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Methodology for Electromagnetic Noise Removal from Magnetotelluric data using Kalman Filter

Abstract

The magnetotelluric records are affected by different types of high-amplitude, electromagnetic noise, which should be removed before actual data processing. Manual noise removal is both time consuming and it divides recorded data into short parts, therefore losing the low frequency part of the signal. We developed an algorithm which allows to reduce noise level in semi-automatic way. The proposed solution discriminates the noisy intervals based on its mean amplitude values. The part of the recording which is recognized as noise is replaced by its version after Kalman filtering. The result can be regulated using three parameters that influence noise discrimination level and Kalman filtering strength. We created graphical user interface for the algorithm. The performance of the algorithm was tested on the real dataset and proved its robustness by removing most of the noise from the data. We compared the results of the processing before and after application of the algorithm. Comparison shows that our solution improve the quality of the data and reduces the noise into acceptable level.