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Romain Brossier

Associate Professor

Research topics

- Subject** High resolution imaging of the Earth at different scales using full waveform inversion and migration.
- Data and targets** Full waveform of body and surface waves ; active seismic and noise correlation data ; near-surface scales ; reservoir characterization, deep crustal and lithospheric scales ; monitoring et 4D characterization ; lab scales, ocean acoustic ; EM waves
- Tools** High resolution tomography using the full waveform, migration, large scale non-linear inverse problems, multi-parameter inversion, local optimization methods, numerical modeling of wave propagation, spectral finite-elements, linear system resolution, high performances computing.
- Projects** PI of the SEISCOPE Consortium (2013-2021, 12 industrial sponsors), partner of French HIWAI project (2016-2021), partner of EU ENERXICO project(2019-2021)

Positions

- 2016-today Associate Professor at university Grenoble Alpes, UFR PHITEM and Laboratory ISTerre.
- 2011-2016 Assistant Professor at Univ. Grenoble Alpes, UFR PHITEM and Laboratory ISTerre.
- 2010-2011 Post-doc fellow at LGIT/ISTerre, university Joseph Fourier, Grenoble. *Multi-scale imaging by full waveform inversion*
- 2006-2009 PhD project at Géoazur lab, university of Nice-Sophia Antipolis. *Visco-elastic Seismic imaging by full waveform inversion*, in the frame of the SEISCOPE project

Education and Diploma

- 2016 Habilitation (HDR), « Contributions to developments and applications of Full Waveform Modeling and Inversion », Univ. Grenoble Alpes
- 2006-2009 Ph.D. in Geophysics, University of Nice-Sophia Antipolis, prepared at Géoazur lab, Sophia-Antipolis, under supervision of Jean Virieux and Stéphane Operto, in the frame of the SEISCOPE consortium, « Imagerie sismique à deux dimensions des milieux visco-élastiques par inversion des formes d'ondes : développements méthodologiques et applications », mention *très honorable*
- 2006 Master degree in Mechanical and Civil Engineering, University of Bourgogne, prepared at Institut Supérieur de l'Automobile et des Transports and at Laboratoire de Recherche en Mécanique et Acoustique, Nevers, mention *Très Bien*, rang 1/7
- 2002-2006 Engineering degree in mechanics, Institut Supérieur de l'Automobile et des Transports, University of Bourgogne, Nevers, rang 1/91

Teaching

- 2011-today Teaching in geophysics at UFR PhiTEM, Univ. Grenoble Alpes
- 2019 Visiting professor at Federal University of Rio Grande del Norte, Natal, Brasil
- 2011-today several industrial training on Full Waveform Inversion
- 2016 course on Full Waveform Inversion at Ecole Doctorale TUE

