Navid C. Constantinou

ARC DECRA Research Fellow Research School of Earth Sciences Australian National University, Australia navid.constantinou@anu.edu.au
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 arXiv/a/constantinou_n_1

Interests

Geophysical fluid dynamics, physical oceanography, atmospheric dynamics, climate, machine learning, fluid mechanics, story telling (both science-related or not)

Education

Oct. 2010 - Ph.D. in Physics

Feb. 2015 National & Kapodistrian University of Athens, Greece

Supervisor : Petros J. Ioannou

THESIS: Formation of large-scale structures by turbulence in rotating planets [arXiv] 🕹

Sep. 2008 - M.Sc. in Physics w/ Honors (summa cum laude, 9.66/10)

Jun. 2010 Astrophysics, Astronomy and Mechanics

National & Kapodistrian University of Athens, Greece

Sep. 2003 - B.Sc. in Physics w/ Honors (summa cum laude, class of 2008 valedictorian, 9.16/10)

Jun. 2008 National & Kapodistrian University of Athens, Greece

Exchange through Socrates-Erasmus program during spring semester 2006 at the

Rheinische Friedrich-Wilhelms Universität, Bonn, Germany

Jul. 2001 - Cyprus National Guard

Aug. 2003 Military service (obligatory) as Second Lieutenant in Armored Forces, Cyprus

Appointments

June 2021 - ARC Discovery Early Career Researcher Award (DECRA) Fellow

Research School of Earth Sciences, Australian National University, Australia

May 2018 - Research Fellow, part of the ARC Centre of Excellence for Climate Extremes

May 2021 Research School of Earth Sciences, Australian National University, Australia (with Andy Hogg)

Sep. 2015 - Postdoctoral Researcher (NOAA Climate & Global Change Postdoctoral Fellow)

Apr. 2018 Scripps Institution of Oceanography, University of California San Diego, USA (with William R. Young)

Jun. 2015 - **Visiting Researcher**

Aug. 2015 Cyprus Oceanography Center, University of Cyprus, Cyprus

Grants & Awards

2022 Consortium for Ocean and Sea Ice Modelling in Australia Most Selfless Contributor Award 2022 [PHOTO]

2022 ANU Institute for Climate, Energy & Disaster Solutions (9,500 USD)

AI Generation of Cyclone Data via Learned Physical Constraints

2021-2024 ARC Discovery Early Researcher Career Award 2021 (ARC: 300,000 USD + ANU: 100,000 USD)

Machine learning of subgrid ocean physics for global ocean models

Best paper among Early Career Researchers within ARC Centre of Excellence for Climate Extremes

2015-2017 NOAA Climate & Global Change Postdoctoral Fellowship (150,000 USD)

2009-2014 Alexander S. Onassis Foundation

Scholarship for the 2nd year of M.Sc. and for 4 years of Ph.D. studies (47,700 USD)

2009-2012 A. G. Leventis Foundation

Scholarship for the 2nd year of M.Sc. and the first 2 years of Ph.D. studies (16,000 USD)

2003-2008 Department of Physics, National & Kapodistrian University of Athens, Greece

Valedictorian for class 2008

1st student for academic years 2003-04 and 2004-05 Honorary Scholarship for academic year 2005-06

