Pavel Perezhogin

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scholar.google.com/citations?user=HRXHqugAAAAJ

Education and Employment

2021 – Now — **Postdoctoral Associate** in Mathematics Department. Courant Institute of Mathematical Sciences, New York University, as part of M^2LInES project.
Advisor: Dr. Laure Zanna

2017 – 2021 — **PhD** in Mathematical Modeling, Numerical Methods and Software.
Marchuk Institute of Numerical Mathematics of the Russian Academy of Sciences (INM RAS)
Thesis Title: Stochastic and deterministic subgrid parameterizations for two-dimensional turbulence and their application in ocean circulation models (in Russian).
Advisor: Dr. Andrey Glazunov

2011 – 2017 — **BSc&MSc** in Applied Mathematics and Physics. Moscow Institute of Physics and Technology (MIPT), Department of Control and Applied Mathematics.

Awards

2018 — **Medal of the Russian Academy of Sciences** for students for the best scientific work in oceanology, atmospheric physics and geography.

Additional Experience

Short-term visits — Summer Program 2024 in Center for Turbulence Research (CTR SP), Stanford.

Teaching — **Invited** guest lectures "Machine Learning in Geophysics", Russia, Moscow, INM RAS (2023).

Mentoring — Grad. student Ivan Kobzar (co-advised with Andrey Glazunov, 2021) and Undergrad. Matias Ortiz (co-advised with Laure Zanna, 2023).

Reviewer — Journal of Advances in Modeling Earth Systems (JAMES) | Ocean Modeling | Geoscientific Model Development (GMD)

Selected Talks

Note: *extended list* of **34** presentations for **2016-2024** years can be found at pperezhogin.github.io/talks

2024 — Ocean Sciences | CESM Ocean Model Working Group | Center for Turbulence Research, Summer Program

2023 — Courant Atmosphere Ocean Science Colloquium (**invited**) | AGU Fall Meeting | APS Division of Fluid Dynamics | CESM Workshop | CPT Annual Meeting | NEMO Machine Learning WG (**invited**) | CESM Ocean Model WG meeting

2022 AGU Fall Meeting | CPT Annual Meeting | NEMO Eddy Closure WG (**invited**)

2017-2021 TRR 181 Seminar (**2021, invited**) | EGU General Assembly (**2020, 2021, online**) | AGU Fall Meeting (**2020, online**) | ECMWF Annual seminar (**2020, online**) | Winter School in Les Houches (**2019**, **poster**) | 32nd-IUGG (**2018**) | CITES-**2017**

Code repositories

- Generative ML models for ocean parameterization github.com/m2lines/pyqg_generative
- Equation-discovered ML parameterization in MOM6 ocean model github.com/NOAA-GFDL/MOM6/pull/484
- Parallel exchange library with load balancing for FEMAO ocean-ice model zenodo.org/records/3873239
- Kinetic energy backscatter parameterizations for NEMO ocean model github

Publications

Preprints

1. **Perezhogin**, **P.**, Balakrishna, A., & Agrawal, R. (2024). Large eddy simulation of ocean mesoscale eddies. In *Center for turbulence research, proceedings of the summer program*.
2. Zhang, C., **Perezhogin**, **P.**, Adcroft, A., & Zanna, L. (2024). Addressing out-of-sample issues in multi-layer convolutional neural-network parameterization of mesoscale eddies applied near coastlines. In *Arxiv preprint arxiv:2411.01138*. doi:https://arxiv.org/abs/2411.01138

