NON-LINEAR INVERSION OF PROBABILITY DENSITY FUNCTIONS OF SURFACE WAVE DISPERSION

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Key words Surface waves, Monte-Carlo Markov chain, Group velocity, Dispersion diagram, Seismic tomography.

A commonly used approach for inferring 3D shear wave velocity structure from surface wave measurements relies on regionalization of group (or phase) velocity curves at various frequencies as an intermediate step before 1D inversion at depth for each grid point. This choice relies on tracking the maximum energy in the dispersion diagram in order to get a unique dispersion curve and the estimate of associated measurement uncertainties usually depends on *ad hoc* user's criteria. We present an alternative by directly inverting the waveform, once it is converted into probability density functions of dispersion, in order to obtain a posterior probability of 1D shear wave structure integrated along the ray path. The dispersion diagram is sampled using a Markov-chain Monte Carlo algorithm and each trial model is parameterized by Bézier curves in order to ensure smooth variations and a fast forward problem. For each depth of the 1D shear wave posterior probabilities, path averaged velocities can be regionalized using classical least-squares criterion. We show inversion results of cross-correlations of ambient seismic noise in a regional context and at global scale of multiple orbit surface wave trains. This latter approach can be used for planetary purposes in the event of deployment of one seismic station on another planet.