

Ryoichiro Agata

RESEARCHER

Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Yokohama, Kanagawa, Japan

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Professional Experience

2020-	Researcher , Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Japan
2017-2020	Postdoctoral Researcher , Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Japan
2016-2017	JSPS Research Fellowship for Young Scientists PD , Japan Society for the Promotion of Science, Japan
2016-2017	Research fellow , Earthquake Research Institute, University of Tokyo, Japan

Education

The University of Tokyo DOCTOR OF ENGINEERING	Tokyo, Japan 2013-2016
• Advisor: Prof. Tsuyoshi Ichimura The University of Tokyo MASTER OF ENGINEERING	Tokyo, Japan 2012-2013
• Advisor: Prof. Tsuyoshi Ichimura The University of Tokyo BACHELOR OF ENGINEERING	Tokyo, Japan 2008-2012

- Advisor: Prof. Tsuyoshi Ichimura

Publications

REFEREED JOURNAL, FIRST-AUTHORED ETC.

- Ryoichiro Agata**, Tomohisa Okazaki: Functional-prior-based approaches to Bayesian PDE-constrained inversion using physics-informed neural networks, *Computer Methods in Applied Mechanics and Engineering*, 461, 119280, 2026. doi: <https://doi.org/10.1016/j.cma.2026.119280>
- Ryoichiro Agata**, Satoru Baba, Ayako Nakanishi, Yasuyuki Nakamura: HypoNet Nankai: Rapid hypocenter determination tool for the Nankai Trough subduction zone using physics-informed neural networks. *Seismological Research Letters*, 97(1), 524–536, 2026. doi: <https://doi.org/10.1785/0220240377>
- Ryoichiro Agata**: Quantification of Uncertainty and Its Propagation in Seismic Velocity Structure and Earthquake Source Inversion, *Journal of the Seismological Society of Japan*. 2nd ser, 2025. Published in Japanese and English preprint available: <https://arxiv.org/abs/2411.17997>
- Ryoichiro Agata**, Kazuya Shiraishi, Gou Fujie: Physics-informed deep learning quantifies propagated uncertainty in seismic structure and hypocenter determination, *Scientific Reports*, 15, 1846, 2025. <https://doi.org/10.1038/s41598-024-84995-9> (open access).
- Ryoichiro Agata**, Kazuya Shiraishi, Gou Fujie: Bayesian seismic tomography based on velocity-space Stein variational gradient descent for physics-informed neural network, *IEEE Transactions on Geoscience and Remote Sensing*, vol. 61, pp. 1-17, Art no. 4506917, 2023. doi: 10.1109/TGRS.2023.3295414
- Ryoichiro Agata**, Nakata, R., Kasahara, A., Yagi, Y., Seshimo, Y., Yoshioka, S., & Iinuma, T.: Bayesian Multi-Model Estimation of Fault Slip Distribution for Slow Slip Events in Southwest Japan: Effects of Prior Constraints and Uncertain Underground Structure. *Journal of Geophysical Research: Solid Earth*, 127(8), e2021JB023712, 2022.
- Ryoichiro Agata**, Amato Kasahara and Yuji Yagi: A Bayesian inference framework for fault slip distributions based on ensemble modeling of the uncertainty of underground structure - With a focus on uncertain fault dip, *Geophysical Journal International*, 225(2), 1392-1411, 2021.

Takane Hori*, **Ryoichiro Agata***, Tsuyoshi Ichimura, Kohei Fujita, Takuma Yamaguchi, Takeshi Iinuma: High Fidelity Elastic Green's Functions for Subduction Zone Models Consistent With the Global Standard Geodetic Reference System, Earth, Planet and Space, 73(1), 1-12, 2021. (* Equal contributors)

Ryoichiro Agata, Takane Hori, Sylvain D. Barbot, Mamoru Hyodo and Tsuyoshi Ichimura: Quasi-static Simulation Method of Earthquake Cycles Based on Viscoelastic Finite Element Modeling. In: Itou H., Hirano S., Kimura M., Kovtunen V., Khludnev A. (eds) Mathematical Analysis of Continuum Mechanics and Industrial Applications III. CoMFoS 2018. Mathematics for Industry, vol 34, 2020. Springer, Singapore. https://doi.org/10.1007/978-981-15-6062-0_11.

