1 Personal data

Name:	**Freddy Bouchet**
Born on:	June the 17th 1972 in Saint Julien en Genevois (France)
Nationality:	French
Civil status:	Married. Three children (1998, 2000, 2005)
National service:	Professor of mathematics and physics at « Lycée Stendhal » in Milano (Italy)
Professional address:	Laboratoire de météorologie dynamique (LMD/IPSL) de l'Ecole Normale Supérieure 24, Rue Lhomond F 75231 Paris Cedex 05 - France
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Current position:	**Research director at CNRS (French National Research Agency)**

2 Professional experience and education

Year	Experience or diploma	Places
22->	**Directeur de recherche DR1 (Prof.) at CNRS - LMD ENS/PSL**	ENS/PSL Paris
22->	**Professeur attaché at ENS/PSL**	ENS/PSL Paris
13-22	**Directeur de recherche DR2 (Prof.) at CNRS - ENS de Lyon**	ENS-Lyon
10-13	**Chargé de recherche CR1 (Ass. Prof.) at CNRS - ENS de Lyon**	ENS-Lyon
09-10	**Chargé de recherche CR1 at CNRS - Sabbatical at LANL-CNLS**	Los Alamos-USA
04-09	**Chargé de recherche CR1 at CNRS - INLN**	INLN-Nice
03-04	**Agrégé préparateur (post doc)** at ENS-Lyon	ENS-Lyon France
03	**Post-Doc** directed by Angelo Vulpiani *Stochastic processes. "Stirring and mixing"*	University *La Sapienza* Rome - Italy
01-02	**Post-Doc** directed by Stefano Ruffo *Statistical mechanics of systems with long range interactions*	University of Florence Italy
98-01	**PHD in physics,** Mention Très Honorable (the highest one in UJF) supervised by **Raoul Robert** and **Joël Sommeria**, untitled *Statistical mechanics for geophysical flows*	Institut Fourier-Grenoble Université Joseph Fourier (UJF)
96-98	Mathematics and physics teacher (during the **national service, french cooperation**)	Lycée Stendhal - Milan (Italy)
92-96	**Student in the Ecole Normale Supérieure de Lyon**	ENSL
95-96	**DEA in theoretical physics,** option statistical physics. Mention Bien (DEA: pre-doctoral course: Master of science)	ENSL
94-95	**Agrégation in Mathématics.** (entitles one to teach up to the second year undergraduate, in France)	

3 Habilitation à diriger les recherches

I got a "Habilitation à Diriger les Recherches" (HDR) on June 16th, 2011 in ENS-Lyon. The members of the jury were **B. Castaing, C. Chandre, H. Dijkstra, C. Gawędzki, D. Mukamel, S. Nazarenko, and C. Villani (Field medalist).**

4 Publication list

HDR*:*

1. *Statistical mechanics of systems with long range interactions and of geophysical turbulent flows.* ENS-Lyon

PHD-Th*esis:*

1. *Statistical mechanics of geophysical flows.* Université Joseph Fourier - Grenoble

Book I was the editor of the books :

1. *Peyresq Lectures on Nonlinear Phenomena, vol 3,* B. Audoly, F. Bouchet, and J.A. Sepulchre (Eds, World Scientific edition, 2012.
2. *Fundamental aspects of turbulent flows in climate dynamics, LECTURE NOTES OF THE LES HOUCHES SUMMER SCHOOL,* held in Les Houches in August 2017, F. Bouchet, T. Schneider and A. Venaille, Oxford UNiversity Press, to be published soon.

4.1 Publications in referred international journals

Comments on my publications and citations: ***By contrast with many colleagues, I try not to publish too much and publish longer papers.***

Google scholar : https://scholar.google.fr/citations?user=GF9b15gAAAAJ&hl=fr

1. F. BOUCHET, and J. SOMMERIA 2002 Emergence of intense jets and Jupiter's Great Red Spot as maximum entropy structures J. Fluid Mech. 464, 165-207. doi:10.1017/S0022112002008789, *arXiv:physics/0003079.pdf,* [pdf]
2. J. BARRE, F. BOUCHET, T. DAUXOIS, and S. RUFFO, 2002a Out-of-equilibrium states as statistical equilibria of an effective mean-field dynamics. *Phys. Rev. Lett.* **89,** 11, 110601. doi:10.1103/PhysRevLett.89.110601
3. J. BARRE, F. BOUCHET, T. DAUXOIS and S. RUFFO, 2002b Birth and long-time stabilization of out-of-equilibrium coherent structures *Eur. Phys. J. B* **29**, 577-591
4. F. BOUCHET, F. CECCONI, and A. VULPIANI, 2004 A Minimal Stochastic Model for Fermi's Acceleration, *Phys. Rev. Lett.,* **92,** *040601* doi:10.1103/PhysRevLett.92.040601
5. Y. YAMAGUCHI, J. BARRE, F. BOUCHET, T. DAUXOIS, and S. RUFFO, 2004 Stability criteria of the Vlasov equation and quasi-stationary states of the HMF model, *Physica A,* **337** (1/2) 36-66 doi:10.1016/j.physa.2004.01.041
6. F. BOUCHET, 2004 The stochastic process of equilibrium fluctuations, of a system governed by long range interactions. *Phys. Rev. E,* **70,** 036113 doi:10.1103/PhysRevE.70.036113
7. T. TATEKAWA, F. BOUCHET, T. DAUXOIS and S. RUFFO, 2005 Thermodynamics of the self-gravitating ring model, *Phys Rev E, **71,** 5, 056111-+*
8. P. H. CHAVANIS, and F. BOUCHET, 2005 On the coarse-grained evolution of collisionless stellar systems. *Astronomy and Astrophysics,* **430**, 771-778 doi:10.1051/0004-6361:20041462
9. P. H. CHAVANIS, F. BOUCHET, and J. VATTEVILLE, 2005 Dynamics and thermodynamics of a simple model similar to self-gravitating systems : the HMF model, *Eur. Phys. J. B*. **46**, 61-99 Doi:10.1140/epjb/e2005-00234-0

10. J. BARRE, F. BOUCHET, T. DAUXOIS, and S. RUFFO, 2005 Large deviation techniques applied to systems with long range interactions, *J. Stat. Phys.,* **119** 1/2 DOI:10.1007/s10955-005-3768-8
11. F. Bouchet, and J. Barré, 2005 Classification of phase transitions and ensemble inequivalence situations in systems with long range interactions. J. Stat. Phys., 118, 5/6, 1073-1105, DOI:10.1007/s10955-004-2059-0, *arXiv:cond-mat/0303307,* [pdf]
12. F. BOUCHET, and T. DAUXOIS, 2005 Prediction of anomalous diffusion and algebraic relaxations for long-range interacting systems, using classical statistical mechanics Phys. Rev. E 72, 045103(R)**,** doi:10.1103/PhysRevE.72.045103
13. F. BOUCHET, T. DAUXOIS, and S. RUFFO, 2006, Controversy about the applicability of Tsallis statistics to the HMF model, *Europhysics News*, **37,** 2, 9-10
14. J. BARRE, F. BOUCHET, T. DAUXOIS, S. RUFFO, and Y. YAMAGUCHI, 2006, The Vlasov equation and the Hamiltonian Mean-Field model, *Physica A, **365,*** 177-183**,** doi:10.1016/j.physa.2006.01.005
15. Y. Y. YAMAGUCHI, F. BOUCHET, T. DAUXOIS, 2007, Algebraic Correlation Function and Anomalous Diffusion in the HMF model. *J. Stat. Mech.*, **1**, 20- doi:10.1088/1742-5468/2007/01/P01020**,**
16. K. JAIN, F. BOUCHET, and D. MUKAMEL, 2007, Relaxation times of unstable states in systems with long range interactions, *J. Stat. Mech.*, 11008**,** doi:10.1016/j.physa.2010.02.024
17. F. BOUCHET, T. DAUXOIS, D. MUKAMEL, and S. RUFFO, 2008, Phase space gaps and ergodicity breaking in systems with long range interactions, *Phys. Rev. E* **77**, 011125, doi:10.1103/PhysRevE.77.011125
18. F. BOUCHET, 2008, Simpler Variational Problem for Statistical Equilibria of the 2D Euler Equation and Other Systems with Long Range Interactions, *Physica D: Nonlinear Phenomena* **237**, pp. 1976-1981**,** doi:10.1016/j.physd.2008.02.029
19. F. Bouchet, and E. Simonnet, 2009, Random change of flow topology in 2D and geostrophic turbulence, *Phys. Rev. Lett.,* **102**, 094504**,** doi:10.1103/PhysRevLett.102.094504
20. A. VENAILLE, and F. BOUCHET, 2009, Ensemble inequivalence, bicritical points, and azeotropy for generalized Fofonoff flows, *Phys. Rev. Lett.,* **102**, 104501**,** doi:10.1103/PhysRevLett.102.104501
21. A. OLIVETTI, J. BARRE, B. MARCOS, F. BOUCHET, and R. KAISER, 2009, Breathing Mode for Systems of Interacting Particles, *Phys. Rev. Lett.*, **103**, 22, 224301**,** doi:10.1103/PhysRevLett.103.224301
22. F. BOUCHET, and H. MORITA, 2010, Large time behavior and asymptotic stability of the two-dimensional Euler and linearized Euler equations*, Physica D: Nonlinear Phenomena, **239**, 12, 948-966***,** doi:10.1016/j.physd.2010.01.020
23. F. BOUCHET, and M. CORVELLEC, 2010, Invariant measures of the of the 2D Euler and Vlasov equations, *J. Stat. Mech.,* **8**, 08021, doi:10.1088/1742-5468/2010/08/P08021
24. F. BOUCHET, S. GUPTA, and D. MUKAMEL, 2010, Thermodynamics and dynamics of systems with long-range interactions, 2010*, proceedings of the summer School FPSPXII, Physica A*, ***389**, 20, 4389-4405, https://doi.org/10.1016/j.physa.2*
25. A. OLIVETTI, J. BARRE, B. MARCOS, F. BOUCHET, and R. KAISER, 2011, Breathing dynamics for systems of interacting particles in the microcanonical and canonical descriptions, *Transport Theory and Statistical Physics,* **39**, 5-7, 524-551
26. A. VENAILLE, and F. BOUCHET, 2011, Solvable phase diagrams and ensemble inequivalence for two-dimensional and geophysical turbulent flows, *J. Stat. Phys. **143**, 2, 346-380***,** doi:10.1007/s10955-011-0168-0
27. A. VENAILLE, and F. BOUCHET, 2011, Ocean rings and jets as statistical equilibrium states, *Journal of Physical Oceanography*, **41**, 10, 1860-1873**,** doi:10.1088/1742-6596/318/7/072024
28. B., T. NADIGA, and F. BOUCHET, 2011, The equivalence of the Lagrangian-Averaged Navier-Stokes-alpha Model and the Rational LES model in two dimensions, *Phys. Fluids 23, 095105*
29. F. BOUCHET, and A. VENAILLE, 2012, Statistical mechanics of two-dimensional and geophysical flows, Physics Reports, 515, 5, June 2012, 227–295**,** doi:10.1016/j.physrep.2012.02.001, and and *arXiv:1110.6245*, [pdf].
30. C. Nardini, S. Gupta, S. Ruffo, T. Dauxois, and F. Bouchet, 2012, Kinetic theory for non-equilibrium stationary states in long-range interacting systems, *J. Stat. Mech.,* L01002
31. F. BOUCHET, and H. TOUCHETTE, 2012, Non-classical large deviations for a noisy system with non-isolated attractors, *J. Stat. Mech.*, P05028, doi:10.1088/1742-5468/2012/05/P05028
32. C. NARDINI, S. GUPTA, S. RUFFO, T. DAUXOIS, and F. BOUCHET, 2012, Kinetic theory of nonequilibrium stochastic long-range systems: phase transition and bistability, *J. Stat. Mech.,* 12, P12010. doi:10.1088/1742-5468/2012/12/P12010

