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Joint inversion of converted and surface waves for characterization of geothermal fields

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Joint inversion of surfaces and teleseismic converted waves is commonly used to retrieve seismic structures beneath a seismic station. Currently, this approach is routinely applied at global and regional scale to probe the structures of the mantle and the lower-crust. However, the difficulty to retrieve reliable converted waves at high frequencies (> 1 Hz) makes challenging to apply this technique to resolve structures at shallow depths (< 20 km). Here we explore the feasibility of using a trans-dimensional Bayesian scheme based on a reversible jump Markov Chains Monte Carlo method, to resolve shallow structure at local scale. We use phase and group velocity dispersion curves for Love and Rayleigh waves, from 0.5 to 10 s and tele-seismic converted waves in a distance range from 30° to 95° . We explore the ability of different approaches to retrieve high frequency converted phases that will be used in the framework of the Bayesian inversion. We present preliminary tests of the reliability of the method and applications to experimental data collected in the super-hot geothermal field of Los Humeros, México. This work is performed in the framework of the Mexican European consortium GeMex (Cooperation in Geothermal energy research Europe-Mexico, PT5.2 N: 267084 funded by CONACyT-SENER: S0019, 2015-04, and Horizon 2020, grant agreement No. 727550).