Ryoichiro Agata: Introduction of covariance components in slip inversion of land and seafloor geodetic data and application to slip deficit rate estimation in the Nankai Trough subduction zone, Geophysical Journal International, 221(3):1832–1844, 2020, doi:10.1093/gji/ggaa116.

Ryoichiro Agata, Sylvain D. Barbot, Kohei Fujita, Mamoru Hyodo, Takeshi Iinuma, Ryoko Nakata, Tsuyoshi Ichimura, and Takane Hori: Rapid mantle flow with power-law creep explains deformation after the 2011 Tohoku mega-quake, Nature Communications, 10(1), 1385, 2019.

Ryoichiro Agata, Takane Hori, Keisuke Ariyoshi and Tsuyoshi Ichimura: Detectability analysis of interplate fault slips in the Nankai subduction thrust using seafloor observation instruments, Marine Geophysical Research, 2019, <https://doi.org/10.1007/s11001-019-09380-y>.

Ryoichiro Agata, Tsuyoshi Ichimura, Takane Hori, Kazuro Hirahara, Chihiro Hashimoto and Muneo Hori: An adjoint-based simultaneous estimation method of the asthenosphere's viscosity and afterslip using a fast and scalable finite element adjoint solver, Geophysical Journal International, 213(1), 461–474, 2018.

Ryoichiro Agata, Tsuyoshi Ichimura, Kazuro Hirahara, Mamoru Hyodo, Takane Hori and Muneo Hori: Robust and portable capacity computing method for many finite element analyses of a high-fidelity crustal structure model aimed for coseismic slip estimation, Computers & Geosciences, 94, 121-130, 2016.

Ryoichiro Agata, T. Ichimura, K. Hirahara, M. Hyodo, T. Hori, C. Hashimoto and M. Hori: Numerical Verification Criteria for Coseismic and Postseismic Crustal Deformation Analysis with Large-scale High-fidelity Model, Procedia Computer Science, 51, 1534-1544, 2015. (Presented at International Conference on Computational Science 2015, Reykjavik, Iceland)

Ryoichiro Agata, T. Ichimura, K. Hirahara, M. Hyodo, T. Hori and M. Hori: Several Hundred Finite Element Analyses of an Inversion of Earthquake Fault Slip Distribution using a High-fidelity Model of the Crustal Structure, Procedia Computer Science, 29, 877–887, 2014. (Presented at International Conference on Computational Science 2014, Cairns, Australia)

Ryoichiro Agata, T. Ichimura, M. Hyodo, T. Hori, K. Hirahara and M. Hori: Fundamental Research for Improving Fault Scenario –Development of a Method for Crustal Deformation Analysis Using High-Fidelity Three-Dimensional Crustal Structure–, Journal of Japan Society of Civil Engineers, Ser. A1 (Structural Engineering & Earthquake Engineering (SE/EE)), 69(4), I_767-I_776, 2013 (in Japanese with English abstract)

REFEREED JOURNAL, COAUTHORED

Tomohisa Okazaki, **Ryoichiro Agata**, Masayuki Kano, Takeo Ito, Kazuro Hirahara, Naonori Ueda: Fault geometry invariance and differentiable ensemble solutions for simultaneous fault and slip inversion in heterogeneous crustal structures, Journal of Geophysical Research: Machine Learning and Computation, 3(4), e2026JH001323, 2026.

Tomohisa Okazaki, Take Ito, Kazuro Hirahara, **Ryoichiro Agata**, Masayuki Kano, Naonori Ueda: Three-dimensional crustal deformation analysis using physics-informed deep learning. Journal of Geophysical Research: Solid Earth, 131(4), e2025JB032618.

Shinji Yamashita, Yuji Yagi, Ryo Okuwaki, Kousuke Shimizu, **Ryoichiro Agata**, Yukitoshi Fukahata, Potency density tensor inversion of complex body waveforms with time-adaptive smoothing constraint, Geophysical Journal International, Volume 231, Issue 1, October 2022, Pages 91–107, <https://doi.org/10.1093/gji/ggac181>

Tomita, F., Iinuma, T., **Ryoichiro Agata**, & Hori, T. (2021). Development of a Trans-Dimensional Fault Slip Inversion for Geodetic Data. Journal of Geophysical Research: Solid Earth, 126(5), e2020JB020991.