33. M. POTTERS, T. VAILLANT, F. BOUCHET, 2013, Sampling microcanonical measures of the 2D Euler equations through Creutz's algorithm: a phase transition from disorder to order when energy is increased., Journal of Statistical Mechanics: Theory and Experiment, 2013(02), P02017, doi:10.1088/1742-5468/2013/02/P02017
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35. S. THALABARD, B. DUBRULLE, and F. BOUCHET, 2014, Statistical mechanics of the 3D axisymmetric Euler equations in a Taylor-Couette geometry. *J. Stat. Mech.: Theory and Experiment,* **1**, P01005, doi:10.1088/1742-5468/2014/01/P01005
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37. F. BOUCHET, C. NARDINI, and T. TANGARIFE, 2014, Stochastic averaging, large deviations, and random transitions for the dynamics of 2D and geostrophic turbulent vortices. *Fluid Dyn. Res.* **46** (2014) 061416.
38. J. LAURIE and F. BOUCHET, 2015, Computation of rare transitions in the barotropic quasi-geostrophic equations, New J. Phys. 17, 015009, doi:10.1088/1367-2630/17/1/015009, [pdf]
39. J. ROLLAND, F. BOUCHET, E. SIMONNET, 2016, Computing transition rates for the 1-D stochastic Ginzburg–Landau Allen–Cahn equation for finite-amplitude noise with a rare event algorithm, Journal of Statistical Physics, 162, 2, 277-311, DOI 10.1007/s10955-015-1417-4, and *arXiv:1507.05577* , [pdf].
40. F. BOUCHET, T. GRAFKE, T. TANGARIFE, and E. VANDEN-EIJNDEN, 2016, Large Deviations in Fast–Slow Systems, Journal of Statistical Physics, p. 1-20., DOI 10.1007/s10955-016-1449-4 and *arXiv:1510.02227*, [pdf]
41. A. RENAUD, A. VENAILLE, and F BOUCHET, 2016, Equilibrium statistical mechanics and energy partition for the shallow water model, J. Stat. Phys., Volume 163, Issue 4, pp 784–843, DOI: 10.1007/s10955-016-1496-x, and *arXiv:1505.01356*, [pdf]
42. F. Bouchet and J. Reygner, 2016, Generalisation of the Eyring-Kramers transition rate formula to irreversible diffusion processes, J. Ann. Henri Poincaré, 17: 3499,, DOI: 10.1007/s00023-016-0507-4 and *arXiv:1507.02104,* [pdf]
43. F. BOUCHET, K. GAWEDZKI, and C. NARDINI, 2016, Perturbative calculation of quasi-potential in non-equilibrium diffusions: a mean-field example, J. Stat. Phys., Volume 163, Issue 5, pp 1157–1210, DOI: 10.1007/s10955-016-1503-2 and *arXiv:1509.03273*, [pdf]
44. F. BOUCHET and J. WOUTERS, 2016, Rare event computation in deterministic chaotic systems using genealogical particle analysis, Journal of Physics A, Volume 49, Number 37, DOI: 10.1088/1751-8113/49/37/374002 and *arXiv:1511.02703*, [pdf]
45. T. NEMOTO, F BOUCHET, R.L. JACK, and V. LECOMTE, 2016, Population dynamics method with a multicanonical feedback control, Phys. Rev. E 93, 062123, DOI: 10.1103/PhysRevE.93.062123, and *arXiv:1601.06648*, [pdf]
46. L.S. GRIGORIO, F BOUCHET, R.M. PEREIRA, and L. CHEVILLARD, 2017, Instantons in a Lagrangian model of turbulence, J. Phys. A: Math. Theor. 50, 055501, DOI: 10.1088/1751-8121/aa51a3, and *arXiv:1608.07332*, [pdf]
47. E. WOILLEZ, and F. BOUCHET, 2017, Theoretical prediction of Reynolds stresses and velocity profiles for barotropic turbulent jets, EPL, 118 (2017) 54002, DOI: 10.1209/0295-5075/118/54002, and *arXiv:1609.00603*, [pdf]
48. Y. YASUDA, F BOUCHET, and A. VENAILLE, 2017, A New Interpretation of Vortex-Split Stratospheric Sudden Warmings in Terms of Equilibrium Statistical Mechanics, Journal of the Atmospheric Sciences, DOI:10.1175/JAS-D-17-0045.1, *arXiv:1702.03716,* [pdf].
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50. E. WOILLEZ and F. BOUCHET, 2017, Long-term influence of asteroids on planet longitudes and chaotic dynamics of the solar system, Astronomy and Astrophysics, Astronomy and Astrophysics, A 607, A62 , https://doi.org/10.1051/0004-6361/201731576, and *arXiv:1707.03577,* [pdf].
51. F. Ragone, J. Wouters, and F. Bouchet, 2018, Computation of extreme heat waves in climate models using a large deviation algorithm, Proceedings of the National Academy of Sciences, vol 115, no 1, pages 24-29, https://doi.org/10.1073/pnas.1712645115, and arXiv:1709.03757, [pdf].
52. F. Bouchet, J. Marston, and T. Tangarife, 2018, Fluctuations and large deviations of Reynolds' stresses in zonal jet dynamics, Physics of Fluids 30, 015110, https://doi.org/10.1063/1.4990509, and arXiv:1706.08810, [pdf].

