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New Method of Seismometer Orientation Correction via Amplitude and Energy Based Teleseismic Receiver Function Measurements: Test Case on West Africa and Adjacent Islands Stations

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Accurate seismic station orientation is important for seismic waveform or particle motion based studies. Station misorientation has been studied using P wave particle motion and Rayleigh wave arrival angle, which may be affected by the complexity of earthquake sources. Recently, P wave receiver function (PRF) using tangential component has been proposed for misorientation estimation. In this study, two new methods using amplitude and energy based objective functions of both radial and tangential components of PRF to estimate station misorientations, are introduced. The two methods are tested using 21 stations in West Africa and adjacent islands, taking into consideration the effect of the different geologic terrains i.e. islands, coastlines, and inland areas. The difference between the two methods are investigated, considering the effects of Gaussian factors, back-azimuthal coverage, number of events, and structural heterogeneities. Both methods produce similar results, which are consistent with a previous study. However, comparison between radial and tangential components indicates that results based on radial components are more stable than tangential components which may be more sensitive to heterogeneities and background noise. Our study suggests that both methods produce more consistent results for inland stations compared to islands/coastal stations, and objective functions for radial components are more stable.

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Promotional text

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