2001 International Physics Olympiad, June 2001

Participation with the national team of Cyprus

Publications

Submitted/In Review

- 27. Wagner, G. L., Hillier, A., **Constantinou, N. C.**, Silvestri, S., Souza, A., Burns, K., Ramadhan, A., Hill, C. N., Campin, J.-M., Marshall, J., and Ferrari, R. (2023) CATKE: a turbulent-kinetic-energy-based parameterization for ocean microturbulence with dynamic convective adjustment. *J. Adv. Model. Earth Sy.* (submitted in June 2023)
- 26. Bennetts, L. G., Shakespeare, C. J., Vreugdenhil, C. A., Foppert, A., Gayen, B., Meyer, A., Morrison, A. K., Padman, L., Phillips, H. E., Stevens, C. L., Toffoli, A., Constantinou, N. C., Cusack, J., Cyriak, A., Doddridge, E. W., Domingues, C. M., England, M. H., Evans, D. G., Heil, P., Hogg, A. McC., Holmes, R. M., Huneke, W. G. C., Jones, N. L., Keating, S. R., Kiss, A. E., Kraitzman, N., Malyarenko, A., McConnochie, C. D., Meucci, A., Montiel, F., Neme, J., Nikurashin, M., Patel, R. S., Peng, J.-P., Rayson, M., Rosevear, M. G., Sohail, T., Spence, P., Stanley, G. J. (2023) Closing the loops on Southern Ocean dynamics: From the circumpolar current to ice shelves and from bottom mixing to surface waves. Rev. Geophys. (submitted in May 2023)
- 25. Ong, E. Q. Y., Doddridge, E. W., **Constantinou, N. C.**, Hogg, A. McC., and England, M. H. (2023) Episodic Antarctic shelf intrusions of circumpolar deep water via canyons. *J. Phys. Oceanogr.* (submitted in April 2023; arXiv:2304.13225) 🚭 📥
- 24. Bhagtani, D., Hogg, A. McC., Holmes, R. M., and **Constantinou, N. C.** (2023) Surface heating steers planetary-scale ocean circulation. *J. Phys. Oceanogr.* (submitted in January 2023, revised in May 2023; arXiv:2301.11474)
- 23. **Constantinou, N. C.**, Rocha, C. B., Llewellyn Smith, S. G., and Young, W. R. (2023) Nusselt number scaling in horizontal convection: boundary conditions and dimensionality. *J. Fluid Mech.* (submitted in January 2023, revised in June 2023; arXiv:2301.03122)
- 22. Wagner, G. L., **Constantinou, N. C.**, and Reichl, B. G. (2023) Stokes drift should not be added to ocean general circulation model velocities. *Geophys. Res. Lett.* (submitted in October 2022, revised in April 2023; arXiv:2210.08552)

Published/In Press

- 21. Hogg, A. McC., Penduff, T., Close, S. E., Dewar, W. K., **Constantinou, N. C.**, and Martínez-Moreno, J. (2022) Circumpolar variations in the chaotic nature of Southern Ocean eddy dynamics. *J. Geophys. Res.-Oceans*, **127**, e2022JC018440.
- 20. Wagner, T. J. W., Eisenman, I., Ceroli, A. M., and **Constantinou, N. C.** (2022) How winds and ocean currents influence the drift of floating objects. *J. Phys. Oceanogr.*, **52(5)**, 907-916.
 - 19. **Constantinou**, **N. C.** and Hogg, A. McC. (2021) Intrinsic oceanic decadal variability of upper-ocean heat content. J. Climate, **34 (15)**, 6175-6189. [datasets and notebooks] 🕹 🕹 (featured in the CLEX press news)

- 17. **Constantinou, N. C.**, Wagner, G. L., Siegelman, L., Pearson, B. C., and Palóczy, A. (2021) GeophysicalFlows.jl: Solvers for geophysical fluid dynamics problems in periodic domains on CPUs & GPUs. *J. Open Source Softw.*, **6 (60)**, 3053. (code repository; package documentation) 🚭 🚣
- 16. Lozano-Durán, A., Constantinou, N. C., Nikolaidis, M.-A., and Karp, M. (2021). Cause-and-effect of linear mechanisms in wall turbulence. *J. Fluid Mech.*, 914, A8.
 - 15. Lozano-Durán, A., Nikolaidis, M.-A., **Constantinou, N. C.**, and Karp, M. (2020). Alternative physics to understand wall turbulence: Navier−Stokes equations with modified linear dynamics. *J. Phys.: Conf. Ser.*, **1522**, 012003. ^⑤ ♣
- 14. Rocha, C. B., **Constantinou, N. C.**, Llewellyn Smith, S. G., and Young, W. R. (2020) The Nusselt numbers of horizontal convection. *J. Fluid Mech.*, **894**, A24.

