



The time-invariant ocean-magnetic field: Prediction and Observation

I. Wardinski, V. Lesur, A. Kuvshinov, M. Manda

Sec. 2.3 Earth's Magnetic Field, GFZ Potsdam

Recently, simulations have been carried out to estimate the strength of electric and magnetic signals generated by the steady motion (ocean circulation) of the highly conducting ocean. The magnetic signals have been found to be on the order of several nT at the Earth's surface. The ocean circulation signals are especially pronounced in the high latitudes of the southern hemisphere, where an eastward current circulates without hitting the continental landmass. In this study, we estimated the magnetic field generated by the ocean circulation and modelled it on a global scale using the spherical harmonics. We found that the energy spectrum of the expansion is dominated by spherical harmonic degrees 3 to 6. A comparison of the field strengths clearly indicates that the ocean magnetic field strength accounts for about 1 % of the lithospheric magnetic field.

Although, the ocean magnetic field is very weak, we seek to extract this signal from geomagnetic satellite observations. First results suggest that the ocean magnetic signal is likely to be obscured by unexplained magnetic signals of the same order of magnitude generated in the ionosphere and magnetosphere.