AGU Fall Meeting Abstracts 2021, Published December 2021
AGU Fall Meeting 2021, held in New Orleans,
LA, 13-17 December 2021, id. NG52A-07.
BibCode 2021AGUFMNG52A..07C

Full-waveform inversion with quantified uncertainty in geophysics

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In recent years, full-waveform inversion (FWI) has become an important imaging technique in geophysics. FWI fully exploits the information encoded in seismic waveforms to estimate physical parameters of subsurface. Most efforts are devoted to infer the spatial variations of fields such as velocity, density, anisotropy, and attenuation in large regions, facing huge computational costs. However, in some applications it would be enough to determine the boundaries enclosing regions where abrupt changes take place, allowing for a considerable cost reduction [**?**]. Moreover, without crucial information about uncertainty, it is difficult to interpret inverted subsurface models. Here, we propose an object based full wave form inversion scheme that combines topological methods, optimization strategies and Bayesian approaches [**?**, **?**]. We test our method localizing different types of reservoirs in 2D soil studies with quantified uncertainty about their location, size, geometry and nature.

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