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Implementation of MASW and waveform inversion techniques for new seismic hazard estimation technique

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In this contribution, an integrated multi-channel analysis of Surface Waves (MASW) technique is applied to explore the geotechnical parameters of subsurface layers at the Zafarana Wind Farm site. The study area includes many active fault systems along the Gulf of Suez that cause many moderate and large earthquakes. Overall, the seismic activity of the area has recently become better understood following the use of waveform inversion method and software to develop accurate focal mechanism solutions for recent recorded earthquakes around the studied area. These earthquakes resulted in major stress-drops in the Eastern Desert and the Gulf of Suez area. These findings have helped to reshape the understanding of the seismotectonic environment of the Gulf of Suez area, which is a perplexing tectonic domain. Based on the collected new information and data, this study uses new an extended stochastic technique to re-examine the seismic hazard for the Gulf of Suez region, particularly the wind turbine towers sites at Zafarana Wind Farm and its vicinity. The essential characteristics of the extended stochastic technique are to obtain and simulate ground motion in order to minimize future earthquake consequences. The first step of this technique is defining the seismic sources which mostly affect the study area. Then, the maximum expected magnitude is defined for each of these seismic sources. It is followed by estimating the ground motion using an empirical attenuation relationship. Finally, the site amplification is implemented in calculating the peak ground acceleration (PGA) at each site of interest.

Key words: MASW, waveform inversion, extended stochastic technique, Zafarana Wind Farm