NIKOLAOS BAKAS

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EDUCATION

2004 - 2007	Harvard University	PhD in Applied Mathematics
2002 - 2004	Harvard University	MSc in Applied Mathematics
1995 - 1999	University of Athens	BSc in Physics

APPOINTMENTS

2014-	University of Ioannina (Dep. of Physics)	Lecturer
2007-2014	University of Athens (Dep. of Physics)	Post-doc researcher
2010	University of Peloponnese (Dep. of Comp. Science)	Adjunct Lecturer
2003 - 2007	Harvard University (SEAS)	Research assistant

AWARDS/FUNDING RECEIVED

2013-16	Axa Post-doctoral research grant (120.000 €)
2009-12	Marie Curie (FP7-PEOPLE-IRG) for post-doctoral research (75.000 €)
2008	IKY Fellowship for post-doctoral research (7200 €)
2003	Kao Fellowship for excellent record for 2002-03
1999	OTE Fellowship for excellent record for 1998-99
1996-99	IKY Fellowship for excellent record during the years 1995-98

RESEARCH INTERESTS

- Shear instability: overreflection, emergence of coherent structures in the b.l
- Gravity wave dynamics: spontaneous generation, breaking, effect on the circulation
- Statistical description of geophysical turbulence

- Organization of geophysical turbulence in jet streams and coherent vortices

PUBLICATIONS

1. Bakas N. A., P. J. Ioannou and G. I. Kefaliakos, 2001: The emergence of coherent structures in stratified shear flow. *J. Atmos. Sci.*, **58**, 2790-2806

2. Bakas N. A., and P. J. Ioannou, 2007: Momentum and energy transport by gravity waves in stochastically driven stratified flows. Part I: Radiation of gravity waves from a shear layer. *J. Atmos. Sci.*, **64**, 1509-1529

3. Bakas N. A., and B. F. Farrell, 2008: Momentum and energy transport by gravity waves in stochastically driven stratified flows. Part II: Radiation of gravity waves from a Gaussian jet. *J. Atmos. Sci.* , **65**, 2308-2325

4. Bakas N. A., and B. F. Farrell, 2009: Gravity waves in a horizontal shear flow Part I: Growth mechanisms in the absence of potential vorticity perturbations. *J. Phys. Oceanogr.*, **39**, 481-496

5. Bakas N. A. and B. F. Farrell, 2009: Gravity waves in a horizontal shear flow Part II: Interaction between gravity waves and potential vorticity perturbations. *J. Phys. Oceanogr.*, **39**, 497-511

6. Bakas N. A. and P. J. Ioannou, 2009: Modal and non-modal growth of perturbations in shear flows with a free surface. *Phys. Fluids* , **21**, 024102.

7. Bakas N. A., 2009: Mechanisms underlying transient growth of planar perturbations in unbounded compressible shear flow. *J. Fluid Mech.*, **639**, 479-507

8. Bakas N. A. and B. F. Farrell, 2010: The role of non-normality in overreflection theory. *J. Atmos. Sci.*, **67**, 2547-2558

9. Bakas N. A. and P. J. Ioannou, 2011: Structural stability theory of two-dimensional flow. *J. Fluid Mech.,* **682**, 332-361

10. Bakas N. A. and P. J. Ioannou, 2013: Emergence of large scale structure in barotropic β-plane turbulence. *Phys. Rev Lett.*, **110**, 224501

11. Bakas N. A. and P. J. Ioannou, 2013: On the mechanism underlying the spontaneous emergence of barotropic zonal jets. *J. Atmos. Sci.*, **70**, 2251-2271

12. Bakas N. A. and P. J. Ioannou, 2014: A theory for the emergence of coherent structures in beta-plane turbulence. *J. Fluid Mech.,* **740**, 312-341

13. Bakas N. A., Constantinou N. C., and P. J. Ioannou, 2014: S3T stability of the homogeneous state of barotropic beta-plane turbulence. *J. Atmos. Sci.,* **72**, 1689-1712

PRESENTATIONS IN CONFERENCES/WORKSHOPS

1. Bakas N. A.: Momentum transport by gravity waves in a stochastically driven jet. *15th Conference on Atmospheric and Oceanic Fluid Dynamics* (Cambridge MA, 2005) **(oral)**

2. Bakas N. A.and B. F. Farrell: Momentum and energy transport by gravity waves in a stochastically driven jet. *EGU General Assembly* (Vienna, 2006) **(poster)**

3. Participation in Alpine summer school (Aosta 2006): Waves, fronts and vortices

4. Bakas N. A., and B. F. Farrell: Transient development of perturbations in a barotropic shear flow. *16th Conference on Atmospheric and Oceanic Fluid Dynamics* (Santa Fe NM, 2007) **(oral)**

5. Participation in Winter school of the Institute for Advanced Studies (Jerusalem 2009) : Reducing the uncertainty in the prediction of global warming

6. Bakas N. A., and B. F. Farrell: Transient growth of gravity waves in a horizontal shear flow leading to wave breaking. *EGU General Assembly* (Vienna, 2010) **(poster)**

7. Bakas N. A., and B. F. Farrell: Interaction between gravity waves and potential vorticity perturbations leading to spontaneous wave generation. *EGU General Assembly* (Vienna, 2010) **(poster)**

8. Bakas N. A., and P. J. Ioannou: On the role of negative viscosity in the emergence of jets. *EGU General Assembly* (Vienna, 2010) **(poster)**

9. Participation in the 10^{th} International Conference of Meteorology, Climatology and Atmospheric Physics COMECAP (Patras, 2010)

