Extracting higher-mode dispersion curves from ambient noise data by using F-J method to acquire more accurate crustal and upper-mantle structure for the east of South China

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It has been widely recognized that the cross-correlation function (CCF) of ambient noise data recorded at two seismic stations approximates to the part of Green’s Function between these two stations. Theoretically, the CCF should include the higher modes, apart from the fundamental mode. However, currently well-known and mature methods that can extract dispersion curves are not pretty proficient in extracting higher modes. Fortunately, our newly proposing method, the Frequency-Bessel Transform Method (F-J Method), has presented its obvious advantage in extracting higher modes. This study applied F-J method to seismic ambient noise data for the east of South China, including Jiangnan Orogen and South China Fold System. We have acquired higher modes, not to mention the fundamental mode with wider frequency than previous studies. Combining both fundamental mode and higher modes, we used L-BFGS inversion method to inverse and acquire more accurate crustal and upper-mantle structure than previous studies only adopting fundamental mode for the east of South China. As shown in this study for the east of South China, we can use F-J method to conveniently and precisely extract multimodes from ambient noise data and thus add more constrains for inversion results, which can significantly improve the preciseness of imaging crustal and upper-mantle structure.