2011 International course on Full Waveform Inversion (1 day), SBGF congress, Rio de Janeiro, Brasil.

PhD Students supervision

- 2021-today Co-supervisor with L. Métivier & E. Oudet, of Amine Abdellaziz, Univ. Grenoble. “*Optimal Design of seismic acquisition*”
- 2021-today Co-supervisor with L. Métivier, of Fandy Fachtory, Univ. Grenoble. “*4F FWI*”
- 2019-today Co-supervisor with L. Stehly, of Ahmed Nouibat, Univ. Grenoble. “*3D characterization of the deep Alps*”
- 2016-2021 Co-supervisor with L. Métivier, of Arnaud Pladys, Univ. Grenoble. “*Misfit function in Full waveform inversion*”
- 2017-2021 Co-supervisor with L. Métivier, of Marwan Irnaka, Univ. Grenoble. “*3D elastic full waveform inversion for subsurface characterization - Study of a shallow seismic multicomponent field data*”
- 2017-2020 Co-supervisor with C. Comina, V. Socco and J. Virieux, of Daniela Theodor, Univ. Torino (It). “*Initial S - wave and P - wave velocity models for full-waveform inversion from surface wave dispersion curves analysis*”
- 2016-2020 Co-supervisor with L. Métivier, of Julien Thurin, Univ. Grenoble. “*Uncertainties estimation in Full Waveform Inversion using Ensemble methods*”
- 2015-2018 Co-supervisor with L. Métivier and J. Virieux of Phuong-Thu Trinh, Univ. Grenoble. “*3D Multi-parameters Full Waveform Inversion for challenging land targets*”, Geophysicist TOTAL
- 2013-2016 Co-supervisor with S. Garambois and J. Virieux of Paul Wellington, PhD student Univ. Grenoble. “*Efficient 1D, 2D and 3D Geostatistical constraints and their application to Full Waveform Inversion*”, Geophysicist Chevron
- 2013-2016 Co-supervisor with S. Operto and J. Virieux of Wei Zhou, PhD student Univ. Grenoble. “*Full Waveform Inversion of Early Arrivals and Reflections for Velocity Model Building and Case Study with Gas Cloud Effect*”, now Post-doc UGA-TOTAL
- 2012-2016 Co-supervisor with J. Virieux of Isabella Masoni, PhD student Univ. Grenoble. “*Inversion of Surface Waves in an Oil and Gas Context*”, Geophysicist TOTAL
- 2013-2015 Co-supervisor with L. Métivier and J. Virieux of Yang Li, PhD student from Har Binh University, China “*Kaczmarz-based linear iterative solver for acoustic and elastic wave propagation modeling*”
- 2010-2014 Advisor for F. Lavoué, PhD student Univ. Grenoble (supervisors S. Garambois and J. Virieux). “*2D Full waveform inversion of ground penetrating radar data Towards multiparameter imaging from surface data*”. Post-Doc Dublin
- 2010-2013 Advisor for C. Castellanos, PhD student Univ. Nice (supervisor S. Operto). “*Accélération et régularisation de la méthode d'inversion des formes d'ondes complètes en exploration sismique*”, scientist at Schlumberger
- 2010-2013 Advisor for A. Asnaashari, PhD student Univ. Grenoble (supervisors S. Garambois and J. Virieux). “*Quantitative 4D seismic imaging in complex media using 2D full waveform inversion*”. Geophysicist at PGS
- 2008-2012 Advisor for D. Pageot, PhD Univ. Nice (supervisors S. Operto and M. Vallée). “*Imagerie de la lithosphère par inversion de formes d'ondes de données télésismiques.*”, Post-Doc IFSTTAR.
- 2008-2012 Advisor for A. Roques, PhD Univ. Grenoble (supervisors J. Virieux and J. Mars). “*Imagerie sismique appliquée à la caractérisation géométrique des fondations de pylônes électriques très haute tension*”. Enseignant
- 2009-2012 Advisor for Y. Gholami, PhD Univ. Nice (supervisors S. Operto and A. Ribodetti). “*Two-dimensional seismic imaging of anisotropic media by full waveform inversion*”. Geophysicist CGG
- 2009-2012 Advisor for G. Hu, PhD Univ. Grenoble (supervisors S. Operto and J. Virieux). “*Three-dimensional acoustic Full Waveform Inversion : method, algorithms and application to the Val-hall petroleum field*”. Geophysicist SINOPEC

2008-2012 Advisor for V. Prioux, PhD Univ. Nice (supervisors S. Operto and J. Virieux).. “*Imagerie sismique des milieux visco-acoustiques et visco-élastiques à deux dimensions par stéréotomographie et inversion des formes d’ondes : applications au champ pétrolier de Valhall*”. Geophysicist CGG

Master Students supervision

- 2021 Supervisor (with L. Métivier) of Mohammad Aminpanah, Master degree Univ. Grenoble “*FWI with receiver location extention*”
- 2020 Supervisor (with L. Métivier) of Mohamed Bachir, Master degree Univ. Grenoble “*4D attributes extraction from seismic data*”
- 2016 Supervisor (with L. Métivier) of Julien Thurin, Master degree Univ. Grenoble “*Data Assimilation-based uncertainty analysis in Full Waveform Inversion*”
- 2016 Supervisor (with L. Métivier) of Arnaud Pladys, Master degree Univ. Grenoble “*Sensibility of several misfit functions for Full Waveform Inversion : theoretical analysis, implementation and comparative study on multiple realistic cases*”
- 2016 Supervisor (with L. Moreau) of Alice Dinsenmeyer, Master degree University of Maine.”*Imagerie ultrasonore par inversion de formes d’onde*”
- 2015 Supervisor of Marwan Irrnaka, Master degree Grenoble University.”*Numerical Simulation of Seismic Wave Propagation in Elastic Medium : Performance’s Evaluation of Several Numerical Methods for The Application of Full-Waveform Inversion*”
- 2014 Supervisor of Théo Masson, Master degree Univ. Grenoble “*Déconvolution non-linéaire pour l’inversion des formes d’ondes*”
- 2013 Supervisor of Boussad Beldjena, Master degree univ. Grenoble “*Seismic data processing of Chevron GOM benchmark for FWI initial model construction*”
- 2012 Supervisor of Cécile Bruyant, Master degree Polytech Grenoble.”*Imagerie sismique haute résolutions sur le système de failles normales de Celano en Italie*”