53. T. Lestang, F. Ragone, C.E. Brehier, C. Herbert, and F. Bouchet, 2018, Computing return times with rare event algorithms, Journal of Statistical Mechanics: Theory and Experiment, 2018, vol. 2018, no 4, p. 043213, https://doi.org/10.1088/1742-5468/aab856, arXiv:1709.03757, [pdf]
54. G. Messori, R. Caballero, F. Bouchet, D. Faranda, R. Grotjahn, N. Harnik, S. Jewson, J.G. Pinto, G. Rivière, T. Woollings, and P. Yiou, 2018, An interdisciplinary approach to the study of extreme weather events: large-scale atmospheric controls and insights from dynamical systems theory and statistical mechanics, BAMS, ES81, https://doi.org/10.1175/BAMS-D-17-0296.1, [pdf]
55. E. Woillez and F. Bouchet, 2019, Barotropic theory for the velocity profile of Jupiter turbulent jets: an example for an exact turbulent closure, Journal of Fluid Mechanics, Volume 860, pp. 577-607, https://doi.org/10.1017/jfm.2018.877, arXiv:1712.04638, [pdf]
56. F. Bouchet, J. Rolland, and E. Simonnet, 2019, A rare event algorithm links transitions in turbulent flows with activated nucleations, Phys. Rev. Lett. 122, 074502, https://doi.org/10.1103/PhysRevLett.122.074502, arXiv:1810.11057, [pdf]
57. F. Bouchet, J. Rolland and J. Wouters, 2019, Rare Event Sampling Methods, Chaos: An Interdisciplinary Journal of Nonlinear Science 29 (8), 080402, https://doi.org/10.1063/1.5120509
58. F. Ragone and F. Bouchet, 2020, Computation of extremes values of time averaged observables in climate models with large deviation techniques, J. Stat. Phys., pp 1–29, arXiv:1907.05762, [pdf], doi.org/10.1007/s10955-019-02429-7
59. E. Woillez and F. Bouchet, 2020, Transport in Hamiltonian systems with slowly changing phase space structure, Communications in Nonlinear Science and Numerical Simulation 80, 104935, DOI, arXiv:1902.06309, [pdf].
60. C. Herbert, R. Caballero and F. Bouchet, 2020, Atmospheric bistability and abrupt transitions to superrotation: wave-jet resonance and Hadley cell feedbacks, Journal of the Atmospheric Sciences, vol. 77, no. 1, DOI, arXiv:1905.12401, [pdf].
61. F. Bouchet, E. Woillez, 2020, Instantons for the destabilization of the inner Solar System, Phys. Rev. Lett. 125, 021101, DOI, *arXiv:1910.04005,* [pdf]. This paper has been the subject of a highlight by Nature Review Physics. There is a shareable link at https://rdcu.be/b5EI3.
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63. T. Lestang, F. Bouchet, and E. Lévêque, 2020, Rare-event sampling applied to the simulation of extreme mechanical efforts exerted by a turbulent flow on a bluf body, Journal of Fluid Mechanics, 895, A19. , DOI, *arXiv:2002.10398,* [pdf].
64. F. Bouchet, 2020, Is the Boltzmann equation reversible? A large deviation perspective on the irreversibility paradox and the Boltzmann equation, Journal of Statistical Physics, 181, 515–550, DOI, *arXiv:2002.10398,* [pdf].
65. E. Simonnet, J. Roland and F. Bouchet, 2021, Multistability and rare spontaneous transitions in barotropic β-plane turbulence, Journal of atmospherical sciences, 78, 6, 1889–1911, doi.org/10.1175/JAS-D-20-0279.1, *arXiv:2009.09913,* [pdf].
66. F Ragone, F Bouchet, 2021, Rare event algorithm study of extreme warm summers and heat waves over Europe, Geophysical Research Letters, 48, e2020GL091197. doi.org/10.1029/2020GL091197, *arXiv:2009.02519,* [pdf].
67. O. Feliachi and F. Bouchet, 2021, Dynamical large deviations for plasma below the Debye length and the Landau equation, Journal of Statistical Physics, 183, 42, DOI, *arXiv:2101.04455,* [pdf].
68. O. Feliachi and F. Bouchet, 2021, Dynamical large deviations for plasma and other systems with long range interactions associated to the Balescu-Guernsey-Lenard equation, Journal of Statistical Physics, 186, 22, DOI, *arXiv:2105.05644,* [pdf].

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70. D. Lucente, C. Herbert and F. Bouchet, 2022, Committor Functions for Climate Phenomena at the Predictability Margin: The example of El Niño Southern Oscillation in the Jin and Timmerman model, Journal of the Atmospheric Sciences, 79(9), 2387-2400, DOI, *arXiv:2106.14990,* [pdf].
71. A. Fuchs, C. Herbert, J. Rolland, M. Wächter, F. Bouchet and J. Peinke, 2022, Instantons and the path to intermittency in turbulent flows, Phys. Rev. Lett. 129, 034502, *arXiv:2106.08790,* [pdf].
72. D. Lucente, J. Rolland, C. Herbert and F. Bouchet, 2022, Coupling rare event algorithms with data-based learned committor functions using the analogue Markov chain, J. Stat. Mech. 083201, *arXiv:2110.05050,* [pdf].
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75. F. Bouchet, R. Tribe and O. Zaboronski, 2022, Path large deviations for stochastic evolutions driven by the square of a Gaussian process, Phys. Rev. E 107, 034111, and *arXiv:2102.09022,* [pdf].
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77. Y. Onuki, J. Guioth, and F. Bouchet, 2023, Dynamical large deviations for an inhomogeneous wave kinetic theory: linear wave scattering by a random medium, Ann. Henry. Poincaré, https://doi.org/10.1007/s00023-023-01329-7 *arXiv:2301.03257,* [pdf].
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79. G. Miloshevich, P. Rouby-Poizat, F. Ragone, and F. Bouchet, 2023, Robust intra-model teleconnection patterns for extreme heatwaves, Frontiers in Earth Science-Atmospheric Science, vol 11, https://doi.org/10.3389/feart.2023.1235579, *arXiv:2306.11769,* [pdf].
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81. G. Miloshevich, D. Lucente, P. Yiou, and F. Bouchet, 2023, Extreme heatwave sampling and prediction with analog Markov chain and comparisons with deep learning, accepted for publication at Environmental Data Science, *arXiv:2307.09060,* [pdf].
82. B. Cozian, C. Herbert, and F. Bouchet, 2024, Assessing the Probability of Extremely Low Wind Energy Production in Europe at Sub-seasonal to Seasonal Time Scales, **Environmental Research Letters, 2024, vol. 19, no 4, p. 044046,** arXiv:2311.13526, [pdf].

Submitted papers:

1. M CORVELLEC, F BOUCHET, A complete theory of low-energy phase diagrams for two-dimensional turbulence steady states and equilibria, *arXiv:1207.1966*

2. C. Le Priol, J.M. Monteiro, and F. Bouchet, 2024, Using rare event algorithms to understand the statistics and dynamics of extreme heatwave seasons in South Asia Authors, arXiv:2404.07791, [pdf]

3. V. Mascolo, C. Le Priol, F. D'Andrea, and F. Bouchet, 2024, Compared influence of the Atlantic Multidecadal Variability and of spring soil moisture on summer heat waves in Europe Authors, arXiv:2405.10821, [pdf]

Papers in progress:

1. J. Guioth, Y. Onuki, and F. Bouchet, Dynamical large deviations for an inhomogeneous non linear wave kinetic theory

4.2 Other publications

Edited books

1. F. Bouchet, B. Audoly and J.A. Sepulchre (Eds), 2012, Peyresq Lectures on Nonlinear Phenomena, Volume 3, World Scientific.
2. F Bouchet, T Schneider, A Venaille, C Salomon (Eds), 2020, Fundamental Aspects of Turbulent Flows in Climate Dynamics: Lecture Notes of the Les Houches Summer School. August 2017., Volume 109, Oxford University Press, ISBN: 9780198855217

Edited special issues

1. F. Bouchet, J. Rolland, and J. Wouters, 2019, Rare Event Sampling Methods, Chaos 29, 080402, DOI.

Chapters of books

1. F. BOUCHET, J. BARRE, and A. VENAILLE, 2008, Equilibrium and out of equilibrium phase transitions in systems with long range interactions and in 2D flows, in *DYNAMICS AND THERMODYNAMICS OF SYSTEMS WITH LONG RANGE INTERACTIONS: Theory and Experiments*, AIP Conf. Proc., **970**, pp. 117-152 **(CI:1)**
2. F. BOUCHET, and A. VENAILLE, 2012, Applications of Equilibrium Statistical Mechanics to Atmospheres and Oceans, *in Peyresq Lectures on Nonlinear Phenomena, vol 3,* World Scientific edition.
3. F BOUCHET, C NARDINI, T TANGARIFE, 2016, *Non-equilibrium statistical mechanics of the stochastic Navier–Stokes equations and geostrophic turbulence,* in 5th Warsaw School of Statistical Physics, *Editors B. Cichocki, M. Napiorkowski and J. Piasecki.,* Warsaw University Press, *Web (HAL)*
4. F. BOUCHET, and A. VENAILLE, 2019, *Zonal flows as statistical equilibria,* chapter of the book *Zonal Jets: Phenomenology, Genesis, and Physics.* Galperin, B., and Read, P. L. (Eds.). Cambridge University Press. *arXiv:1602.06714,* [pdf]
5. F. BOUCHET, C. NARDINI AND T. TANGARIFE, *2019, Kinetic theory and quasilinear theories of jet dynamics,* chapter of the book *Zonal Jets: Phenomenology, Genesis, and Physics.* Galperin, B., and Read, P. L. (Eds.). Cambridge University Press. *arXiv:1602.02879,* [pdf]

Conference proceedings.

