

# UCHIDA, Takaya

A Physical Oceanographer with a flair of data science

## Office Address

Climate Dynamics Laboratory  
Moscow Institute of Physics and Technology  
141701 Dolgoprudny, Russia  
[takachanbo@gmail.com](mailto:takachanbo@gmail.com)  
<https://roxyboy.github.io>

## Languages

- Native: Japanese, English
- Conversational: French
- Learning: Russian

## Education

- |   |               |
|---|---------------|
| Doctor of Philosophy, Physical Oceanography<br>Columbia University in the City of New York, USA | October 2019  |
| Master of Philosophy, Physical Oceanography<br>Columbia University in the City of New York, USA | February 2018 |
| Master of Arts, Physical Oceanography<br>Columbia University in the City of New York, USA       | May 2016      |
| Bachelor of Engineering, Ocean Engineering<br>The University of Tokyo (東大), 日本                  | March 2014    |

## Research Experience

- |  |                        |
|--|------------------------|
| Senior Researcher, Physical Oceanography<br>Climate Dynamics Laboratory, МФТИ, Россия                            | January 2025 - present |
| Assistant Research Scientist, Physical Oceanography<br>Center for Ocean-Atmospheric Prediction Studies, FSU, USA | December 2024          |
| MOPGA Postdoctoral Fellow, Physical Oceanography<br>Institut des Géosciences de l'Environnement, CNRS, France    | September 2022         |

## Publications

[M]: Work led by mentee

- **Uchida, T.**, Q. Jamet, A. Poje, N. Wienders, L. Sun & W. Dewar. (Submitted). Dynamics and thermodynamics of the Boussinesq North Atlantic eddy kinetic energy spectral budget. *J. Adv. Model. Earth Sys.*, doi:10.22541/essoar.172969549.95386966/v1;
- **Uchida, T.**, B. Yadidya, K. Lapo, X. Xu, J. Early, B. Arbic, D. Menemenlis, L. Hiron, E. Chassignet, J. Shriver & M. Buijsman. (Submitted). Dynamic-mode decomposition of geostrophically balanced motions from SWOT altimetry. *Earth and Space Sci.*, doi:10.48550/arXiv.2407.09309;
- **Uchida, T.**, Q. Jamet, A. Poje, N. Wienders & W. Dewar. (2024). Wavelet-based wavenumber spectral estimate of eddy kinetic energy: Application to the North Atlantic. *Ocean Model.*, doi:10.1016/j.ocemod.2024.102392;