Scientific production

67 articles in peer-reviewed international journals

5 book chapters

131 proceedings of international conferences with peer-review

H-index : 36 (Google Scholar 05/2021)

Editorial activities

2008-today Reviewer for journals *Geophysical Journal International*, *Geophysics*, *Geophysical Prospecting*, *Journal of Applied Geophysics*, *Exploration Geophysics*, *Geophysical Research Letters*, for proceedings of conferences *SEG* and *EAGE*.

PhD commitee participation

- 2021 Reviewer for the PhD work of Julien Porté, University of Strasbourg, supervised by J.F. Girard & F. Bretaudeau : *Imagerie de la résistivité complexe à partir de données électromagnétiques à source contrôlée*
- 2021 Examiner for the PhD work of Milad Farshad, Mines ParisTech, supervised by Hervé Chauris : *Multi-parameter seismic linear waveform imaging*
- 2021 Examiner for the PhD work of Serge Sambolian, Université Cote d’Azur, supervised by Alessandra Ribodetti and Stephane Operto : *Kinematically consistent slope tomography using eikonal solvers and the adjoint-state method Theory and applications to velocity model building and event location*
- 2021 Reviewer for the PhD work of Aline Robin, University of Paris, supervised by Satish Singh and Mark Noble : *Elastic full waveform inversion in anisotropic media Methodology and Application to ocean bottom node data from the North Sea*

- 2020 Reviewer for the PhD work of Sneha Singh, University of Nantes, supervised by Yann Capdeville and Heiner Igel : *Wavefield gradients and small-scale heterogeneities*
- 2020 Reviewer for the PhD work of Bhargav Boddupalli, University of Southampton, supervised by Tim Minshull and Gaye Bayrakci : *Imaging the Deep Galicia Margin using Ocean Botton Seismic Data*
- 2020 Reviewer for the PhD work of Tianyou Zhou, Mines ParisTech, supervised by Hervé Chauris : *Migration velocity analysis : selection of user parameters and introduction of transmitted waves*
- 2019 Reviewer for the PhD work of Hao Jiang, Mines ParisTech, supervised by Hervé Chauris : *Seismic imaging : strategies for visco-acoustic full waveform inversion*
- 2018 Examiner for the PhD work of Yubing Li, Mines ParisTech, supervised by Hervé Chauris : *Subsurface seismic imaging based on inversion velocity analysis in both image and data domains*
- 2017 Reviewer for the PhD work of Filip Kubina, Comenius University in Bratislava, supervised by Peter Moczo : *Adjoint tomography of 2D local surface sedimentary structures*
- 2017 Reviewer for the PhD work of Weiguang He, IPGP, supervised by René-Edouard Plessix and Satish Singh : *Elastic full waveform inversion in vertically transversely isotropic media*
- 2015 Examiner for the PhD defense of Fang Wang, Mines ParisTech, supervised by Hervé Chauris and Daniella Donno : *Waveform inversion based on wavefield decomposition.*
- 2014 Examiner for the PhD defense of Raphaël Valensi, Univ. Nantes, supervised by Philippe Côte and Donatienne Leparoux : *Développements méthodologiques à partir de formes d'ondes multicomposantes en vue de l'imagerie sismique quantitative de la proche surface : modélisation physique à échelle réduite, traitements et inversion de la polarisation.*
- 2013 Examiner for the PhD defense of Elodie Estecahandy, Univ. Pau et des Pays de l'Adour, supervised by Hélène Barrucq and Rabia Djellouli : *Contribution à l'analyse mathématique et à la résolution numérique d'un problème inverse de scattering élasto-acoustique.*

