Lower Mantle Conductivity Anomalies Estimated from the 1969 Geomagnetic Jerk

Hiromichi Nagao[1], Toshihiko Iyemori[2], Tomoyuki Higuchi[3], Tohru Araki[4]

[1] Dept. of Geophysics, Kyoto Univ., [2] WDC-C2 for Geomag., Kyoto Univ., [3] Inst. Stat. Math., [4] Geophysics,Kyoto Univ.

The occurrence epochs and duration periods of the 1969 geomagnetic jerk are estimated for 47 geomagnetic observatories by applying a statistical time series model to monthly means of the geomagnetic eastward component. It is confirmed that the occurrence epochs in the southern hemisphere are delayed several years from those in the northern hemisphere as reported by previous papers. Moreover it is found that the duration times, which are defined as the lengths of the duration periods, are longer than twelve months around South Africa and South Pacific Ocean although those in other regions are not more than six months. This result may imply the existence of large conductivities in the lower mantle beneath South Africa and South Pacific Ocean, which possibly relates to the fact that the velocity of seismic S waves in the lower mantle beneath these regions is slower than that in other regions. The mantle conductivities beneath South Africa, South Pacific Ocean, and other regions are estimated through a numerical experiment; the magnetic diffusion equation in the mantle is solved for an abrupt magnetic change generated at the core-mantle boundary. Comparing the results obtained by the numerical experiment with those obtained by the data analysis, it is plausible that the mantle conductivities beneath South Africa and South Pacific Ocean are larger than that beneath other regions although there is an ambiguity in the estimated magnitudes of the mantle conductivity.