Navid C. Constantinou

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Interests

Geophysical fluid dynamics, physical oceanography, atmospheric dynamics, climate dynamics, fluid mechanics.

Education

Oct. 2010 – Feb. 2015 **Ph.D. in Physics**
National & Kapodistrian University of Athens, Greece
SUPERVISOR : Petros J. Ioannou
THESIS : Formation of large-scale structures by turbulence in rotating planets [arXiv]

Sep. 2008 – Jun. 2010 **M.Sc. in Physics w/ Honors** (summa cum laude)
Astrophysics, Astronomy and Mechanics
National & Kapodistrian University of Athens, Greece

Sep. 2003 – Jun. 2008 **B.Sc. in Physics w/ Honors** (summa cum laude, 9.16/10)
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 – Aug. 2003 **Cyprus National Guard**
Military service as Second Lieutenant in Armored Forces, Cyprus

Experience

May. 2018 – **Research Fellow**, part of the ARC Centre of Excellence for Climate Extremes
Research School of Earth Sciences, Australian National University (with Andy Hogg)

Sep. 2015 – Apr. 2018 **Postdoctoral Researcher (NOAA Climate & Global Change Postdoctoral Fellow)**
Scripps Institution of Oceanography, University of California San Diego, USA (with William R. Young)

Jun. 2015 – Aug. 2015 **Visiting Researcher**
Cyprus Oceanography Center, University of Cyprus

Grants & Awards

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)

2003-2006 *Department of Physics, National & Kapodistrian University of Athens, Greece*
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

Constantinou, **N. C.** and Hogg, A. McC. (2019). Eddy saturation of the Southern Ocean: a baroclinic versus barotropic perspective. *Geophys. Res. Lett.* (submitted, arXiv:1906.08442)

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.* (submitted, arXiv:1906.01929)

In press / Published

Parker, J. B. and **Constantinou**, **N.C.** (2019). Magnetic eddy viscosity of mean shear flows in two-dimensional magnetohydrodynamics. *Phys. Rev. Fluids* (in press, arXiv:1902.01105)

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.)

Constantinou, **N. C.** and Parker, J. B. (2018). Magnetic suppression of zonal flows on a beta-plane. *Astrophys. J.*, **863**, 46. (Featured in the ANU, LLNL, and CLEx press news; also read about it in The Conversation.)

Constantinou, **N. C.** (2018). A barotropic model of eddy saturation. *J. Phys. Oceanogr.*, **48(2)**, 397-411.

Constantinou, **N. C.** and Young, W. R. (2017). Beta-plane turbulence above monoscale topography. *J. Fluid Mech.*, **827**, 415-447.

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.

Constantinou, **N. C.**, Farrell, B. F., and Ioannou, P. J. (2016). Statistical state dynamics of jet–wave coexistense in barotropic beta-plane turbulence. *J. Atmos. Sci.*, **73 (5)**, 2229-2253.

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.

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.

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.

Constantinou, **N. C.** and Ioannou, P. J. (2011). Optimal excitation of two dimensional Holmboe instabilities. *Phys. Fluids*, **23**, 074102.

Chapters in Books (refereed)

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.

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)

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.

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.

Other publications

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.

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

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)

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. *AGU Fall 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 coexistense in beta-plane turbulence. *APS March Meeting 2016*, Baltimore, USA, 14-18 Mar., 2016. (talk)

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)

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

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.

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. 2nd Meeting of "Zonal Jets and Eddies" team, International Space Science Institute (ISSI) [URL], Bern 2-5 Apr. 2013.

Workshops

2019 **Advanced Ocean Modelling School**
April 28 - May 3, Tasmania, TAS, Australia [URL]

2018 **ARC Centre of Excellence for Climate Extremes Annual Workshop**

November 19 - November 21, Wollongong, NSW, 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]

2017 **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]

2009 **Climate Variability & Climate Change: Estimating and reducing uncertainties**
8-17 June 2009, Visegrád, Hungary. [URL]

Programming skills

julia, Python, Matlab, git, markdown

Software

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

Core developer for "GeophysicalFlows.jl": Julia modules for solving problems in Geophysical Fluid Dynamics on periodic domains using Fourier-based pseudospectral methods; doi:10.5281/zenodo.1463809

Teaching experience

2018 Course Coordinator for **Instabilities in fluids** (Honours/Masters)
[lecture notes and student's project reports available at github]
Research School of Earth Sciences, Australian National University, Australia

2018 Visiting lecturer for **Fluid Mechanics** (Undergraduate) [lecture notes available at github]
Department of Physics and Physical Oceanography, University of North Carolina Wilmington, USA

2017 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

Other scientific activities

Reviewer : Journal of Fluid Mechanics, Journal of Physical Oceanography, Physics of Plasmas, Physics Letters A, Scientific Reports, Geophysical Research Letters.

Member : American Geophysical Union, American Meteorological Society, American Physical Society (also member of Topical Group on the Physics of Climate).

References

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University of California San Diego
La Jolla, CA 92037-0213, USA
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