 - 12. Martínez-Moreno, J., Hogg, A. McC., Kiss, A. E., **Constantinou, N. C.**, and Morrison, A. K. (2019). Kinetic energy of eddy-like features from sea surface altimetry. *J. Adv. Model. Earth Sy.*, **11 (10)**, 3090-3105.
- 10. Bakas, N. A., **Constantinou, N. C.**, and Ioannou, P. J. (2019). Statistical state dynamics of weak jets in barotropic beta-plane turbulence. *J. Atmos. Sci.*, **76 (3)**, 919-945. 🚳 🚣 (Featured in the CLEx press news.)
- 8. Constantinou, N. C. (2018). A barotropic model of eddy saturation. J. Phys. Oceanogr., 48(2), 397-411. 🚳 🕹
- 7. Constantinou, N. C. and Young, W. R. (2017). Beta-plane turbulence above monoscale topography. J. Fluid Mech., 827, 415-447.
 - 6. Farrell, B. F., Ioannou, P. J., Jiménez, J., **Constantinou, N. C.**, Lozano-Durán, A., and Nikolaidis, M.-A. (2016). A statistical state dynamics-based study of the structure and mechanism of large-scale motions in plane Poiseuille flow. *J. Fluid Mech.*, **809**, 290-315.
- 5. **Constantinou, N. C.**, Farrell, B. F., and Ioannou, P. J. (2016). Statistical state dynamics of jet—wave coexistence in barotropic beta-plane turbulence. *J. Atmos. Sci.*, **73 (5)**, 2229-2253.
- up to 2015 4. Bakas, N. A., Constantinou, N. C., and Ioannou, P. J. (2015). S3T stability of the homogeneous state of barotropic beta-plane turbulence. J. Atmos. Sci., 72 (5), 1689-1712.
 - 3. Constantinou, N. C., Lozano-Durán, A., Nikolaidis, M.-A., Farrell, B. F., Ioannou, P. J., and Jiménez, J. (2014). Turbulence in the highly restricted dynamics of a closure at second order: comparison with DNS. J. Phys.: Conf. Ser., 506, 012004.
 - 2. **Constantinou, N. C.,** Farrell, B. F., and Ioannou, P. J. (2014). Emergence and equilibration of jets in beta-plane turbulence: applications of Stochastic Structural Stability Theory. *J. Atmos. Sci.*, **71** (5), 1818-1842.
 - 1. **Constantinou, N. C.** and Ioannou, P. J. (2011). Optimal excitation of two dimensional Holmboe instabilities. *Phys. Fluids*, **23**, 074102. 🚳 🚣

Chapters in Books (refereed)

- 2. **Constantinou, N. C.**, Ioannou, P. J., and Bakas, N. A. (2016). Structure and stability of low amplitude jet equilibria in barotropic turbulence. In Karacostas, T., Bais, A., and Nastos, T. P. (eds.) *Perspectives on Atmospheric Sciences*, 369-375, Springer International Publishing.
- 1. Bakas, N. A., Constantinou, N. C., and Ioannou, P. J. (2016). On the dynamics underlying the emergence of coherent structures in barotropic turbulence. In Karacostas, T., Bais, A., and Nastos, T. P. (eds.) *Perspectives on Atmospheric Sciences*, 361-367, Springer International Publishing.

Conference Proceedings (refereed)

