

SIO 223 Homework

Spectral Estimation

Due 6/8/04

1. On the class website you can find 2 sets of data series derived from the magnetic satellite Magsat. One comes from measurements derived at dawn local times, and the other from dusk. In each file there are 3 columns, corresponding to measurement time t , an estimate of the external ring current field $e_1^0(t)$, and an estimate of the internal field $i_1^0(t)$ induced by the time variations in $e_1^0(t)$. The transfer function between the two can be used to infer information about electrical conductivity as a function of depth in the earth.

Use cross to derive an estimate of the transfer function as a function of frequency. Explain how you deal with the fact that both the internal and external signals contain noise. Do the dawn and dusk local times give compatible results? If not can you explain why? To what depth in the earth are these data likely to be able to provide conductivity information?