10. Bakas N. A., and P. J. Ioannou: Stability of a shear flow with a free surface. *EGU General Assembly* (Vienna, 2011) **(poster)**

11. Bakas N. A., and B. F. Farrell: On the role of nonnormality in the overreflection of gravity waves. *EGU General Assembly* (Vienna, 2011) **(poster)**

12. Bakas N. A., and P. J. Ioannou: Stochastic structural stability of a barotropic flow. *EGU General Assembly* (Vienna, 2011) **(oral)**

13. Bakas N. A., and P. J. Ioannou: On the mechanism underlying spontaneous emergence of barotropic zonal jets. *18th Conference on Atmospheric and Oceanic Fluid Dynamics* (Spokane WA, 2011) **(oral)**

14. Bakas N. A., and P. J. Ioannou: Structural instability of a barotropic flow leading to the emergence of a zonal jet. *Bifurcations and Instabilities in Fluid Dynamics* (Barcelona, 2011) **(oral)**

15. Bakas N. A.: Stability of a compressible shear flow. *EGU General Assembly* (Vienna, 2012) **(poster)**

16. Bakas N. A., and P. J. Ioannou: Emergence and maintenance of coherent vortices by stochastically forced Vortex Rossby Waves. *EGU General Assembly* (Vienna, 2012) **(oral)**

17. Bakas N. A., P. J. Ioannou and N. Constantinou: Stochastic structural stability theory of the Antarctic Circumpolar current. *EGU General Assembly* (Vienna, 2012) **(poster)**

18. Bakas N. A., and B. F. Farrell: On the role of potential vorticity perturbations in the spontaneous generation of gravity waves. 11th COMECAP (Athens, 2012) **(oral)**

19. Bakas N. A., and P. J. Ioannou: On a dynamical mechanism underlying the intensification of tropical cyclones. 11th COMECAP (Athens, 2012) **(poster)**

20. Bakas N. A.: Gravity wave parameterizations. Workshop on stochastic flows and climate modeling of the Aspen Center for Physics (Aspen, 2012) **(oral)**

21. Bakas, N. A. and B. F. Farrell: The role of non-normal growth in the overreflection of gravity waves. 8th ROH conference (Volos, 2012) **(oral)**

22. Bakas, N. A. and P. J. Ioannou: Modal and non-modal stability of a shear flow with a free surface. 8th ROH conference (Volos, 2012) **(poster)**

23. Bakas, N. A. and P. J. Ioannou: Emergence of large scale structure in beta plane turbulence. *EGU General Assembly* (Vienna, 2013) **(PICO)**

24. Ioannou, P. J., B. F Farrell, N. A. Bakas and N. Constantinou: Large scale coherent flow structures in planetary turbulence arise from spectrally non-local interactions. Geoturb workshop (Lyon, 2013) **(oral)**

25. Bakas, N. A. and P. J. Ioannou: A theory for the emergence of large scale structures in planetary turbulence. Geoturb workshop (Lyon, 2013) **(oral)**

26. Bakas, N. A., P. J. Ioannou and N. Constantinou: Emergence of non-zonal structures in barotropic turbulence. COMECAP 2014 (Heraklion, 2014) **(poster)**

27. Bakas, N. A., and P. J. Ioannou: Abrupt jet stream reorganization and its climate impacts. Axa Pop Days (Paris, 2014) **(oral)**

28. Bakas, N. A., and P. J. Ioannou: Emergence of coherent structures in barotropic turbulence. Geophysical and Astrophysical Workshop (UCLA, 2014) **(poster)**

29. Bakas N. A. and P. J. Ioannou: Emergence of coherent structures in barotropic turbulence. 9th ROH conference (Athens, 2014) **(oral)**

30. Bakas N. A., and P. J. Ioannou, 2015: Emergence of large scale structure in beta

plane turbulence. Theoretical Advances in Planetary Flows and Climate Dynamics (Les Houches, 2015) **(oral)**

31. Bakas N. A., and P. J. Ioannou, 2015: A theory for the emergence of large scale structure in barotropic turbulence. Bifurcations and instabilities in fluid dynamics (Paris, 2015) **(oral)**

INVITED TALKS

1. The role of WISHE in the dynamics of Madden – Julian Oscillation. **(Univ. of Ioannina 2008)**

2. Vorticity wave-gravity wave interactions and mixing in astrophysical and geophysical fluids. **(Univ. of Athens 2009)**

3. Jet stream re-organization and climate change. **(Aegean Univ. 2009)**

4. Buoyancy wave-vorticity wave interactions and mixing **(Academy of Athens 2010)**

5. Turbulence. (lectures for the graduate course "Complex systems" of NCSR Demokritos **2010**)

6. The organization of the midlatitude jet stream (**Univ. of Ioannina 2011**)

7. A theory for the emergence of large scale non-zonal structures in planetary turbulence (**ISSI Team, Bern 2013**)

8. A theory for the emergence of large scale structures in planetary turbulence (**Geoturb workshop, Lyon, 2013**)

9. Self-organization of planetary turbulence. What can we learn by studying the statistical state dynamics (**IPAM, 2014**)

10. A theory for the emergence of large scale structures in planetary turbulence (**Scripps Oceanographic Institute, 2014**)

11. A theory for the emergence of large scale structures in planetary turbulence (**Caltech, 2014**)

OTHER SCIENTIFIC ACTIVITIES

- Reviewer: Journal of the Atmospheric Sciences, Journal of Physical Oceanography, Journal of Fluid Mechanics, International Journal of Atmospheric Sciences, Annales Geophysicae, New Journal of Physics
- Member of the European Geosciences Union and of the American Meteorological Society