1. J. BARRE, and F. BOUCHET, 2002 Mean field justified by large deviation results in long range interacting systems, *Proceeding of the conference "Dynamics and thermodynamics of systems with long range interactions."*
2. F. BOUCHET, and T. DAUXOIS, 2005 Kinetics of anomalous transport and algebraic correlations in a long range interacting system, *Journal of Physics: Conference Series,* **7,** *34-47,* **(CI: 7***)*
3. F. BOUCHET, and J. BARRE, 2006 Statistical mechanics of systems with long range interactions, *Journal of Physics: Conference Series*, **31**, 18-26
4. T. TATEKAWA, F. BOUCHET, T.DAUXOIS, and S. RUFFO, 2006 Thermodynamics of the self-gravitating ring model: Analysis with new iterative method, *Journal of Physics: Conference Series*, **31,** 163-164 doi:10.1103/PhysRevE.71.0
5. J. BARRE, and F. BOUCHET, 2006, Statistical mechanics and long range interactions *Comptes rendus Physique* **7** - 3-4 (414-)
6. F. BOUCHET, and A. VENAILLE, 2011, Are ocean rings and jets statistical equilibria? 13th European Turbulence Conference Proceedings.
7. F. BOUCHET, J. LAURIE, and O. ZABORONSKI, 2011, Control and Instanton Trajectories for Random Transitions in Turbulent Flows, 13th European Turbulence Conference Proceedings.
8. F. BOUCHET, J. LAURIE, and O. ZABORONSKI, 2011, On the Statistical Mechanics of the 2D Stochastic Euler Equation", 13th European Turbulence Conference Proceedings.
9. M. CORVELLEC, and F. BOUCHET, 2011, Continuous and discontinuous transitions in geophysical turbulence", 13th European Turbulence Conference Proceedings.
10. F. BOUCHET, and J. LAURIE, 2012, Statistical mechanics approaches to self organization of 2D flows: fifty years after, where does Onsager's route lead to?, *Proceeding of the conference RIMS held in Kyoto in August 2011.*
11. F. BOUCHET, and J. LAURIE, 2012, Instanton trajectories for random transitions in turbulent flows, *Proceeding des Rencontre du Non Linéaire,* Paris, Février 2012.
12. T. TANGARIFE, C. NARDINI, and F. BOUCHET, Stochastic averaging and jet formation in planetary turbulence*, proceeding of the CFM (Congrès Français de Mathématique), 2013.*
13. F. BOUCHET, J. ROLLAND, and E. SIMONNET*, Etude systématique des transitions dans l'équation de Ginzburg–Landau stochastique par l'algorithme adaptive multilevel splitting, rencontre du non-linéaire 2014.*
14. D. LUCENTE, S. DUFFNER, C. HERBERT, J. ROLLAND, F. BOUCHET. Machine learning of committtor functions for predicting high impact climate events, Proceedings of the 9th International Workshop on Climate Informatics: CI 2019, J. Brajard, A. Charantonis, C. Chen, and J. Runge, Eds., NCAR, doi:10.5065/y82j-f154, 1910.11736, *arXiv:1910.11736,* [pdf], hal-02322370v1

ANR Publication

1. Publication of a contribution for *"Cahier ANR calcul intensif",* related to ANR project STATFLOW.

5 Conferences, invitations, and scientific lectures

5.1 Middle term visits abroad and invited professor

1. ***Waseda University, Tokyo, Japan,*** group of *K.P. Maeda,* September 2005.
2. ***Weizmann Institute, Rehovot, Israel,*** group of *D. Mukamel,* November 2005.
3. ***One year sabbatical in Los Alamos National Laboratory, Center for Non-Linear Studies (CNLS)***, Los Alamos, NM, USA, August 2009-July 2010.
4. ***IAS fellowship at Warwick university (8 weeks in 2013).***
5. ***Newton Institute program "Climate and statistical mechanics", November 2014, 4 weeks invited fellow.***

6. ***KITP, March-April 2014***.
7. ***Statistical mechanics, Firenze, Italy, May-June 2014***.
8. ***Courant Institute, 1 month in October 2016***.
9. ***Courant Institute, 2 weeks in November 2018.***
10. ***KITP, November-December 2022, Machine Learning and the Physics of Climate.***
11. ***Newton Institute program "Mathematical aspects of turbulence: where do we stand?", January-May 2022, invited fellow.***

5.2 Research lectures

1. Lecture in Waseda university, Japan, September 2005, *"Statistical mechanics of systems with long range interactions"*, (4h.).
2. Lecture in Nice university, France, April 2008, *"Statistical mechanics of systems with long range interactions"*, (6h.).
3. Lecture in the school "Rencontres de Peyresq", May 2008, *"Two dimensional and geophysical turbulence"*, (5h.).
4. School "Aux rencontres de Peyresq", Nonlinear physics, Peyresq, France, May 2008 **(solicited lecture) (organizing committee)**
5. Lecture at the summer school "Mathematical problems in hydrodynamics", 14-25 June 2010, organized by A. Shirikyan and S. Kuksin, University of Cergy-Pontoise, France**.** *Statistical mechanics of two-dimensional and geostrophic flows* **(solicited lecture)**
6. Invited lecture at the Spring School "Kinetic Theory and Fluid Mechanics" in Lyon, Institut Camille Jordan, organized by Francis FILBET, from March 26th to March 30th 2012 (6 hours), **Invited lecture**
7. 5th Warsaw School of Statistical Physics, 22-29 June 2013, Kazimierz Dolny, Poland, **invited course,** "Stochastic Navier-Stokes equations and non-equilibrium statistical mechanics of geostrophic turbulence" (6 hour lecture).
8. 12 hour lecture at Leuven university (C. Maes), Leuven, February 2014, **invited lecture,** "Atmosphere dynamics and the statistical mechanics of the two-dimensional stochastic Navier-Stokes equations and geostrophic turbulence".
9. 3 hour lecture at the school "Extreme Value Modeling and Water Resources", June 13-24, 2016, Institut Camille Jordan, Lyon, France, **invited lecture**
10. 2 times a one hour lecture at the workshop "Climate Fluctuations and Non-equilibrium Statistical Mechanics: An Interdisciplinary Dialogue", at MPIPKS in Dresden, July 2017, **invited lecture**
11. 1.5 hour lecture at the school "Fundamental aspects of turbulent flows in climate dynamics." at "Ecole de physique des Houches", August 2017 **(organizer)**
12. 2h15m of lectures at the "Mokaplan seminar", INRIA, Paris, March 2018..
13. 4h30m of lectures at the "Summer School Mathematics of Planet Earth", University of Reading and Imperial College, April 2018, Web.
14. 6-hour lectures at the school "Scaling limits and Kinetic theory", UMPA ENS de Lyon, October 2019 - "Large deviations for kinetic theories: from interacting particles to geophysical fluid dynamics and atmosphere jets".

15. 3-hour lectures for the master, PhD and post-doc students of SISSA and the Weizmann institute, organized by SISSA (online), May 2021, "Path large deviations for kinetic theories: beyond the Boltzmann, the Landau and the Lenard—Balescu kinetic equations". Recording SISSA 1, Recording SISSA 2.
16. 2-hour lectures for a meeting of the EGRIN GdR, May 2021, "A (very) short introduction to climate dynamics".
17. 4-1/2 hour lectures for the school Boulder School for Condensed Matter and Materials Physics, "Hydrodynamics across scales", Boulder, USA, July 2022.
18. Lecture at the meeting "Attribution of Extreme Events to Climate Change", Princeton, USA, August 2022.
19. 10-1/2 hour lectures at the Beg Rohu summer school, Statistical physics of complex systems, Statistical physics and large deviation theory for climate dynamics, June 2023.

5.3 Talks and conferences in an international context

Invited speaker in international conferences and solicited lectures in schools

1. *Conference "Cold Atoms and Long Range Interactions",* Nice (France), September 2004, ***invited speaker***;
2. *The Third 21COE Symposium : Astrophysics as Interdisciplinary Science*, Waseda University, Tokyo (Japan), September 2005, ***invited speaker***;
3. *Conference "Dynamics And Thermodynamics of Systems With Long Range Interactions"*, Assisi (Italy), July 2007, **invited speaker**;
4. *School "Aux rencontres de Peyresq", Nonlinear physics,* Peyresq (France), May 2008, **solicited lecture (organizing committee);**
5. *Conference "ΣΦ : International conference in statistical physics"*, Kolymbari (Greece), July 2008, **invited speaker**;
6. *Workshop on "Structures and Waves in Anisotropic Turbulence"*, *Newton Institute program,* Warwick (UK), November 2008, ***solicited speaker***;
7. *International Seminar on "Many-body systems far from equilibrium"*, Dresden (Germany), February 16/27 2009, **invited speaker**;
8. Lecture at the summer school *"Mathematical problems in hydrodynamics"*, Université de Cergy-Pontoise, France, 14-25 June 2010, **solicited lecture**;
9. *American Geophysical Union meeting*, 12-17 December 2010, San Francisco, USA, Nonlinear geophysics session, **invited speaker**;
10. Workshop *NPDE (Non-Linear Partial Differential Equation)*, January 18-21 2011, Edinburgh, Scotland, **invited speaker**;
11. Workshop *Statistical mechanics and climate*, Paris, June 2011, **invited speaker**;
12. Minisymposium *Dynamical systems techniques for fluids*, at Equadiff 2011, in Loughborough, UK, August 1-5 2001, **invited speaker**;
13. Conference *RIMS: Modern developments to Onsager's theory on statistical vortices,* Kyoto University, August 28-31 2011, **invited speaker**;
14. GDR *DYCOEC: Rencontre "plasma and geophysical flows"*, Marseille, October 2011, **invited speaker**;
15. Spring School *"Kinetic Theory and Fluid Mechanics"*, organized by Francis FILBET, Lyon, Institut Camille Jordan, March 26-30 2012, **invited lecture**;