- 3. Ioannou, P. J., Nikolaidis, M.-A., and **Constantinou, N. C.** (2014) Simplified turbulence in wall-bounded flows. *9th Panhellenic Meeting "Fluid Flow Phenomena" (ROH 2014)*, Athens, 12-13 Dec., 2014 (in greek).
- 2. Bakas, N. A., Ioannou P. J., and **Constantinou, N. C.** (2014). Emergence of non-zonal coherent structures in barotropic turbulence. In Kanakidou, M., Mihalopoulos, N. and Nastos, P. (eds.) *Proceedings of the 12th International Conference on Meteorology, Climatology & Atmospheric Physics (COMECAP)*, Heraklion, Crete, 28-31 May, Vol. 1, 107-111, ISBN: 978-960-524-430-9.
- 1. **Constantinou**, N. C. and Ioannou, P. J. (2014). Emergence and equilibration of zonal winds in turbulent planetary atmospheres. In Kanakidou, M., Mihalopoulos, N. and Nastos, P. (eds.) *Proceedings of the 12th International Conference on Meteorology, Climatology & Atmospheric Physics (COMECAP)*, Heraklion, Crete, 28-31 May, Vol. 1, 210-214, ISBN: 978-960-524-430-9.

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Other publications

- 6. Miller, J. W., O'Neil, C., **Constantinou, N. C.**, and Anzecot, O. (2022). Eigenvalue initialisation and regularisation for Koopman autoencoders. (arXiv:2212.12086) 🚭 🚣
 - 5. **Constantinou, N. C.** (2021). How machine learning is helping us fine-tune climate models to reach unprecedented detail. *The Conversation*, 18th August 2021. [URL]
- 4. **Constantinou, N. C.**, Martínez-Moreno, J., Hogg, A. McC., England, M. H., Kiss, A. E., and Morrison, A. K. (2021). Satellites reveal ocean currents are getting stronger, with potentially significant implications for climate change. *The Conversation*, 23rd April 2021. [URL]
- 3. Lozano-Durán, A., Nikolaidis, M.-A., **Constantinou, N. C.**, and Karp, M. (2019). Wall turbulence without modal instability of the streaks. (arXiv:1909.05490)
 - 2. Lozano-Durán, A., Karp, M., and **Constantinou, N. C.** (2018). Wall turbulence with constrained energy extraction from the mean flow. *Center for Turbulence Research Annual Research Briefs 2018*, 209-220.
- 1. **Constantinou, N. C.** (2018). Jupiter's magnetic fields may stop its wind bands from going deep into the gas giant. *The Conversation*, 10th August 2018. [URL]

Conferences

- Oceananigans.jl: breakthrough resolution, memory, and energy efficiency in global ocean simulations. *Australasian Leadership Computing Symposium 2023* [URL], Australian Academy of Sciences, Canberra, Australia, 14-16 Jun. 2023. (talk)
 - Open-source, reproducible workflow in physical oceanography and geophysical fluid dynamics. *Ocean Sciences Meeting 2022*, Virtual Conference, USA, 27 Feb.-3 Mar 2021. (**invited talk**)
- A data-driven approach for developing and calibrating a parameterization for mesoscale eddy fluxes. *Ocean Sciences Meeting 2022*, Virtual Conference, USA, 27 Feb.-3 Mar 2021. (talk)
- A data-driven approach for developing and calibrating a parameterization of the ocean mesoscale eddy fluxes Conference on "Machine Learning for Climate", KITP, UC Santa Barbara, USA, 1-4 Nov. 2021. (invited talk) Livideo

Cause-and-effect of linear mechanisms in wall turbulence. *73rd APS Division of Fluid Dynamics Meeting*, Chicago, IL, USA, 22-24 Nov. 2020. (virtual talk) **★** [VIDEO]

Eddy saturation of the Southern Ocean: a baroclinic versus barotropic perspective. *Ocean Sciences Meeting 2020*, San Diego, CA, USA, 16-21 Feb. 2020. (poster) **\ddots**

Demystifying the Southern Ocean's response to wind variability. *ARC Centre of Excellence for Climate Extremes Annual Workshop 2019* [URL], Hobart, Tasmania, Australia, 19-21 Nov. 2019. (**invited talk**)

Barotropic versus baroclinic eddy saturation: implications to Southern Ocean dynamics. *22nd Conference on Atmospheric and Oceanic Fluid Dynamics*, Portland ME, USA, 24-28 Jun. 2019. (talk)