Honors and Awards

- 2020 *top 25 papers* for the expended abstract J. Cao, R. Brossier and L. Métivier presented at SEG annual meeting (virtual conf)
- 2019— Recipient of the “PEDR”
- 2017 SIGEST award from SIAM for paper Métivier et al. “FULL WAVEFORM INVERSION AND THE TRUNCATED NEWTON METHOD”
- 2016 *outstanding reviewer of the year 2016* at *Geophysical Journal International*
- 2015 *Arie van Weelden, Young Professional Award 2015* of EAGE
- 2015 *Honorable Mention Award 2015* of SEG for paper S. Operto et al. in Geophysics
- 2014-2018 Recipient of the “PEDR”
- 2013 *Best student paper award* for proceeding F. Lavoué et al. presented at IWAGPR meeting, Nantes (Fr)
- 2012 *top 30 papers* for proceeding A. Asnaashari, R. Brossier et al. presented at SEG annual meeting, Las Vegas (US)
- 2011 *outstanding reviewer of the year 2011* at *Geophysical Journal International*
- 2011 *Award of Merit* (Best student paper) for proceeding A. Asnaashari, R. Brossier et al. presented at SEG Annual Meeting, San Antonio (US)
- 2010 C3I (Certificat de Compétences en Calcul Intensif) label provided by GENCI
- 2009 *Geophysics Bright Spots* for paper : « Seismic imaging of complex onshore structures by two-dimensional elastic frequency-domain full-waveform inversion » by Brossier R., S. Operto and J. Virieux, (2009), *Geophysics*.
- 2005-2006 Merit grant for Master year

