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Anisotropic acoustic full-waveform inversion without cycle skipping using multiscale approach

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Full waveform inversion (FWI) is an effective method based on full-wavefield modeling to extracct high resolution earth models from seismic data. Since FWI accounts for the full wavefield, the seismic modeling which is the basis of FWI should simulate all of the physics of wave propagation as accurately as possible. Accordingly, seismic anisotropy also has received much attention in the FWI during the last decade. However, the intrinsic non-linearity, ill-posedness, and possibility of being trapped in local minima must be addressed to consider multiparameter FWI in an anisotropic media. Especially, to prevent cycle-skipping effects and increase resolution power, multiscale approach are usually applied to the FWI. In this research, multiscale approach using increaing frequencies was adopted to acoustic FWI in the VTI media for reducing the cycle-skipping artifacts and improving the linearity of FWI. Using multiscale approach, the resolution of lower layer was increased and both vertical and horizontal velocities are well reconstructed. In addition, RMS error converged rapidly to the lower value and calculated model misfit error decreased.