Developing A Synchronized Multichannel Magnetotelluric System For Imaging The Subsurface Structures In Taiwan Hualien Area

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Abstract

Magnetotelluric method is non-destructive geophysical prospecting method of passive source. The station will record natural electric and magnetic fields change to calculation that Impedance tensor and apparent resistivity, for further analysis to understand the local underground electrical structure. The market of commercial magnetotelluric instrument are various kinds, but because the mode of standardization, and Price expensive. So in the case of limited resources, often limit the flexibility and efficiency of the construction survey, collect of the signals is often difficult to deal with the powerline noise correction in electric and magnetic fields, therefore, in the noise elimination also have greater restrictions. The present study was using own development the synchronized multichannel magnetotelluric system, In the self-developed instrument, the combination can be a multi-channel satellite timing signal high sampling rate record, a three-axis fluxgate magnetometer and the non-polar electrode. In Taichung and Ilan area, we use commercial magnetotelluric measuring instruments and systems jointly determined by comparing the original electromagnetic signal received by both the consistency and verify the correctness of the signal. Then use this self-developed magnetotelluric instrument, we have chosen to set up several simultaneous sequence magnetotelluric station in Hualien Yuli Mizuho region, at the same time sequence magnetotelluric instrument test equipment and signal collection, and self-developed calculation program was used to collect data after data calculation. In our data Processing, we use a notch filter to filter out the power line interference, and employ the cross power spectrum operation, to improve the correlation between the signals, and we use parzen window computing the specific frequency spectrum, and finally calculates the best apparent resistivity values with robust fit. We preliminary verification post-processing program effectiveness and accuracy in magnetotelluric measuring systems. The future will be the practical application of geophysical exploration on the eastern Rift Valley region of investigation.