

Meredith Plumley

Applied Mathematics PhD & Postdoctoral Researcher

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Work Experience

Post Doctoral Researcher

ETH Zurich - Zürich, ZH

September 2018 to Present

- Proposed and secured own funding for current 2-year post doctoral position in the Institute of Geophysics at ETH Zurich.
- Conducting independent research using reduced mathematical models to investigate turbulent flows within the Earth's core
- Implemented a python code for simulating a new reduced model for Earth's core.

Lecturer

ETH Zurich - Zurich, Switzerland

September 2018 to Present

- Lecturer of the Physics of the Core class for masters students at ETH
- Covered the composition, structure and physical conditions in Earth's core, with a focus on the geodynamo mechanism.

Doctoral Researcher | NASA Funded

University of Colorado - Boulder, CO

September 2015 to June 2018

- Authored and secured NASA funding in the field of planetary science. This grant represented 1 of 28 national grants awarded in 2015.
- Investigated rotating turbulence driven by fluid instabilities, with an emphasis on Rayleigh-Benard convection.
- Ran large scale numerical simulations and analyzed the data for scaling laws and flow behavior.
- Published 4 articles in top tier peer-reviewed journals.

Calculus II Instructor

University of Colorado - Boulder, CO

September 2013 to September 2015

- Lead instructor for two summer sections of Calculus II, covering the topics of integration, sequences and series.
- Managed all aspects of the course including the schedule, lectures, exams and final grades.

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Education

PhD in Applied Mathematics

University of Colorado Boulder - Boulder, CO

September 2012 to May 2018

MS in Applied Mathematics

University of Washington - Seattle, WA

September 2011 to June 2012

BS in Mathematics

Washington University in St. Louis - St. Louis, MO

September 2007 to May 2011

Skills

- Python (4 years)
- Matlab (9 years)
- C++ (3 years)
- Linux (5 years)

Awards

AGU Donald Turcotte Award for outstanding dissertation research AGU

July 2018

- The Donald L. Turcotte Award is given annually to one honoree in recognition of outstanding dissertation research that contributes directly to nonlinear geophysics.

ETH Postdoctoral Fellow, ETH Zurich

September 2018

- The ETH Zurich Postdoctoral Fellowship Program supports incoming postdoctoral researchers at ETH Zurich. The program is intended to foster young researchers who have already demonstrated scientific excellence in the early stages of their careers.

NASA Earth and Space Science Fellowship for graduate research

September 2015

- The purpose of the NESSF is to ensure continued training of a highly qualified workforce in disciplines required to achieve NASA's scientific goals. Awards resulting from the competitive selection are made in the form of training grants to the respective universities and educational institutions, with the faculty advisor serving as the principal investigator.

Best Should Teach Award, Graduate Teacher Program, CU Boulder

June 2013

- The Best Should Teach Initiative strives to acknowledge excellence in teaching and academic leadership. The initiative is managed by the Graduate Teacher Program in coordination with the School of Education, the College of Arts and Sciences, and the Graduate School at the University of Colorado

at Boulder. Lindley and Marguerite Stiles established the initiative in 1996 to promulgate the message that “The Best Should Teach.”

Publications

The effects of Ekman pumping on quasi-geostrophic Rayleigh-Bénard convection

<https://www.cambridge.org/core/journals/journal-of-fluid-mechanics/article/effects-of-ekman-pumping-on-quasigeostrophic-rayleighbenard-convection/7397A3B51472B137F75D9B6B07F5D04E>

September 2016

- Numerical simulations of three-dimensional rapidly rotating Rayleigh-Bénard convection are performed by employing an asymptotic quasi-geostrophic model that incorporates the effects of no-slip boundaries through (i) parametrized Ekman pumping boundary conditions and (ii) a thermal wind boundary layer that regularizes the enhanced thermal fluctuations induced by pumping...

Impact of domain anisotropy on the inverse cascade in geostrophic turbulent convection

<https://www.cambridge.org/core/journals/journal-of-fluid-mechanics/article/impact-of-domain-anisotropy-on-the-inverse-cascade-in-geostrophic-turbulent-convection/84E8737F012FDA3E56D28933BBE93306>

January 2018

- The effect of domain anisotropy on the inverse cascade occurring within the geostrophic turbulence regime of rapidly rotating Rayleigh-Bénard convection is investigated.

Self-consistent single mode investigations of the quasi-geostrophic convection-driven dynamo model

<https://www.cambridge.org/core/journals/journal-of-plasma-physics/article/selfconsistent-single-mode-investigations-of-the-quasigeostrophic-convectiondriven-dynamo-model/FC6614B80EAE5283FDD218A9ED489A38>

August 2018

- The quasi-geostrophic dynamo model (QGDM) is a multiscale, fully nonlinear Cartesian dynamo model that is valid in the asymptotic limit of low Rossby number.

Sensitivity of rapidly rotating Rayleigh-Bénard convection to Ekman pumping

<https://journals.aps.org/prfluids/abstract/10.1103/PhysRevFluids.2.094801>

September 2017

- The dependence of the heat transfer, as measured by the nondimensional Nusselt number Nu , on Ekman pumping for rapidly rotating Rayleigh-Bénard convection in an infinite plane layer is examined for fluids with Prandtl number $Pr=1$.

Scaling Laws in Rayleigh-Bénard Convection

<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019EA000583>

August 2019

- The heat transfer scaling theories for Rayleigh-Bénard convection (RBC) are reviewed and discussed for configurations with and without rotation and magnetic fields. Specifically, power law scalings that relate the efficiency of the heat transport, as measured by the nondimensional Nusselt number Nu , to the thermal driving are pursued.