Shinji Yamashita, Yuji Yagi, Ryo Okuwaki, Kousuke Shimizu, **Ryoichiro Agata**, Yukitoshi Fukahata: Consecutive ruptures on a complex conjugate fault system during the 2018 Gulf of Alaska earthquake. Scientific Report, 11, 5979, 2021.

Masaru Nakano, Shane Murphy, **Ryoichiro Agata**, Yasuhiko Igarashi, Masato Okada, Takane Hori: Self-similar stochastic slip distributions on a non-planar fault for tsunami scenarios for megathrust earthquakes. Progress in Earth and Planetary Science 7, 45, 2020. <https://doi.org/10.1186/s40645-020-00360-0>

Tsuyoshi Ichimura, **Ryoichiro Agata**, Takane Hori, Kenji Satake, Kazuto Ando, Toshitaka Baba and Mueno Hori: Tsunami Analysis Method with High-Fidelity Crustal Structure and Geometry Model: Journal of Earthquake and Tsunami, 1750018, 2017.

Takuma Yamaguchi, Tsuyoshi Ichimura, Yuji Yagi, **Ryoichiro Agata**, Takane Hori and Muneo Hori: Fast crustal deformation computing method for multiple computations accelerated by a graphics processing unit cluster. Geophysical Journal International, 210(2), 787-800, 2017.

Takuma Yamaguchi, **Ryoichiro Agata**, Tsuyoshi Ichimura, Muneo Hori and Lalith Wijerathne: A Monte Carlo analysis method of crustal deformation computation on GPU clusters, Journal of Japan Society of Civil Engineers, Ser. A1 (Structural Engineering & Earthquake Engineering (SE/EE)), 73(4), 2017 (in Japanese with English abstract).

Tsuyoshi Ichimura, **Ryoichiro Agata**, Takane Hori, Kazuro Hirahara, Chihiro Hashimoto, Muneo Hori and Yukihiro Fukahata: An Elastic/Viscoelastic Finite Element Analysis Method for Crustal Deformation using a 3D Island-scale High-fidelity Model, Geophysical Journal International, 206(1), 114-129, 2016.

Tsuyoshi Ichimura, **Ryoichiro Agata**, Takane Hori, Kazuro Hirahara and Muneo Hori: Fast numerical simulation of crustal deformation using a three-dimensional high-fidelity model, Geophysical Journal International, 195 (3), 1730-1744, 2013.

Awards, Fellowships, & Grants

2024-2025	Grant-in-Aid for Transformative Research Areas A (Publicly Offered Research) , Japan Society for the Promotion of Science, Japan	4,030k JPY
2021-2023	Grant-in-Aid for Young Scientists , Japan Society for the Promotion of Science, Japan	3,770k JPY
2019-2020	Grant-in-Aid for Scientific Research on Innovative Areas (Publicly Offered Research) , Japan Society for the Promotion of Science, Japan	1,500k JPY
2014-2016	JSPS Research Fellowship for Young Scientists DC1 , Japan Society for the Promotion of Science, Japan	3,200k JPY

Other Research Experience

The Earth Observatory of Singapore, Nanyang Technological University Singapore
 HOST: PROF. SYLVAIN BARBOT 2016-2017

- Three-month visit for collaborative study (published as Agata+2019NatComms etc.)

Outreach & Professional Development

PEER REVIEW

- Artificial Intelligence and Data Science
- Artificial Intelligence in Geosciences
- Communications Earth & Environment
- Engineering
- Geochemistry, Geophysics, Geosystems
- Geophysical Journal International
- Geophysical Research Letters
- Geosciences
- IEEE Transactions on Geoscience and Remote Sensing
- Journal of Geophysical Research: Machine Learning and Computation
- Journal of Geophysical Research: Solid Earth

- Surveys in Geophysics
- Mathematical Geosciences
- Progress in Earth and Planetary Science

PROFESSIONAL MEMBERSHIPS

- American Geophysical Union
- Japan Geoscience Union
- The Seismological Society of Japan
- The Japan Society for Industrial and Applied Mathematics