Magnetic eddy viscosity of mean shear flows in 2D magnetohydrodynamics: possible application to gas giants' interiors. 22nd Conference on Atmospheric and Oceanic Fluid Dynamics, Portland ME, USA, 24-28 Jun. 2019. (poster)

Barotropic versus baroclinic eddy saturation. *AGU Fall Meeting 2018*, Washington DC, USA, 10-14 Dec. 2018. (poster)

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Magnetic suppression of zonal flows on a beta plane. AGU Fall Meeting 2018, Washington DC, USA, 10-14 Dec. 2018. (poster) 🕹

Statistical state dynamics reveals mechanism for organization of coherent structures in turbulent flows. *Euromech Colloquium 598: Coherent structures in wall-bounded turbulence*, Imperial College London, London, UK, 29-31 Aug. 2018. (invited keynote talk)

Eddy saturation in a barotropic model. 21st Conference on Atmospheric and Oceanic Fluid Dynamics, Portland OR, USA, 25-30 Jun. 2017. (talk) 🚣

A statistical state dynamics based theory for jet-wave coexistence in beta-plane turbulence. *21st Conference on Atmospheric and Oceanic Fluid Dynamics*, Portland OR, USA, 25-30 Jun. 2017. (poster)

Understanding self-organization in turbulent flows by studying the statistical state dynamics, *Conference on "Recurrence, self-organization, and the dynamics of turbulence"*, KITP, UC Santa Barbara, USA, 9-13 Jan. 2017. (invited talk)

Topographic beta-plane turbulence and form stress. *AGUFall Meeting 2016*, San Francisco, USA, 12-16 Dec. 2016. (poster) ♣

Structure and mechanism of turbulence under dynamical restriction in plane Poiseuille flow. *69th APS Division of Fluid Dynamics Meeting*, Portland, USA, 20-22 Nov. 2016. (talk)

Statistical state dynamics of jet—wave coexistence in beta-plane turbulence. *APS March Meeting 2016*, Baltimore, USA, 14-18 Mar., 2016. (talk) **\(\structure{\struc**

up to 2014 Emergence and equilibration of zonal winds in turbulent planetary atmospheres. 12th International Conference on Meteorology, Climatology and Atmospheric Physics, COMECAP 2014 [URL], Heraklion, Crete, Greece, 28-31 May 2014. (poster)

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Emergence and equilibration of jets in planetary turbulence. *EGU 2013 General Assembly* [URL], Vienna, Austria, 8-12 Apr. 2013. (talk)

Emergence and equilibration of jets in planetary turbulence. 8th Panhellenic Meeting "Fluid Flow Phenomena" (ROI 2012) [URL], Volos, Greece, 16-17 November 2012. (talk) 🕹

Seminars

2020

2019

2019

2017

2016

2023

- Open-source and reproducibility workflow within the Consortium for Ocean–Sea Ice Modelling in Australia (COSIMA). Pangeo Showcase [url] (via Zoom), 10 May 2023. (invited talk)
- "From little things big things grow": how mesoscale eddies affect the global ocean circulation and climate. Scripps Institution of Oceanography, UC San Diego [url], La Jolla, CA, USA, 12 May 2022. (invited talk)
- From small swirls up to the global ocean circulation: how ocean eddies affect the Earth's climate, Research School of Earth Sciences [URL], Australian National University, Canberra, Australia, 25 Mar. 2021. (invited talk)

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2020

2019

2018

2017

2016

Cause-and-effect of linear mechanisms in wall turbulence. Shear Flow Instability, Transition and Turbulence Seminar Series, Monash University [URL], (via Zoom), 7 Oct. 2020.

What's underneath Jupiter's and Saturn's stripes? FEARS Meeting, Research School of Astronomy and Astrophysics [URL], Australian National University, Canberra, Australia, 29 Oct. 2019.

What is hiding underneath the stripes of Jupiter and Saturn? Department of Physics Colloquium, Department of Physics [URL], National and Kapodistrian University of Athens [URL], Athens, Greece, 16 Oct. 2019.