Publications in peer-reviewed international journals

- [1] Jet Hoe Tang, Romain Brossier, and Ludovic Métivier. Fully scalable solver for frequency-domain viscoelastic wave equations in 3d heterogeneous media : A controllability approach. *Journal of Computational Physics*, 468 :111514, 2022.
- [2] A. Nouibat, L. Stehly, A. Paul, S. Schwartz, Y. Rolland, T. Dumont, W. C. Crawford, R. Brossier, and Cifalps Team, and AlpArray Working Group . Ambient-noise tomography of the ligurian-provence basin using the alparray onshore-offshore network : Insights for the oceanic domain structure. *Journal of Geophysical Research : Solid Earth*, 127(8) :e2022JB024228, 2022. e2022JB024228 2022JB024228.
- [3] Arnaud Pladys, Romain Brossier, Nishant Kamath, and Ludovic Métivier. Robust FWI with graph space optimal transport : application to 3D OBC Valhall data. *Geophysics*, in press, 2022.
- [4] Ludovic Métivier and Romain Brossier. Receiver-extension strategy for time-domain full-waveform inversion using a relocalization approach. *GEOPHYSICS*, 87(1) :R13–R33, 2022.
- [5] T M Irnaka, R Brossier, L Métivier, T Bohlen, and Y Pan. 3-D multicomponent full waveform inversion for shallow-seismic target : Ettlingen Line case study. *Geophysical Journal International*, 229(2) :1017–1040, 12 2022.
- [6] Jian Cao, Romain Brossier, Andrzej Górszczyk, Ludovic Métivier, and Jean Virieux. 3-D multiparameter full-waveform inversion for ocean-bottom seismic data using an efficient fluid–solid coupled spectral-element solver. *Geophysical Journal International*, 229(1) :671–703, 2022.
- [7] A Nouibat, L Stehly, A Paul, S Schwartz, T Bodin, T Dumont, Y Rolland, R Brossier, Cifalps Team, and AlpArray Working Group. Lithospheric transdimensional ambient-noise tomography of W-Europe : implications for crustal-scale geometry of the W-Alps. *Geophysical Journal International*, 229(2) :862–879, 12 2022.
- [8] P T C Carvalho, S L E F da Silva, E F Duarte, R Brossier, G Corso, and J M de Araújo. Full waveform inversion based on the non-parametric estimate of the probability distribution of the residuals. *Geophysical Journal International*, 229(1) :35–55, 2022.
- [9] Peng Yong, Romain Brossier, and Ludovic Métivier. Parsimonious truncated newton method for time-domain full-waveform inversion based on the fourier-domain full-scattered-field approximation. *Geophysics*, 87(1) :R123–R146, 2022.
- [10] Alain Manceau, Romain Brossier, and Brett Poulin. Response to comment on “mercury isotope fractionation by internal demethylation and biomineralization reactions in seabirds : Implications for environmental mercury science” : Principles and limitations of source tracing and process tracing with stable isotope signatures. *Environ. Sci. Technol.*, 56(3) :2065–2068, 2022.
- [11] Alain Manceau, Romain Brossier, and Brett Poulin. Mercury isotope fractionation by internal demethylation and biomineralization reactions in seabirds : Implications for environmental mercury science. *Environ. Sci. Technol.*, 55(20) :13942–13952, 2021.
- [12] Alain Manceau, Romain Brossier, and Brett Poulin. Chemical forms of mercury in pilot whales determined from species-averaged mercury isotope signatures. *ACS Earth and Space Chemistry*, 5(6) :1591–1599, 2021.
- [13] Daniela Teodor, Cesare Comina, Farbod Khosro Anjom, Romain Brossier, Laura Valentina Socco, and Jean Virieux. Challenges in shallow target reconstruction by 3d elastic full-waveform inversion — which initial model? *GEOPHYSICS*, 86(4) :R433–R446, 2021.
- [14] Andrzej Górszczyk, Romain Brossier, and Ludovic Métivier. Graph-space optimal transport concept for time-domain full-waveform inversion of ocean-bottom seismometer data : Nankai trough velocity structure reconstructed from a 1d model. *Journal of Geophysical Research : Solid Earth*, 126(5) :e2020JB021504, 2021. e2020JB021504 2020JB021504.
- [15] A. Pladys, R. Brossier, Y. Li, and L. Métivier. On cycle-skipping and misfit function modification for full-wave inversion : Comparison of five recent approaches. *Geophysics*, 86(4) :R563–R587, 2021.
- [16] Nishant Kamath, Romain Brossier, Ludovic Métivier, Arnaud Pladys, and Pengliang Yang. Multiparameter full-waveform inversion of 3D OBC data from the Valhall field. *Geophysics*, 86 :B15–B35, 2021.
- [17] François Lavoué, Olivier Coutant, Pierre Boué, Laura Pinzon-Rincon, Florent Brenguier, Romain Brossier, Philippe Dales, Meysam Rezaeifar, and Christopher J. Bean. Understanding seismic waves generated by train traffic via modelling : implications for seismic imaging and monitoring. *Seismological Research Letters*, 92(1) :287–300, 2021.
- [18] Yang Li, Romain Brossier, and Ludovic Métivier. 3d frequency-domain elastic wave modeling with the spectral element method using a massively parallel direct solver. *GEOPHYSICS*, 85(2) :T71–T88, 2020.
- [19] Y Lu, L Stehly, R Brossier, A Paul, and AlpArray Working Group. Imaging Alpine crust using ambient noise wave-equation tomography. *Geophysical Journal International*, 222(1) :69–85, 03 2020.
- [20] J Thurin, R Brossier, and L Métivier. Ensemble-based uncertainty estimation in full waveform inversion. *Geophysical Journal International*, 219(3) :1613–1635, 08 2019.