- **Uchida, T.**, Q. Jamet, W. Dewar, B. Deremble, A. Poje & L. Sun. (2024). Imprint of chaos on the ocean energy cycle from an eddying North Atlantic ensemble. *J. Phys. Oceanogr.*, doi:10.1175/JPO-D-23-0176.1;
- Deremble, B., **T. Uchida**, W. Dewar & R. Samelson. (2023). Eddy-mean flow interaction with the Multiple Scale Quasi-Geostrophic Model. *J. Adv. Model. Earth Syst.*, doi:10.1029/2022MS003572;
- Chassignet, E., X. Xu, A. Bozec & **T. Uchida**. (2023). Impact of the New England seamount chain on the Gulf Stream pathway and variability. *J. Phys. Oceanogr.*, doi:10.1175/JPO-D-23-0008.1;
- **Uchida, T.**, Q. Jamet, A. Poje, N. Wienders, W. Dewar & B. Deremble. (2023). Wavelet-based wavenumber spectral estimate of eddy kinetic energy: Idealized quasi-geostrophic flow. *J. Adv. Model. Earth Syst.*, doi:10.1029/2022MS003399;
- **Uchida, T.**, D. Balwada, Q. Jamet, W. Dewar, B. Deremble, T. Penduff & J. Le Sommer. (2023). Cautionary tales from the mesoscale eddy transport tensor. *Ocean Model.*, doi:10.1016/j.ocemod.2023.102172;
- **Uchida, T.**, J. Le Sommer, C. Stern, R. Abernathey, C. Holdgraf, A. Albert, L. Brodeau, E. Chassignet, X. Xu, J. Gula, G. Roullet, N. Koldunov, S. Danilov, Q. Wang, D. Menemenlis, C. Bricaud, B. Arbic, J. Shriver, F. Qiao, B. Xiao, A. Biastoch, R. Schubert, B. Fox-Kemper, W. Dewar & A. Wallcraft. (2022). Cloud-based framework for inter-comparing submesoscale permitting realistic ocean models. *Geosci. Model Dev.*, doi:10.5194/gmd-15-5829-2022;
- **Uchida, T.**, Q. Jamet, W. Dewar, J. Le Sommer, T. Penduff & D. Balwada. (2022). Diagnosing the thickness-weighted averaged eddy-mean flow interaction from an eddying North Atlantic ensemble: The Eliassen-Palm flux. *J. Adv. Model. Earth Syst.*, doi:10.1029/2021MS002866;
- **Uchida, T.**, B. Deremble & S. Popinet. (2022). Deterministic model of the eddy dynamics for a midlatitude ocean model. *J. Phys. Oceanogr.*, doi:10.1175/JPO-D-21-0217.1;
- **Uchida, T.**, Q. Jamet, A. Poje & W. Dewar. (2021). An ensemble-based eddy and spectral analysis, with application to the Gulf Stream. *J. Adv. Model. Earth Syst.*, doi:10.1029/2021MS002692;
- Khatri, H., S. Griffies, **T. Uchida**, H. Wang & D. Menemenlis. (2021). Role of mixed-layer instabilities in the seasonal evolution of eddy kinetic energy spectra in a global submesoscale permitting simulation. *Geophys. Res. Lett.*, doi:10.1029/2021GL094777;
- **Uchida, T.**, B. Deremble & T. Penduff. (2021). The seasonal variability of the ocean energy cycle from a quasi-geostrophic double gyre ensemble. *Fluids*, doi:10.3390/fluids6060206;
- **Uchida, T.**, B. Deremble, W. Dewar & T. Penduff. (2021). Diagnosing the Eliassen-Palm flux from a quasi-geostrophic double gyre ensemble. In proceedings of the *EarthCube Annual Meeting*, doi:10.5281/zenodo.5496375. [https://earthcube2021.github.io/ec21\\_book/notebooks/ec21\\_uchida\\_et al/notebooks/TU\\_05\\_Diagnosing-the-Eliassen-Palm-flux-from-a-quasi-geostrophic-double-gyre-ensemble.html](https://earthcube2021.github.io/ec21_book/notebooks/ec21_uchida_et al/notebooks/TU_05_Diagnosing-the-Eliassen-Palm-flux-from-a-quasi-geostrophic-double-gyre-ensemble.html);

- Jamet, Q., B. Deremble, N. Wienders, **T. Uchida** & W. Dewar. (2021). On wind-driven energetics of subtropical gyres. *J. Adv. Model. Earth Syst.*, doi:10.1029/2020MS002329;
- Jones, S., J. Busecke, **T. Uchida** & R. Abernathey. (2020). Vertical regridding and remapping of CMIP6 ocean data in the cloud. In proceedings of the *EarthCube Annual Meeting*, [https://github.com/earthcube2020/ec20\\_jones\\_etal](https://github.com/earthcube2020/ec20_jones_etal);
- **Uchida, T.**, D. Balwada, R. Abernathey, G. McKinley, S. Smith & M. Lévy. (2020). The impact of seasonality in eddy iron fluxes on primary production in the Southern Ocean. *Nature Comm.*, doi:10.1038/s41467-020-14955-0;
- **Uchida, T.**, D. Balwada, R. Abernathey, G. McKinley, S. Smith & M. Lévy. (2019). The contribution of submesoscale over mesoscale eddy iron transport in the open Southern Ocean. *J. Adv. Model. Earth Syst.*, doi:10.1029/2019MS001805;
- **Uchida, T.**, D. Balwada, R. Abernathey, C. Prend, E. Boss & S. Gille. (2019). Southern Ocean Phytoplankton Blooms Observed by Biogeochemical Floats. *J. Geophys. Res.: Oceans*, doi:10.1029/2019JC015355;
- **Uchida, T.**, R. Abernathey & S. Smith. (2017). Seasonality of eddy kinetic energy in an eddy permitting global climate model. *Ocean Model.*, doi:10.1016/j.ocemod.2017.08.006.