Barotropic versus baroclinic eddy saturation: implications to Southern Ocean dynamics. Geophysical Fluid Dynamics Summer Program, Woods Hole Oceanographic Institution [URL], Woods Hole, USA, 9 Jul. 2019.

Barotropic versus baroclinic eddy saturation: implications to Southern Ocean dynamics. Geophysical Fluid Dynamics Summer Program, Woods Hole Oceanographic Institution [URL], Woods Hole, USA, 9 Jul. 2019.

A barotropic process-model for eddy saturation. WHOI Physical Oceanography Seminar Series, Woods Hole Oceanographic Institution [URL], Woods Hole, USA, 16 Apr. 2019.

How does the Antarctic Circumpolar Current respond to the increasing winds over the Southern Ocean? Barotropic versus baroclinic eddy saturation. Physics & Physical Oceanography Department Seminar Series, University of North Carolina Wilmington [URL], Wilmington NC, USA, 11 Apr. 2019.

How does the Antarctic Circumpolar Current respond to the increasing winds over the Southern Ocean?: Barotropic versus Baroclinic Eddy Saturation. Fluids Seminar Math Department [URL], Monash University [URL], Melbourne, Australia, 12 Feb. 2019.

Statistical state dynamics: a new framework for understanding turbulent flows. Fluid Mechanics Research Group Seminar [URL], University of Melbourne [URL], Melbourne, Australia, 8 Feb. 2019.

Magnetic suppression of zonal flows on a beta plane. SpinLab Group Seminar [URL], University of California Los Angeles [URL], Los Angeles, CA, USA, 11 Jan. 2019.

Barotropic versus baroclinic eddy saturation. Oceans and Climate Group Seminar [URL], Geophysical Fluid Dynamics Laboratory [URL], Princeton, NJ, USA, 12 Dec. 2018.

Eddy saturation in a barotropic model. LDEO OCP Seminar [URL], Lamont-Doherty Earth Observatory [URL], Columbia University, Palisades, NY, USA, 27 Oct. 2017.

Eddy saturation in a barotropic model. ClimaTea Seminar [URL], Harvard University, Cambridge, MA, USA, 26 Oct. 2017.

Eddy saturation in a barotropic model. CEAFM Seminar [URL], Department of Earth & Planetary Sciences, The Johns Hopkins University, Baltimore, USA, 13 Oct. 2017.

Topographic beta-plane turbulence and form stress. Geophysical Fluid Dynamics Summer Program, Woods Hole Oceanographic Institution [URL], Woods Hole, USA, 19 Jul. 2016.

Topographic beta-plane turbulence and form stress. Mathematics of Turbulence Reunion Conference, IPAM, UCLA [URL], Lake Arrowhead, 7 Jun. 2016.

Statistical state dynamics of planetary turbulence. CEAFM Seminar [URL], Whiting School of Engineering, The Johns Hopkins University, Baltimore, 18 Mar. 2016.

A theory for large-scale structure formation in atmospheric/oceanic turbulence: Is jet formation a phase transition phenomenon? CASPO Seminar, Scripps Institution of Oceanography, UC San Diego [URL], La Jolla, 10 Feb. 2016.

up to 2015 Formation of large-scale structures by turbulence in planetary atmospheres. Physics Department, University of Cyprus [URL], Nicosia, 5 May 2015. ♣

Emergence of large-scale structure in planetary turbulence as an instability of the of the homogeneous turbulent state. IPAM, UCLA [URL], Los Angeles, 21 Oct. 2014. 🚣

Emergence and equilibration of zonal winds in turbulent planetary atmospheres. Cyprus Oceanography Center, University of Cyprus [URL], Nicosia, 7 Jan. 2014.

