Geophysical Research Abstracts
Vol. 20, EGU2018-4305, 2018
EGU General Assembly 2018

Laplace-domain waveform inversion using the sloth parametrization

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We adopt the sloth parametrization to express the subsurface velocity model for acoustic waveform inversion in the Laplace domain. The logarithmic objective function and the pseudo-Hessian is a frequently-used combination for waveform inversions in the Laplace domain. Combined with the logarithmic objective function for each damping coefficient, the sloth parametrization reduces the diagonal elements of the pseudo-Hessian matrix to a constant. Therefore, the sloth parametrization simplifies the calculation of the pseudo-Hessian and eliminates the stabilizing factor to avoid singular values in the Hessian. Numerical examples demonstrate that inversions using the sloth parametrization yields comparable results to those from the conventional Laplace-domain inversion using the velocity parametrization.