16. Conference *European Geophysical Union General Assembly*, April 2012, Wien, **invited talk** to the session "Young rising stars" : EGU2012-12836, Non equilibrium statistical mechanics of geophysical flows.
17. Conference *American Geophysical Union Fall Meeting,* December 2012, San Francisco, **invited talk** to the session NG41E-02 : "Stochastic averaging and jet formation in geostrophic turbulence".
18. Conference *Non-equilibrium Statistical Mechanics and the Theory of Extreme Events in Earth Science,* January 8th-11th, 2013, University of Reading, **invited speaker :** "Large deviations, instantons and the statistical mechanics of atmosphere jets".
19. Workshop MIRAW day, in the Mathematics department of Warwick university, Monday-Feb 4 2013, **invited speaker**
20. IUTAM Symposium on Vortex Dynamics: Formation, Structure and Function, March 10-14, 2013, Fukuoka, JAPAN **(invited to this event with everything funded, but not among the invited speakers of the conference)**
21. 11th workshop "Statistical Physics and Low Dimensional Systems" http://www.lpm.u-nancy.fr/activite_phys Pont-a-Mousson, France, May 15th-May 17th 2013. ***invited talk.***
22. 5th Warsaw School of Statistical Physics, 22-29 June 2013, Kazimierz Dolny, Poland, **invited course,** "Stochastic Navier-Stokes equations and non-equilibrium statistical mechanics of geostrophic turbulence".
23. CEMRACS 2013 *"Modéliser et simuler la complexité: approches stochastiques et déterministes"*, CIRM, Marseille, July 22nd - August 30th 2013, (organized by Tony Lelièvre). **1hour invited talk.**
24. Workshop "Models from Statistical Mechanics in Applied Sciences", Warwick university, 9-13 September 2013 (organized by Stefan Grosskinsky, Ostap Hryniv and Florian Theil). **40 minutes invited talk.**
25. One day meeting "Paramétrisation et Turbulence Géophysique", in the framework of the ARP MathsinTerre (Mathematics and planet Earth), September 24th 2013, **invited speaker.**
26. 92th Meeting between theoretical physicists and mathematicians, September 26 - September 28, 2013 : "Entropy in mathematics and in physics". **invited speaker.**
27. Newton Institute, Cambridge, Workshop in the framework of the program "Climate and statistical mechanics", October 2013, **invited speaker.**
28. Workshop « Dynamics & Kinetic theory of self-gravitating systems » from November 4th to 8th, in the framework of the IHP program GRAVASCO, IHP, Paris, France, **invited speaker.**
29. Workshop on Stochastic Modelling of Multiscale Systems, 2 - 6 Dec. 2013, Eindhoven, Netherland, December 2013, **invited speaker.**
30. Conference *"Stochastic Partial Differential Equations and Applications - IX",* Levico Terme (Trento, Italy), from January 5th to January 11th, 2014, **invited main lecture.**
31. 12 hour lecture at Leuven university (organized by C. Maes), February 2014, **invited lecture.**
32. Workshop on Fundamentals of Climate, Atmosphere and Ocean Dynamics (Hamburg, May 12-14, 2014), **invited talk**, http://www.klimacampus.de/2762+M563a176f1a5.html?&L=1
33. Conference "Advances in Nonequilibrium Statistical Mechanics: large deviations and long-range correlations, extreme value statistics, anomalous transport and long-range interactions", GGI Florence, from 26-05-2014 to 30-05-2014, **invited speaker,** Web
34. Conference Mathematical Hydrodynamics 2014, École normale supérieure (Paris), June 16–20, Paris, **invited speaker,** Web, movie : Movie

35. Conference on Extreme Value Theory and Laws of Rare Events: 14th-18th July 2014, CIRM, Marseille, **invited speaker**, Web
36. SIAM: SIAM Conference on Nonliner Waves and Coherent Structure, August 11-14 2014, **invited speaker**, (I finally had to cancel my participation). Web
37. Large audience conference "CLIMATE: SCIENCE KNOWLEDGE GOVERNANCE ", Prague, November 2014, **invited speaker.** Web, PDF.
38. Conference "Non-Equilibirum Statistical Mechanics", Brown University, May 4 -5, 2015., **invited speaker.** Web.
39. CHAOS 2015 PROGRAM 8th Chaotic Modeling and Simulation, International Conference, May 2015, **invited speaker.** Web.
40. Workshop "Progress in Nonequilibrium Statistical Mechanics", June 8-12, 2015, Laboratoire J.-A. Dieudonné Université, de Nice Sophia Antipolis, **invited speaker,** Web.
41. Interplay of Analysis and Probability in Applied Mathematics, Oberwolfach, Germany, July 2015, **invited speaker,** Web.
42. Workshop "Fluctuation driven phenomena in non-equilibrium statistical mechanics", 21 - 25 September 2015, Warwick university, September 2015, **invited speaker,** Web.
43. CS-DC'15 World e-conference, Complex Systems Digital Campus, October 2015, **invited speaker,** Web.
44. Conférence 2èmes rencontres niçoises physique théorique et probabilités 15-16 octobre 2015, **invited speaker**.
45. Workshop on Gradient flows, Large deviations and Applications, Eindhoven, Netherlands, November 22-23 2015, **invited speaker,** Web.
46. Workshop on Instantons and Extreme Events in Turbulence and Dynamical Systems, IMPA, Rio de Janeiro, Brazil, December 7-10 2015, **invited plenary speaker,** Web.
47. COmputational Statistics and MOlecular Simulation (Paris, 2-5 February 2016), **invited speaker,** Web.
48. 2016 SIAM Conference on Uncertainty Quantification, Lausanne, Switzerland, April 5-8 2016, **invited speaker to a mini session,** Web.
49. Workshop on Multiscale Modeling and its Applications: From Weather and Climate Models to Models of Materials Defects, April 25 - 29, 2016, The Fields Institute, Toronto, Canada, **invited speaker,** Web.
50. Workshop at the Institut d'Astrophysique de Paris, The secular evolution of self-gravitating systems over cosmic ages, May 24-27, 2016, IAP, Paris, **invited speaker,** Web.
51. Conference "Stochastic Partial Differential Equations & Applications", Levico Terme, Italia, May 30-June 04, 2016, **invited plenary speaker,** Web.
52. 3 hour invited lecture at the school "Extreme Value Modeling and Water Resources", June 13-24, 2016, Institut Camille Jordan, Lyon, France, **invited lecture,** Web.
53. International symposium *"Extreme events in the Earth and planetary sciences",* the mathematics department of the university of Warwick, July 04 - 08, 2016, **speaker and organizer.** Web.
54. **Plenary speaker of the SIAM 2016 annual meeting, July 11-14, 2016.** (SIAM annual meeting is the worldwide reference conference in Applied Mathematics gathering several thousands of participants) Web.
55. Workshop "Multiscale Interactions in Geophysical Fluids", August 14-20, Oberwolfach, Germany, **plenary speaker,** Web.
56. CECAM workshop "Non-equilibrium Statistical Mechanics and Turbulence", September 8-10 2016, Roma, Italy, **invited speaker** Web.

57. SIAM conference MPE (Mathematics for the planet Earth), September 30 - October 2, 2016, Philadelphia, USA, **invited speaker to a minisymposium.** Web.
58. AGU fall meeting, December 12-16, 2016, **invited speaker,** Web.
59. Conference "From Field Theory to Non-Equilibrium on Mathematical Physics", in honor of Krzysztof Gawędzki, on the occasion of his 70th birthday, June 19-21, 2017, Nice, France, **invited speaker**, Web
60. Seminar at "Climate Fluctuations and Non-equilibrium Statistical Mechanics: An Interdisciplinary Dialogue", at MPIPKS in Dresden, July 2017, 2 times a one hour lecture, **invited lecture**, Web
61. Workshop "Climate Fluctuations and Non-equilibrium Statistical Mechanics: An Interdisciplinary Dialogue", at MPIPKS in Dresden, July 2017, **invited speaker**, Web
62. Summer school "Fundamental aspects of turbulent flows in climate dynamics." at "Ecole de physique des Houches", August 2017, one 1 hour research seminar **(organizer)**, Web
63. Summer school "Fundamental aspects of turbulent flows in climate dynamics." at "Ecole de physique des Houches", August 2017, one 1.5 hour lecture **(organizer)**, Web
64. CliMathNet Conference, August 29-September 1, 2017, Reading, UK, **invited speaker**, Web
65. Program "Large Deviation Theory in Statistical Physics" at the International Center for Theoretical Sciences (ICTS), September 2017, Bangalore, India, **invited speaker**, Web.
66. Conference "Classic and Stochastic Approaches to Mathematical Fluid Dynamics", in honor of Darryl Holm 70th birthday, October 2017, Imperial College, London, **invited speaker**, Web.
67. Conference "AtMath collaboration Kickoff", November 2017, Levi, Finland, **invited speaker**, Web.
68. Conference "Extremes 2018", March 2018, Hannover, Germany, **invited speaker**, Web.
69. "Mokaplan seminar", INRIA, Paris, March 2018, **2h15m lectures.**.
70. "Summer School Mathematics of Planet Earth", University of Reading and Imperial College, April 2018, **4h30m lectures,** Web..
71. Workshop "Particle Methods and Data Assimilation", May 2018, Imperial College, London, **invited speaker**, Web.
72. Workshop "Simulation aléatoire: problèmes actuels", Centre Henri Lebesgue, INRIA, Rennes, France, **invited speaker**, Web.
73. IUTAM Symposium "Stochastic dynamical systems approaches to fluid flow transitions", Ithaca, USA, **September 2018, invited speaker**, Web.
74. Workshop "SISSA meets ENS de Lyon", SISSA, Trieste, Italy, September 2018, **invited speaker**, Web.
75. Workshop "Entropic Fluctuation Relations in Mathematics and Physics", CRM (Centre de recherches mathématiques), Montreal, Canada**, November 2018, invited speaker**, Web.
76. Workshop, "Systèmes Hors Equilibre", Lyon, November 2018, **invited speaker.** Web.
77. Workshop, "Fluids and complexity", Nice, December 2018, **invited speaker.** Web.
78. SRitp Workshop, Weizmann Institute, Rehovot, Israël, December 2018, **invited speaker.** Web.
79. Conference "Journées de Statistiques", Nancy, France, June 2019, **invited plenary speaker.** Web.
80. Workshop "Scaling Limits and Large Deviations", Orléans, France, June 2019, **invited speaker,** Web.
81. Conference "Equadiff 2019", Leiden, Netherlands, July 2019, **invited speaker to a minisymposium,** Web.