Peer-reviewed Journal papers

1. Falasca, F., **Perezhogin**, **P.**, & Zanna, L. (2024). Data-driven dimensionality reduction and causal inference for spatiotemporal climate fields. *Phys. Rev. E*, *109*, 044202. doi:https://doi.org/10.1103/PhysRevE.109.044202
2. **Perezhogin**, **P.**, Zhang, C., Adcroft, A., Fernandez-Granda, C., & Zanna, L. (2024). A stable implementation of a data-driven scale-aware mesoscale parameterization. *Journal of Advances in Modeling Earth Systems*, *16*(10), e2023MS004104. doi:https://doi.org/10.1029/2023MS004104
3. **Perezhogin**, **P.**, & Glazunov, A. (2023). Subgrid Parameterizations of Ocean Mesoscale Eddies Based on Germano Decomposition. *JAMES*, *15*(10). doi:https://doi.org/10.1029/2023ms003771
4. **Perezhogin**, **P.**, Zanna, L., & Fernandez-Granda, C. (2023). Generative Data-Driven Approaches for Stochastic Subgrid Parameterizations in an Idealized Ocean Model. *JAMES*, *15*(10), e2023MS003681. doi:https://doi.org/10.1029/2023MS003681
5. Ross, A., Li, Z., **Perezhogin**, **P.**, Fernandez-Granda, C., & Zanna, L. (2023). Benchmarking of machine learning ocean subgrid parameterizations in an idealized model. *JAMES*, *15*(1), e2022MS003258. doi:https://doi.org/10.1029/2022MS003258
6. Zasko, G. V., Glazunov, A. V., Mortikov, E. V., Nechepurenko, Y. M., & **Perezhogin**, **P.** (2023). Optimal energy growth in stably stratified turbulent Couette flow. *Boundary-Layer Meteorology*, *187*(1-2), 395–421. doi:https://doi.org/10.1007/s10546-022-00744-3

7. Zhang, C., **Perezhogin**, **P.**, Gultekin, C., Adcroft, A., Fernandez-Granda, C., & Zanna, L. (2023). Implementation and Evaluation of a Machine Learned Mesoscale Eddy Parameterization Into a Numerical Ocean Circulation Model. *JAMES*, *15*(10), e2023MS003697. doi:https://doi.org/10.1029/2023MS003697

8. **Perezhogin**, **P.**, Chernov, I., & Iakovlev, N. (2021). Advanced parallel implementation of the coupled ocean–ice model FEMAO (version 2.0) with load balancing. *Geoscientific Model Development*, *14*(2), 843–857. doi:https://doi.org/10.5194/gmd-14-843-2021

9. **Perezhogin**, **P.** (2020a). 2d turbulence closures for the barotropic jet instability simulation. *Russian Journal of Numerical Analysis and Mathematical Modelling*, *35*(1), 21–35. doi:https://doi.org/10.1515/rnam-2020-0003

10. **Perezhogin**, **P.** (2020b). Testing of kinetic energy backscatter parameterizations in the NEMO ocean model. *Russian Journal of Numerical Analysis and Mathematical Modelling*, *35*(2), 69–82. doi:https://doi.org/10.1515/rnam-2020-0006

11. **Perezhogin**, **P.**, Glazunov, A. V., & Gritsun, A. S. (2019). Stochastic and deterministic kinetic energy backscatter parameterizations for simulation of the two-dimensional turbulence. *Russian Journal of Numerical Analysis and Mathematical Modelling*, *34*(4), 197–213. doi:https://doi.org/10.1515/rnam-2019-0017

12. Dymnikov, V., & **Perezhogin**, **P.** (2018). Systems of hydrodynamic type that approximate two-dimensional ideal fluid equations. *Izvestiya, Atmospheric and Oceanic Physics*, *54*, 232–241. doi:https://doi.org/10.1134/S0001433818030040

13. **Perezhogin**, **P.**, & Dymnikov, V. (2017). Modeling of quasi-equilibrium states of a two-dimensional ideal fluid. *Doklady Physics*, *62*, 248–252. doi:https://doi.org/10.1134/S1028335817050032

14. **Perezhogin**, **P.**, Glazunov, A. V., Mortikov, E. V., & Dymnikov, V. P. (2017). Comparison of numerical advection schemes in two-dimensional turbulence simulation. *Russian Journal of Numerical Analysis and Mathematical Modelling*, *32*(1), 47–60. doi:https://doi.org/10.1515/rnam-2017-0005

Note: *Additional* publications, including peer-reviewed in Russian journals (**2**), preprints (**1**), conference papers (**3**) and open source education/software (**1**) can be found at pperezhogin.github.io/publications

CV was created on November 24, 2024