- [21] Weiguang He, Romain Brossier, Ludovic Métivier, and René-Édouard Plessix. Land seismic multiparameter full waveform inversion in elastic VTI media by simultaneously interpreting body waves and surface waves with an optimal transport based objective function. *Geophysical Journal International*, 219(3) :1970–1988, 09 2019. ggz414.
- [22] Farbod Khosro Anjom, Daniela Teodor, Cesare Comina, Romain Brossier, Jean Virieux, and Laura Valentina Socco. Full waveform matching of vp and vs models from surface waves. *Geophysical Journal International*, 218(3) :1873–1891, 06 2019.
- [23] L Métivier, R Brossier, Q Mérigot, and E Oudet. A graph space optimal transport distance as a generalization of lp distances : application to a seismic imaging inverse problem. *Inverse Problems*, 35(8) :085001, jul 2019.
- [24] Paul Wellington, Romain Brossier, and Jean Virieux. Preconditioning Full Waveform Inversion with local correlation operators. *Geophysics*, 84(3) :R321–R332, 2019.
- [25] Phuong-Thu Trinh, Romain Brossier, Ludovic Metivier, Laure Tavard, and Jean Virieux. Efficient time-domain 3d elastic and visco-elastic fwi using a spectral-element method on flexible cartesian-based mesh. *Geophysics*, 84(1) :R75–R97, 2019.
- [26] Ludovic Métivier, Aude Allain, Romain Brossier, Quentin Mérigot, Edouard Oudet, and Jean Virieux. Optimal transport for mitigating cycle skipping in full waveform inversion : a graph space transform approach. *GEOPHYSICS*, 83(5) :R515–R540, 2018.
- [27] P. Yang, R. Brossier, L. Métivier, J. Virieux, and W. Zhou. A time-domain preconditioned truncated newton approach to visco-acoustic multiparameter full waveform inversion. *SIAM Journal on Scientific Computing*, 40(4) :B1101–B1130, 2018.
- [28] Wei Zhou, Romain Brossier, Stéphane Operto, Jean Virieux, and Pengliang Yang. Velocity model building by waveform inversion of early arrivals and reflections : A 2d case study with gas-cloud effects. *GEOPHYSICS*, 83(2) :R141–R157, 2018.
- [29] P.T. Trinh, R. Brossier, L. Métivier, J. Virieux, and P. Wellington. Bessel smoothing filter for spectral-element mesh. *Geophysical Journal International*, 209(3) :1489–1512, 2017.
- [30] P.J. Wellington, R. Brossier, O. Hamitou, P.T. Trinh, and J. Virieux. Efficient anisotropic dip filtering via inverse correlation functions. *Geophysics*, 82(4) :A31–A35, 2017.
- [31] L. Métivier, R. Brossier, S. Operto, and J. Virieux. Full waveform inversion and the truncated newton method. *SIAM Review*, 59(1) :153–195, 2017.
- [32] R. Brossier, L. Métivier, J. Virieux, P. Yang, and W. Zhou. A review of some methodological developments on full waveform inversion tackled in the seiscopes group. *Geophysical Prospecting for Petroleum*, 56(1) :3, 2017.
- [33] L. Métivier, R. Brossier, Q. Mérigot, E. Oudet, and J. Virieux. Increasing the robustness and applicability of full waveform inversion : an optimal transport distance strategy. *The Leading Edge*, 35(12) :1060–1067, 2016.
- [34] L. Métivier, R. Brossier, Q. Mérigot, E. Oudet, and J. Virieux. An optimal transport approach for seismic tomography : application to 3d full waveform inversion. *Inverse Problems*, 32(11) :115008, 2016.
- [35] Pengliang Yang, Romain Brossier, Ludovic Métivier, and Jean Virieux. Wavefield reconstruction in attenuating media : A checkpointing-assisted reverse-forward simulation method. *Geophysics*, 81(6) :R349–R362, 2016.
- [36] P. Amestoy, R. Brossier, J.-Y. L’Excellent, T. Mary, L. Métivier, A. Miniussi, and . Operto. Fast 3D frequency-domain full waveform inversion with a parallel Block Low-Rank multifrontal direct solver : application to OBC data from the North Sea. *Geophysics*, 81(6) :R363–R383, 2016.
- [37] Pengliang Yang, Romain Brossier, Ludovic Métivier, and Jean Virieux. A systematic formulation of 3d multiparameter full waveform inversion in viscoelastic medium. *Geophysical Journal International*, 207 :129–149, 2016.
- [38] Y. Li, B. Han, L. Métivier, and R. Brossier. Optimal fourth-order staggered-grid finite-difference scheme for 3d frequency-domain viscoelastic wave modeling. *Journal of Computational Physics*, 321 :1055–1078, 2016.
- [39] C. Voisin, S. Garambois, C. Massey, and R. Brossier. Seismic noise monitoring of the water table in a deep seated slow moving landslide. *Interpretation*, 4(3) :SJ67–SJ76, 2016.
- [40] Pengliang Yang, Romain Brossier, and Jean Virieux. Wavefield reconstruction from significantly decimated boundaries. *Geophysics*, 81 :T197–T209, 2016.
- [41] J. Virieux, R. Brossier, L. Métivier, S. Operto, and A. Ribodetti. Direct and indirect inversions. *Journal of Seismology*, 2016.
- [42] L. Métivier, R. Brossier, Q. Mérigot, E. Oudet, and J. Virieux. Measuring the misfit between seismograms using an optimal transport distance : application to full waveform inversion. *Geophysical Journal International*, 205 :345–377, 2016.