82. Workshop “Mathematics of the Economy and Climate”, Utrecht, Netherlands, July 2019, **invited speaker.** Web.
83. Conference “Universal features of hydrodynamical, optical and wave turbulence”, Nice, France, 9-12 September 2019, invited speaker. Web.
84. Conference “Nonlinear and stochastic methods in climate and geophysical fluid dynamics” in the framework of the IHP thematic semester “Mathematics of climate and the environment”, IHP, Paris, October 2019, **invited speaker.** Web
85. International workshop “Physics at the equator: from the lab to the stars", ENS de Lyon, October 2019, **invited speaker.** Web
86. 1-1/4 hour seminar at the NCTR school (Nouveaux défis en Turbulence VI), Les Houches, February 2021, “Rare events and large deviation theory on turbulent flows”, **invited speaker.** Web.
87. Conference of the APS (American Physical Society) March meeting, March 2021, **invited speaker to the session R15.** Web.
88. Conference RESIM 2021: 13th International Workshop on Rare-Event Simulation, May 2021, Paris (online), **invited speaker**. Web.
89. Conference ICTAM 2021: 25th International Congress of Theoretical and Applied Mechanics (held in August 2021, online), Milano (online), **invited speaker for a mini symposium.** Web.
90. 74th Annual Meeting of the APS Division of Fluid Dynamics, November 2021, **invited speaker for the mini symposia Mini-Symposium** ‘Fluids Next: Environmental turbulent flows under the effect of climate change’.
91. Journées de physique statistique, Paris, France, January 2022, **invited speaker.**
92. Workshop ITN Critical-Earth, “Rare event simulations for climate dynamics”, Nijmegen, Netherlands, April 2022, **invited speaker**.
93. Conference at Newton Institute INI, Frontiers in Kinetic Theory FKTW03, Cambridge, UK, April 2022, **invited speaker (online)**.
94. Conference “Science de la durabilité : quels enjeux ? quelles opportunités ?” 11-12 mai 2022 Marseille (France), **invited speaker (table ronde)**.
95. Conference at Newton Institute INI, “Advances in geophysical and astrophysical turbulence”, Cambridge, UK, May 2022, **invited speaker**.
96. Conference “Coarse-grained description for non-equilibrium systems and transport phenomena”, Roma, Italy, July 2022, **invited speaker**.
97. Talk at the Woods Hole Geophysical Fluid Dynamics program, July 2022, Woods Hole, MA, USA, **invited speaker**.
98. Meeting “Attribution of Extreme Events to Climate Change”, Princeton, USA, August 2022, **invited talk.**
99. Conference IMSI: Climate and Weather Extremes , Chicago, October 2022, **invited talk.**
100. Conference: Machine Learning-Assisted Sampling for Scientific Computing –{} Applications in Physics, ENS, Paris, October 2022, **invited talk.**
101. Conference IMSI: Machine Learning for Climate and Weather Applications , Chicago, November 2022**, invited talk.**
102. Colloquium at Institut Pascal, in the framework of the program Sampling physics, Saclay, September 2023, **invited talk.**
103. Conference “About Entropy in Large Classical Particle Systems”, Clay institute, Oxford, September 2023, **invited talk.**

Invitations to international conferences for which I refused because of climate impact:

1. Dynamics Days Europe 2022 to be held from 22 to 26 August 2022 at the University of Aberdeen, Scotland.
2. Dynamics Days 2023, Naples.
3. “Classical, Quantum, and Active Fluids", to be held at the Initiative for the Theoretical Sciences (ITS) at The CUNY Graduate Center, and would like to invite you to give a talk. We’re planning to have it be in-person. For various reasons, the workshop will be quite soon, from March 11-15, 2024.

Oral talks in international conferences with competitive selections:

1. Entropy maxima for the Quasi-Geostrophic equations*, EGS (European Geophysical Society) Congress,* Nice (France), February 1999;
2. Entropy maxima for the Quasi-Geostrophic equations*,* a model for the Great Red Spot of Jupiter, *EGS Congress,* Nice (France), April 2000;
3. Entropy maxima for the Shallow-Water equations*, EGS Congress,* Nice (France), April 2001;
4. Model of Jupiter’s troposphere using statistical mechanics, *EGS Congress*, Nice (France), April 2002;
5. Parametrization of small scale turbulence using a maxing entropy production theory*, EGS Congress,* Nice (France), April 2002;
6. Conference *"Statistical Mechanics of Non-Extensive Systems",* Paris, October 2005;
7. Conference *“European Geophysical Union general assembly”,* Vienna, April 2007;
8. Conference *UPON “Open Problems on Noise”*, Lyon (France), June 2008;
9. Conference *Dynamics Days Europe*, Bristol (England), September 2010;
10. Non-equilibrium statistical mechanics of geophysical flows, *EGU General Assembly*, Vienna (Austria), April 2011;
11. On the Statistical Mechanics of the 2D Stochastic Euler Equation, *13th European Turbulence Conference*, Warsaw (Poland), September 2011;
12. Are ocean rings and jets statistical equilibria? *13th European Turbulence Conference*, Warsaw (Poland), September 2011;
13. A statistical mechanics approach to computing rare transitions in multi-stable turbulent geophysical flows, *Rencontres du Non Linéaire,* Paris, Février 2012;
14. A statistical mechanics approach to computing rare transitions in multi-stable turbulent geophysical flows, *EGU General Assembly*, Vienna (Austria), EGU2012-11747, April 2012.
15. Talk during the conference held at the occasion at the *KITP program “Wave Mean Flow Interactions”*, March 2014. Web.
16. The LATSIS symposium 2014, Atmosphere and climate dynamics: from clouds to global circulations, Zurich, June 18-21 2014, **Oral Talk** Web.
17. EGU General assembly, Vienna, Austria, April 2015, session NP 2.2, **Oral talk.**
18. EGU General assembly, Vienna, Austria, April 2016, **Oral talk.**
19. EGU General assembly, Vienna, Austria, April 2016, **another oral talk.**
20. Conference Statphys 26, Lyon, France, July 2016, **Oral talk.**
21. Conference MECO (Statistical physics), Lyon, France, February 2017, **Oral talk.**
22. EGU General assembly, Vienna, Austria, April 2017, **Oral talk.**
23. EGU General assembly, Vienna, Austria, April 2018, **Oral talk.**
24. EGU, General assembly, Vienna, April 2023, ITS2.1/NP0.4, **Oral talk.**

