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