- [43] L. Métivier and R. Brossier. The seisclope optimization toolbox : A large-scale nonlinear optimization library based on reverse communication. *Geophysics*, 81 :F11–F25, 2016.
- [44] B. Dupuy, A. Asnaashari, R. Brossier, S. Garambois, L. Métivier, A. Ribodetti, and Jean Virieux. A downscaling strategy from fwi to microscale reservoir properties from high-resolution images. *The Leading Edge*, 35 :1146–150, 2016.
- [45] Longfei Gao, Romain Brossier, and Jean Virieux. Using time filtering to control the long-time instability in seismic wave simulation. *Geophysical Journal International*, 204 :1443–1461, 2016.
- [46] Longfei Gao, Romain Brossier, Benjamin Pajot, Josue Tago, and Jean Virieux. An immersed free-surface boundary treatment for seismic wave simulation. *Geophysics*, 80(5) :T193–T209, 2015.
- [47] Wei Zhou, Romain Brossier, Stéphane Operto, and J. Virieux. Full waveform inversion of diving & reflected waves for velocity model building with impedance inversion based on scale separation. *Geophysical Journal International*, 202(3) :1535–1554, 2015.
- [48] S. Operto, A. Miniussi, R. Brossier, L. Combe, L. Métivier, V. Monteiller, A. Ribodetti, and J. Virieux. Efficient three-dimensional frequency-domain full-waveform inversion of ocean-bottom cable data : application to Valhall in the visco-acoustic vertical transverse isotropic approximation. *Geophysical Journal International*, 202(2) :1362–1391, 2015.
- [49] Ludovic Métivier, Romain Brossier, and Jean Virieux. Combining asymptotic linearized inversion and full waveform inversion. *Geophysical Journal International*, 201(3) :1682–1703, 2015.
- [50] Yang Li, Ludovic Métivier, Romain Brossier, Bo Han, and Jean Virieux. 2d and 3d frequency-domain elastic wave modeling in complex media with a parallel iterative solver. *Geophysics*, 80(3) :T101–T118, 2015.
- [51] C. Castellanos, L. Métivier, S. Operto, R. Brossier, and J. Virieux. Fast full waveform inversion with source encoding and second-order optimization methods. *Geophysical Journal International*, 200(2) :718–742, 2015.
- [52] F. Lavoué, R. Brossier, L. Métivier, S. Operto, S. Garambois, and J. Virieux. Frequency-domain modeling and inversion of electromagnetic data for 2d permittivity and conductivity imaging : An application to the institut fresnel experimental data. *Near Surface Geophysics*, 13(3) :227–241, 2015.
- [53] R. Brossier, S. Operto, and J. Virieux. Velocity model building from seismic reflection data by full waveform inversion. *Geophysical Prospecting*, 63(2) :354–367, 2015.
- [54] A. Asnaashari, R. Brossier, S. Garambois, F. Audebert, P. Thore, and J. Virieux. Time-lapse seismic imaging using regularized fwi with prior model : which strategy ? *Geophysical Prospecting*, 63(1) :78–98, 2015.
- [55] L. Métivier, F. Bretaudeau, R. Brossier, S. Operto, and J. Virieux. Full waveform inversion and the truncated newton method : quantitative imaging of complex subsurface structure. *Geophysical Prospecting*, 62 :1353–1375, 2014.
- [56] L. Métivier, R. Brossier, S. Labbé, S. Operto, and J. Virieux. Smart : dissipative absorbing layer technique for general elastodynamics equations. application as s-waves filter in acoustic ti media. *Seismic Technology*, 11(4) :1–14, 2014.
- [57] Isabella Masoni, Romain Brossier, Jean-Luc Boelle, and Jean Virieux. Robust full waveform inversion of surface waves. *Seismic Technology*, 11(4) :1–19, 2014.
- [58] S. Operto, R. Brossier, L. Combe, L. Métivier, A. Ribodetti, and J. Virieux. Fast and accurate three-dimensional visco-acoustic finite-difference frequency-domain seismic modeling in vertical transversely isotropic media with sparse direct solver. *Geophysics*, 79(5) :T257–T275, 2014.
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