Verification of the predictions of SSST in nonlinear simulations	s. 2nd M	eeting of	"Zonal Jets	and Eddies"	team
International Space Science Institute (ISSI) [URL], Bern 2-5 Apr. 2	2013. 📥				

Workshops

Sean R. Haney Memorial Symposium (organizer)

Scripps Institution of Oceanography, US San Diego February 16-17 2023, La Jolla, CA, USA [URL]

2021 Machine Learning and the Physics of Climate

Kavli Institute for Theoretical Physics, UC Santa Barbara November 1 - December 17 2021, Santa Barbara, CA, USA [url]

Layering in Atmospheres, Oceans, and Plasmas

Kavli Institute for Theoretical Physics, UC Santa Barbara January 11 - March 12 2021, Santa Barbara (Virtual), CA, USA [URL]

2019 Advanced Ocean Modelling School

University of Tasmania

April 28 - May 3, Lake Pedder, Tasmania, Australia [URL]

2017 Vorticity in the Universe: From Superfluids to Weather and Climate, to the Universe

Aspen Center for Physics

August 27 - September 17 2017, Aspen, CO, USA [URL]

Les Houches Summer School on Fundamental Aspects of Turbulent Flows in Climate Dynamics

Les Houches Physics School

July 31 - August 25 2017, Les Houches, France [URL]

2014 Mathematics of Turbulence

Institute of Pure & Applied Mathematics, UCLA September 8 - December 12 2014, Los Angeles, USA [URL]

2013 Geoturb: Numerical Modeling and Theoretical Challenges in Atmosphere and Ocean Turbulence

Ecole normale supérieure de Lyon 2-4 October 2013, Lyon, France. [URL]

2013 First Multiflow Summer Workshop

Universidad Politécnica de Madrid 10 June - 12 July 2013, Madrid, Spain. [URL]

2011 International Graduate School on Stability, Transition to Turbulence and Flow Control

Organized by Advanced Instability Methods (AIM) Network 22-27 August 2011, Cambridge, UK. [URL]

Climate Variability & Climate Change: Estimating and Reducing Uncertainties

8-17 June 2009, Visegrád, Hungary. [URL]

Teaching

2009

(main lecturer and co-convener along w/ Louis Moresi)

[course website at github]

Research School of Earth Sciences, Australian National University, Australia

Jun. 2021 Atmosphere and Ocean Dynamics Winter School 2021

[Postponed due to COVID-19 lockdowns in East Australia]

(main lecturer along w/ Martin Singh and Annie Foppert)

Australian National University

[organized by ARC Centre of Excellence for Climate Extremes; more information online]

Jun. 2020 Atmosphere and Ocean Dynamics Winter School 2020

[School changed form due to COVID-19; 3 introductory lectures via Zoom, full-blown lectures post-poned for 2021]

(main lecturer along w/ Martin Singh and Annie Foppert)

Institute for Marine and Antarctic Studies & University of Tasmania

[organized by ARC Centre of Excellence for Climate Extremes; more information online]

2020 Course Coordinator for **Basics of Dynamical Systems and Bifurcation Theory** (Honors/Masters/Graduate)

[3 lectures by Henk Dijkstra; 3 workshops by myself; lecture & workshop slides/notes available at github]

Research School of Earth Sciences, Australian National University, Australia

2018 Course Coordinator for **Instabilities in Fluids** (Honors/Masters)

[lecture notes and students' project reports available at github]

Research School of Earth Sciences, Australian National University, Australia

Visiting lecturer for **Fluid Mechanics** (Undergraduate) [lecture notes available at github]

Department of Physics and Physical Oceanography, University of North Carolina Wilmington, USA

Teaching assistant for **Applied Mathematics III** (Graduate)

Scripps Institution of Oceanography, University of California San Diego, USA

2010-2014 Teaching assistant for **Nonlinear Dynamical Systems** (3rd year Undergraduate)

Physics Department, National & Kapodistrian University of Athens, Greece

Students

Ph.D.

Feb. 2021 - Ellie Ong (University of New South Wales; co-supervisor).

Project: "Investigation into local drivers of change at the Antarctic Continental Margin."

Oct. 2020 - Dhruv Bhagtani (Australian National University; co-supervisor).