5.4 Other talks

Talks in international contexts

1. ICG (Istituto di CosmoGeophysica), Torino *(Italy), January 2000;*
2. Workshop on Bose-Einstein condensates. Salerno *(Italy), December 2001;*
3. CICC Cuernavaca *(Mexico), February 2002;*
4. Center for Nonlinear Dynamics. University of Texas*, Austin (USA), February 2002;*
5. Ecole de physique des Houches: "Long range interacting systems", *Les Houches (France)*, *February 2002;*
6. Rome university*, Tor Vergatta (Italy), May 2002;*
7. Conference Eurojove, *Lisbon (Portugal), June 2002;*
8. Gruppo di fisica teorica, Dipartimento di fisica, *Bologna, Italy, December 2002;*
9. Universit'a di Roma "La sapienza"*, Italy, March 2003;*
10. *I*NFM Meeting, Fai della Paganella*, Trento (Italie), March 2003;*
11. European meeting "Stirring and Mixing"*, Nice (France), September 2004;*
12. Workshop "Fokker-Planck equations, algebraic correlations, long range correlations, and related questions"*, ENS-**Lyon** (France), March 2005;*
13. Workshop "Systems with long range interactions", *Florence (Italy), May 2006;*
14. Physics department.,University of Barcelona*, Barcelona (Spain), November 2006;*
15. Italian-French Conference, *Bagno Vignoni (Italy), November 2006;*
16. Conference "Two dimensional turbulence"*, Leiden (Netherlands), March 2007;*
17. Workshop "Physical Oceanography" *in the context of the* "Rencontres de Mécanique des fluides de Nice"*, Nice, May 2007;*
18. Meeting "Non Equilibrium Steady States"*, IHP Paris, October 2007;*
19. Conference "Statistical mechanics meeting"*, Rutgers (USA), May 2008;*
20. Caltech, Pasadena, *(CA, USA), April 2009;*
21. NCAR-Boulder *(CO, USA), October 2009;*
22. CNLS Los Alamos, *(NM, USA), November 2009;*
23. GFDL, Princeton*, NJ, USA, April 2010;*
24. Courant Institute, NYU*, New York, USA, April 2010;*
25. Department of mathematic, Warwick University*, GB, May 2010;*
26. Department of physics, Warwick University*, GB, May 2010;*
27. CWI, Amsterdam university*, Netherlands, November 2010;*
28. Meeting *"The nature of turbulence", KITP,* Santa Barbara, USA, May 2011.
29. Meeting "Stochastic Flows and Climate Modeling", Aspen ACP*, from June 10 to July 1, 2012.*
30. Workshop "Equilibrium and out-of-equilibrium properties of systems with long-range interactions", Lyon (organized by S. Ruffo), August 27, 2012 - August 31, 2012.
31. Meeting *"Statistical Mechanics of self-gravitating particles",* Les Treilles, 22–27 October 2012.
32. Seminar in the astrophysics department of Queen Mary College, London, January 2013.
33. Statistical mechanics seminar, Mathematics department, Warwick university, June 2013.
34. Talk at the occasion of Sergio Ciliberto's birthday, Lyon, June 2013.
35. Seminar at the international meeting dedicated to zonal jets, ISSI, Bern, Switzerland, April 2013.
36. Seminar at the workshop ERCOFTAC, Ecole centrale, Lyon, October 2015.
37. Seminar at the workshop "Intrinsic ocean variability science day", LGGE, Grenoble, January 2015.

38. Seminar at Bristol university, Mathematics department, May 2015.
39. Seminar at Edinburgh university, Mathematics department, October 2015.
40. Seminar at Imperial college, Mathematics department, February 2016.
41. Seminar at the meteorology department of Reading university, February 2016.
42. Seminar at the mathematics department of Bath university, February 2016.
43. Seminar in the framework of the European research program CRITICS, March 2016.
44. Seminar at ETH (climate group), Zurich, Switzerland, March 2016.
45. Seminar at SISSA, Trieste, Italy, May 2016.
46. Seminar at Brown university, Providence, USA, October 2016.
47. Seminar at Chicago university (statistics department), Chicago, USA, October 2016.
48. Applied maths seminar at the Courant Institute, NYU, New York, USA, October 2016.
49. Seminar at Columbia university (applied mathematics), New York, USA, October 2016.
50. Seminar at the Courant Institute, Caos group, NYU, New York, USA, October 2016.
51. Seminar at the Potsdam Institute for Climate Impact Research, Potsdam, Germany, July 2017.
52. Seminar at L'escandille, Aussois, Workshop on Fluctuations, Large deviations in Turbulence, joint Oldenburg-Grenoble Universities Workshop, August 2017
53. Seminar at the Indian Institute of Science (IISc) (Astrophysics seminars and colloquium), Bangalore, India, September 2017.
54. Seminar at the Indian Institute of Science (IISc), Centre for Atmospheric and Oceanic Sciences (CAOS), Bangalore, India, September 2017.
55. Seminar at the Indian Institute of Technology (IIT) Madras, Chennai, India, September 2017.
56. Seminar at the Niels Bohr Institute, Copenhagen, Denmark, November 2017.
57. Seminar at the Finish Meteorological Institute (FMI) Helsinki, Finland, November 2017.
58. Colloquium at the Centre for Geophysical and Astrophysical Fluid Dynamics, Exeter, England, December 2017.
59. Colloquium at the Department of Applied Mathematics and Theoretical Physics (DAMTP), Cambridge university, Cambridge, England, May 2018.
60. Seminar at the "Analysis seminar" of the Courant Institute, New-York University, USA, November 2018.
61. Colloquium at the Collaborative Research Center (SFB) - Freie Universität Berlin (math department), Berlin, Germany, January 2019.
62. Talk at the workshop "Transition in turbulence", Grenoble, February 2019**.** Web.
63. Talk at the workshop VALPRED (validation of ensemble forecasting), Aussois, March 2019**.** Web.
64. Seminar at EDF, the French electricity company, Palaiseau, France, June 2019.
65. Colloquium at Oldenburgh university, Oldenburgh, Germany, July 2019.
66. Simons' Statistical Mechanics and Turbulence project. General Seminar, February 2020.
67. Colloquium at Utrecht University's Centre for Complex Systems Studies (visoconference), June 2020.
68. Seminar for the Simons Foundation Collaboration on Turbulence and Statistical Mechanics, September 2020.
69. NYU seminar for the Simons Foundation Collaboration on Wave Turbulence, September 2020.
70. Complex System (CoSy) seminnar, Uppsala, November 2020.
71. Fluids and MHD seminar (visioconference), Leeds, November 2020.
72. Seminar for a workshop of the Simons Foundation Collaboration on Wave Turbulence, December 2020.

73. Seminar for the weekly meetings of the Simons Foundation Collaboration on Statistical Mechanics and Turbulence, Instantons in the solar system, April 2021.
74. Seminar at KITP, Santa Barbara, USA, for the meeting "Machine learning for climate", December 2022.
75. Seminar at Woods Hole Oceanographic Institution WHOI, Woods Hole, USA, July 2022.
76. Seminar at the joint workshop TIPES/Critical Earth, Munich, February 2023.

Other participations to international conferences.

1. Conference "Turbulence and Statistical Mechanics", Les Houches, March 2009 (Organizer)
2. 12th Marcel Grossman Meeting (MG12), Paris, July 12-18 2009 (Talk)
3. Caltech-Pasadena, CA, Conference "Ocean-Atmosphere Energy Transport", November 5-7 2009 (Poster)
4. Conference "Ocean Science Meeting", Portland, OR, USA, March 2010 (Poster)

5.5 Talks in national laboratories or in a national context (GDR-Workshops-...)

1. February 1999: GDR Mécanique des fluides géophysiques et astrophysiques , LMD Paris: *Maxima d'entropie pour les équations quasi-géostrophiques.*
2. February 2000: Laboratoire de Physique Quantique de l'IRSAMC à Toulouse (France), *États d'équilibre pour la mécanique statistique d'écoulements géostrophiques.Application: un modèle pour la tache rouge de Jupiter.*
3. May 2000: Ecole Normale Supérieure de Lyon, Lyon (France), *Entropy maxima for the Quasi Geostrophic equations : a model for the Great Red Spot of Jupiter.*
4. May 2000: MADYLAM, LGIT, Grenoble *Entropy maxima for the Quasi Geostrophic equations: a model for the Great Red Spot of Jupiter.*
5. June 2000: LEGI, Grenoble *Entropy maxima for the Quasi Geostrophic equations: a model for the Great Red Spot of Jupiter.*
6. February 2001: Institut Fourier, Grenoble *Entropy maxima for the Quasi Geostrophic equations : a model for the Great Red Spot of Jupiter.*
7. February 2002: Laboratoire de Météorologie Dynamique, LMD-ENS (Paris) *Mécanique statistique des flots géophysiques: de l'atmosphère de Jupiter à la paramétrisation de la turbulence.*
8. Laboratoire de Physique Quantique à Toulouse, April 2002.
9. Laboratoire pour les Ecoulements Géophysiques et Industriels, LEGI (Grenoble), France, Mai 2002.
10. LPT Orsay, France, December 2002.
11. Ecole Normale Supérieure de Lyon, France, Avril 2003.
12. CPT Marseille, France, Avril 2003.
13. IRSAMC Toulouse, France, Avril 2003.
14. Institut Fourier (Grenoble), France, December 2003.
15. INLN, Nice, France, April 2004.
16. CEA Saclay (Paris) France, April 2004.
17. LPMCN, Lyon, France, April 2004
18. GDR "Phénomènes hors-équilibres", ENS, Paris, November 2004
19. Workshop "Journée Mathématiques et Océanographie", Orsay, France, April 2005
20. Journée maths/physique, Fondation Wolfgang Doeblin, Lab. Dieudonné, October 2005.
21. PPF DISCO, Grenoble, December 2005 ***(solicited talk)***
22. Rencontres niçoises de mécanique des fluides, Nice, Mars 2006.

