Please fill in the name of the event you are preparing this abstract for.	International Petroleum Technology Conference
Please fill in your 5-digit IPTC manuscript number and IPTC Control number.	IPTC-19166-MS 19IPTC-P-1444-IPTC
Please fill in your abstract title.	Automatic Statics and Residual Statics Correction with Low-Rank Approximation

Please fill in your author name(s) and company affiliation.

Given Name	Surname	Company
Ali M.	Alfaraj	University of British Columbia
Rajiv	Kumar	DownUnder Geosolutions
Felix J.	Herrmann	Georgia Institute of Technology

Abstract

The near-surface is usually composed of loose material characterized by low-velocity layers. It can be heterogeneous, rapidly changing and season dependent. This results in static time shifts that can lead to wrongly interpreted images. Moreover, the presence of near-surface scatterers adds to the problem by masking events of interest with coherent noise. In this work, we consider two specific types of statics: (i) long-wavelength statics generated by the low-velocity and lateral variations of the weathering layers and (ii) short-wavelength residual statics. To correct for such statics, we propose a rank-based, automatic and data-driven statics correction method. The method utilizes the property that statics-free seismic data can be represented by low-rank in the midpoint-offset domain, while data with statics exhibits higher rank. Low-rank means that the data can be approximated by a small number of singular vectors associated with relatively few largest singular values. We apply our proposed method on synthetic and real data examples to obtain data with statics correction applied, (figure 1). Compared with current statics correction methods, our proposed method does not require estimation the time-shifts or a near-surface velocity model to estimate statics. It does not also require a repetitive estimation of an NMO velocity model and statics, which is the case for most residual statics correction methods. This makes our proposed method computationally efficient and favorable for correcting the specified types of statics.

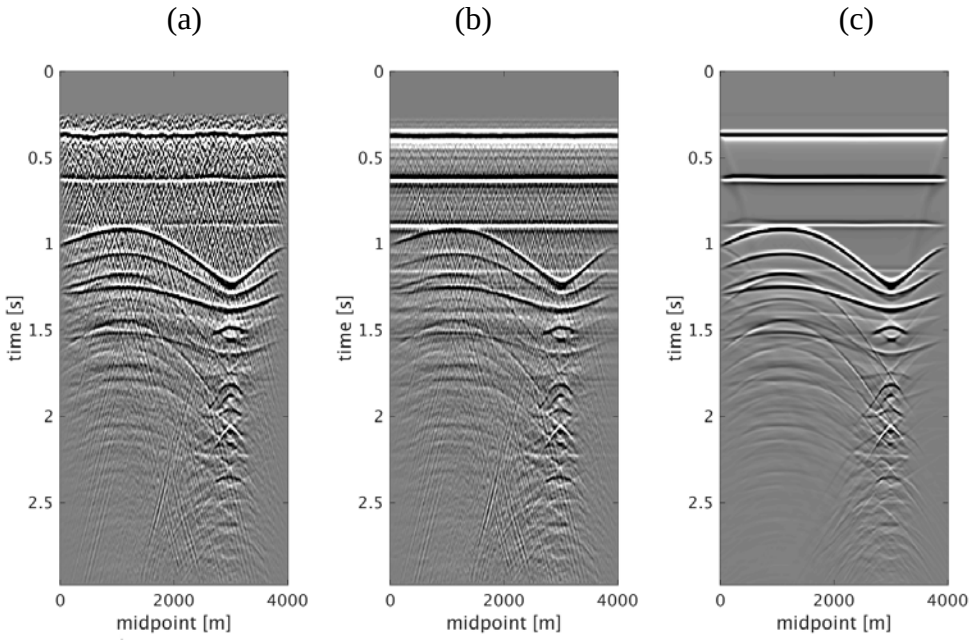

Figure 1: Stack of data: (a) with statics and noise, (b) after applying our proposed method and (c) statics-free data.