Project: "The interplay between wind stress and surface buoyancy in driving large-scale oceanic gyres."

Masters/Honors

Feb. 2022 - Elise Palethorpe (Honours, Australian National University).

Nov. 2022 Project: "Implementing a multigrid pressure solver in CliMA's ocean general circulation model."

First Class Honors

Undergraduate

Dec. 2022 - Phoebe Grosser (2nd year, Australian National University).

Mar. 2023 Project: "Ocean's tidal response with high-fidelity bathymetry and investigation on physical mecha-

nisms."

Jul. 2022 - Jack Miller (2nd year, Australian National University).

Dec. 2022 Project: "Modeling with Koopman autoencoders for data synthesis with application to cyclones."

Feb. 2022 - Jack Miller (2nd year, Australian National University).

Jul. 2022 Project: "Predicting cyclone genesis, trajectory, and intensity with machine learning."

Feb. 2022 - Oliver Balfour (2nd year, Australian National University).

Jul. 2022 Project: "Predicting cyclone genesis, trajectory, and intensity with machine learning."

Jul. 2020 - Elise Palethorpe (2nd year, Australian National University).

Nov. 2020 Project: "Numerical methods for Partial Differential Equations."

Aim: Learn basics of finite difference numerical schemes for solving hyperbolic and also study and implement

high-order accurate weighted essentially non-oscillatory (WENO) schemes.

Nov. 2019 - Fabian Antonio Circelli (3rd year, Australian National University).

Feb. 2020 Project: "Fourier-based Pseudospectral Methods for Solving Partial Differential Equations."

Aim: Learn basics of pseudospectral techniques for solving PDEs and implement GPU functionality in Fourier-

Flows.jl Julia package.

Programming skills

julia, Python, git

Open-Source Software

A small selection of projects include:

FourierFlows.jl: Julia ecosystem for solving partial differential equations on periodic domains with Fourier-based pseudospectral methods; doi:10.5281/zenodo.1161724. (lead developer)

GeophysicalFlows.jl: Julia modules for solving problems in Geophysical Fluid Dynamics on periodic domains using Fourier-based pseudospectral methods; doi:10.21105/joss.03053. (lead developer)

Oceananigans.jl: A fast and friendly incompressible fluid flow solver in Julia that can be run in 1-3 dimensions on CPUs and GPUs; doi:10.21105/joss.02018. (lead developer)

ParameterEstimocean.jl: Parameter estimation of turbulence closures for ocean models using Ensemble Kalman Inversion; doi:10.5281/zenodo.5762810. (lead developer)

xrft: Python package for discrete Fourier transforms (DFT) on xarray and dask arrays; doi:10.5281/zenodo.1402635. (contributor)

For more details visit my GitHub profile: O navidcy

Outreach

I regularly contribute articles to The Conversation and also often appear in radio shows talking about science and been invited to give public audience lectures.

A selection of outreach events is found at my website: www.navidconstantinou.com/outreach/

Mobility

Studied and worked in academic institutions in Greece, Cyprus, U.S.A., and Australia.

Other Scientific Activities

Reviewer: Journal of Fluid Mechanics, Journal of Physical Oceanography, Physics of Plasmas, Physics Letters A, Scientific Reports, Geophysical Research Letters, Fluids, Journal of Advances in Modeling Earth Systems, Mathematics and Computers in Simulation, Australian Research Council.

Hobbies

surfing 🏂, biking 🚲, horse riding 🤝, dancing 🍇, story telling, and story listening

References

Petros J. Ioannou (Ph.D. advisor)

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Andy McC. Hogg (postdoc supervisor)

Research School of Earth Sciences Australian National University

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w http://rses.anu.edu.au/people/academics/prof-andy-hogg

Raffaele Ferrari

Department of Earth, Atmospheric, and Planetary Sciences Massachusetts Institute of Technology Cambridge, MA 02139, USA

T +1 (617) 253 1291

⊠ raffaele@mit.edu

w http://ferrari.mit.edu

William R. Young (postdoc supervisor)

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