### Non-refereed

- **Uchida, T.** (2019). *Seasonality in surface (sub)mesoscale turbulence and its impact on iron transport and primary production*. (Ph.D. dissertation, Columbia University in the City of New York). doi:10.7916/d8-9s8r-m049.

### Mentoring

- Postdoctoral fellows: Luolin Sun (CNRS, France); Habib Micaël Aguedjou (CNES, France);
- Doctoral students: Ilkyeong Ma (FSU, USA);

### Honors and Awards

- Co-investigator of the National Aeronautics and Space Administration (NASA) award ‘*Mesoscale eddies, internal waves, solitons in SWOT, global models, and downscaled regional models*’ with the reference 80NSSC24K1649, funded for the duration of 2025-2028;
- Co-investigator of the National Science Foundation (NSF) award ‘*Novel Ensemble Based North Atlantic Diagnostics*’ with the reference OCE-2123632, funded for the duration of 2022-2026;
- Co-investigator of the the French Les Enveloppes Fluides et l’Environnement (LEFE) award ‘*Assessing the Role of forced and internal Variability for the Ocean and climate Response in a changing climate (ARVOR)*’ funded for the duration of 2022 - 2024;
- Attendee of Les Houches Summer School on Fundamental Aspects of Turbulent Flows in Climate Dynamics, which took place during August 2017 at l’École de Physique des Houches, France;

- Scholarship from the Heiwa Nakajima Foundation from September 2014 - August 2016.
- Laureate of the 2014 Dean's Award from the Faculty of Engineering, The University of Tokyo.

## Technical Skills

- Proficient in compiling and running numerical models in Fortran, with experience using the MITgcm. Also experienced in tuning and running the Darwin biogeochemical model;
- Expert in big-data analysis and has continued contributing to the development of Python open-source software such as:

1. `xrft`: doi:10.5281/zenodo.1402635 (<https://xrft.readthedocs.io/en/latest/>);
2. `xwavelet`: doi:10.5281/zenodo.6984380 (<https://github.com/roxyboy/xwavelet>);
3. `xgcm`: doi:10.5281/zenodo.4821276 (<https://xgcm.readthedocs.io/en/latest/>);

available via the Github platform, and `pip` and `conda-forge` package managers. Also has contributed to the implementation of Pangeo Forge for cloud-based computational analyses (doi:10.5281/zenodo.6762536);

- Intermediate expertise on numerical model development based on the JAX differentiable language (<https://github.com/jejohnson/somax>);

## Service Activity

- Panelist for the NASA Research Opportunities in Space and Earth Science (ROSES) to review scientific proposals;
- Special U.S. government employee of NSF as a panelist and reviewer for reviewing scientific proposals;
- Reviewer for the Wallenberg Academy Fellowship awarded by the Knut and Alice Wallenberg Foundation in Sweden, and the BIENVENUE Call 2021 (H2020-MSCA-COFUND-2019) managed by the Regional Council of Brittany, France;
- Reviewed manuscripts for *J. Phys. Oceanogr.*, *J. Adv. Model. Earth Syst.*, *J. Geophys. Res.: Oceans*, *Geophys. Res. Lett.*, *Glob. Biogeochem. Cyc.*, *Nature Comm.*, *Ocean Model.*, *Climate Dyn.*, *Fund. Res.*, *J. Marine Syst.*, *Biogeosci.*, *Geosci. Model Dev.*, *Front. Marine Sci.*, *Deep-Sea Res.: Part I*, *J. Limn. Oceanogr.*, *Fluids*, *J. Oper. Oceanogr.*, & *Inter. J. Digi. Earth*;
- Technician for the Lowered Acoustic Doppler Current Profiler (LADCP) measurements on the 2016 GO-SHIP 109N transect ([https://currents.soest.hawaii.edu/go-ship/ladcp\\_rst\\_2015-2018/2016\\_I8S9N.html](https://currents.soest.hawaii.edu/go-ship/ladcp_rst_2015-2018/2016_I8S9N.html)).