Geophysics 699 - Magnotellurics and Continental dynamics

Assignment 1

(1) Papers to read

Tikhonov, A.N., On determining electrical characteristics of the deep layers of the Earth's crust, Proceedings of Academy of Sciences (USSR) Doklady, 83, 2, 295-297, 1950.

Cagniard, L., Basic Theory of the magneto-telluric method of Geophysical Prospecting, *Geophysics*, **18**, 605-635, 1953.

Wait, J.R., On the relation between telluric currents and the Earth's magnetic field, *Geophysics*, **19**, 281-289, 1954.

Cantwell, T., T.R. Madden, Preliminary report on crustal magnetotelluric measurements, *J. Geophys. Res.,* **65**, 4202-42-5, 1960.

Niblett, E.R., and C. Sayn-Wittgenstein, Variation of Electrical conductivity with depth by the Magnetotelluric method, *Geophysics*, **25**, 998-1008, 1960

Price, A.T., The theory of Magnetotelluric methods when the source field is considered, *J. Geophys. Res.,* **67**, 1907-1918, 1962.

T.R.Madden and P. Nelson, A defense of Cagniard's magnetotelluric method, ONR report, 1963.

(2) Computation

Write a MATLAB code for 1-D MT response of multi-layer Earth.

Use the same theory as in Geophysics 424 and consider downgoing and upgoing diffusive signals in the nth layer.

Derive a recursion relation that relates the impedance at the top (Z_{n-1}) and the impedance at the base (Z_n) of the layer.

The recursion can begin from the results for the half space at the bottom of the stack of N layers.

Validate the algorithm for some simple 1-D models.

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