23. GDR Turbulence, Nice, November 2006. Presentation of the ANR Statflow
24. INLN, Nice December 2006.
25. GDR Phénomène hors équilibre, IHP Paris, September 2007.
26. Rencontres “Océanographie physique”, CNFGG (Colin de Verdière), Paris, December 2007.
27. Seminar in a laboratory : IRMAR, ENS-Cachan, Rennes, December 2007.
28. GDR DYCOEC, Nice, February 2008.
29. GDR Turbulence, Lyon, March 2008.
30. GDR Phénomène hors équilibre, IHP Paris, June 2008.
31. Rencontres niçoises de mécanique des fluides, April 2009
32. LADHYX, Ecole Polytechnique, May 2009
33. CPT Marseille, June 2009
34. ENS-Lyon, November 2010
35. ANR meeting, final JC 2006, Strasbourg, March 2011
36. Institut Fourier, UJF, Grenoble, April 2011
37. Soutenance d’HDR à l’ENS-Lyon, June 2011
38. Bistability in Turbulent Flows, *Workshop on Computation of Rare Events*, Lyon, (France), June 2011
39. Workshop on Long-Range Interacting Systems, ENS de Lyon, Lyon, October 2011
40. Présentation mi-parcours, Septembre 2011, ANR SYSCOM STATOCEAN, ANR, Paris.
41. Talk at the "Workshop turbulence - Lyon", Ecole Centrale, October 2012.
42. Seminars in CERMICS (école des ponts), Marne La vallée, March 2013.
43. Seminar in IRMAR (mathematics department of Rennes university), May 2013.
44. Seminar in LATP, CMI (mathematics) in Marseille, May 2013.
45. Seminar in the workshop, Journées OGOA "Ondes de Gravité dans l’Océan et l’Atmosphère" 23-24 mai 2013 Lyon.
46. Seminar in LSCE (Saclay, Orme des Merisiers), January 2013.
47. Seminar at “Laboratoire Probabilités et Modèles Aléatoires”, Université Paris VII, Paris, June 2015.
48. Seminar et LADHYX, Ecole Polytechnique, November, 12, 2015.
49. Seminar at IPHT, CEA, Saclay, December, 1, 2015.
50. Seminar at IMCCE, Paris, January 2016.
51. Seminar at Montpellier university, physics department, March 2016.
52. Seminar at MAPMO (mathematics), Orléans, May 2016.
53. Seminar et LMD (meteorology and climate), Paris, May 2016.
54. Seminar at UMPA (mathematics), ENS de Lyon, Lyon, June 2016.
55. Seminar at the workshop *“Adaptive Multilevel Splitting et évènements rares”*, école des Ponts Paritech, Paris, June 2016.
56. Seminar at CPT (physics), Marseille, September 2016.
57. Seminar “Stochastic problems in mathematical physics and economy”, at IHP, Paris, May 2017.
58. Seminar at ENS de Lyon, for the visit of Gulliver laboratory, Lyon, May 2017.
59. Seminar at Institut d’Alembert, Paris, June 2017.
60. Seminar at the IAGAFD (Interdisciplinary Geo-Astro Fluid Dynamics) meeting in Paris, October 2017.
61. Seminar at ISFA (Institut de Sciences Financières et d’Assurance), Lyon, April 2018.
62. Colloquium at Forum de physique statistique, ENS-Paris, September 2018.
63. Seminar at InPhyNi, Nice–Sophia-Antipolis, December 2018.
64. Workshop “Journées Calcul et Apprentissage”, Lyon, April 2019, **invited speaker.** Web.
65. Workshop “Extrêmes en climatologie”, CEA Saclay, November 2019. Web.

66. Seminar at the LSCE laboratory, CEA Saclay, January 2020.
67. Seminar at a working meeting the the ANR RevEarth (Realistic modelling of Earth's magnetic field reversals, led by Nathanaël Shafer), January 2020.
68. Seminar for the HCERES evaluation of the Laboratoire de Physique at ENS de Lyon, March 2020.
69. Webinar Oceanix from the university of Brest and Rennes - October 2020.
70. Seminar at IRPHE, Marseille (online) - January 2021.
71. Seminar within the ANR project RETENU - April 2021.
72. Seminar at Conseil Scientifique de l'INP at CNRS, Paris - April 2022.
73. Seminar at PMC, Ecole Polytechnique - June 2022.
74. Seminar at the Samprace ANR meeting, LMD/ENS, December 2022.
75. Seminar "Vers un GIEC de l'Energie" au colloque"Transition Énergétique et Société" du CNRS, Paris, April 2023.
76. Colloquium at ENS-DMA (mathematics) "Des maths climatiques", Paris, March 2023.
77. Colloquium at the physics department of ENS, Paris - May 2023.
78. **Invited talk** at the workshop: Data science and/or modeling for the environment, Sorbonne University-INRIA, May 2023.
79. Talk for the SAMA group at IPSL, Paris - **invited talk** - May 2023.
80. Talk at LPMTC, UPMC, Jussieu, November 2023.

5.6 Interventions in schools and universities

1. February 2013. As I was fellow of the Institute of Advanced Studies of Warwick university (UK), at the mathematic department, I was asked to make a public lecture for high-school students at the grammar school of Stratfort-upon-Avon, the former school of Shakespeare.
2. June 2013: Seminar in classes préparatoires. At "Lycée la Martinière", Lyon.
3. February 2014: Seminar for middle school students. At "Lycée international", Lyon.
4. January 2015: 5 seminars for elementary school students, Lyon.
5. May 2015: Seminar to school children at SISSA, Trieste, Italy.
6. November 2015: Seminar in classes préparatoires (undergraduate level) at "Lycée du Parc", Lyon.
7. April 2018: Seminar in classes préparatoires (undergraduate level) at "Lycée de la Martinière", Lyon.
8. March 2019: Broad audience seminar to the math students of ENS de Lyon about mathematical physics open problems and their application in turbulence, climate and astronomy (in the framework of "Théminaire" at UMPA, ENS de Lyon).
9. September 2019: Conférence sur la transition énergétique au lycée Etienne Minard, Saint Etienne, France.
10. February 2020: Intervention le 04 février soir au MKS #1 - Agir contre le changement climatique organisé par les étudiants de l'EM-Lyon.
11. February 2020: Séminaire de la détente mathématiques, à l'ENS de Lyon (to the mathematics students of ENS de Lyon).
12. September 2022: 1 hour lecture at "Lycée Charles Mérieux" à Lyon.
13. Séminaire à l'ensemble des étudiants nouveaux entrants de l'ENS de Lyon, "Incertitudes fondamentales pour les impacts des changements climatiques et les transitions potentielles", Janvier 2023.

5.7 Large audience seminars, cultural events and public debate

1. In 2000-2001 (during my PhD thesis), I organized (together with A. Bogdanovic, S. Cohen, ...) in University Joseph Fourier, a cycle of conferences **"Midi Sciences"**, twice per months, targeted to master students, PhD students and researchers from Joseph Fourier university. Average number of participants : 80.
2. Intervention at the meeting "La nuit des chercheurs", in Lyon, in September 2011.
3. Numerous participations to the meeting "Fête de la science".
4. September 2011. Intervention at "La nuit des chercheur", Lyon.
5. One hour lecture on physical aspects of climate changes in the framework of the meeting "Changements de climat : changements de société", Lyon, October 2012 (please see the movie on the blog "Et si on en parlait" Web, or the meeting webpage Web).
6. October 2014: Fete de la science à Saint Priest. Organisation d'un stand sur la dynamique de l'atmosphère et le climat - 2 jours
7. October 2014: Seminar at Rotary club, Lyon.
8. November 2014: CLIMATE CONFERENCE - 20th November 2014 - Institut Français de Prague - Climate: Science Knowledge Governance. Web, Web.
9. October 2015: Seminar in the framework of "Train du Climat", Lyon
10. November 2015: Débat public organisé par **"les acteurs de l'économie",** sur le thème de la transition énergétique, Lyon.
11. 2 hour public debate about interactions between academic research and industrial partners, in the framework of the school "Extreme Value Modeling and Water Resources", June 13-24, 2016, Institut Camille Jordan, Lyon.
12. June 2017: Seminar at Meteo-France, Bron (Lyon).
13. March 2018: Large audience seminar at the "Société Astronomique de Lyon" (SAL), Lyon, France
14. October 2018: Conférence grand public "Parlez nous de ... Sciences" à la bibliothèque de l'ENS de Lyon.
15. January 2019: Conférence sur la transition énergétique aux étudiants de l'ENS de Lyon (cyle Anthropocène).
16. February 2019: Intervention dans le cadre du grand débat national sur le sujet du changement climatique et de la transition énergétique, (débat grand public avec sur scène un député, le responsable de l'environnement à la ville de Lyon, un responsable d'association, et un scientifique), Lyon.
17. May 2019: Conférence sur la transition énergétique dans le cadre des journées du Laboratoire de Physique (Fréjus, France).
18. September 2019: Conférence sur la transition énergétique au laboratoire Liphy (Grenoble, France).
19. September 2019: Conférence sur la transition énergétique au lycée Etienne Minard, Saint Etienne, France.
20. September 2019: Intervention sur "La transition énergétique, l'impact du numérique et Labos1point5" au Conseil scientifique de l'Institut des sciences de l'information et de leurs interactions (INS2I) du CNRS, Paris.
21. October 2019: Conférence "Les impacts du changement climatique et la transition énergétique" dans le cadre de la Journée « Le défi du changement climatique » organisée par l'Institut rhônalpin des systèmes complexes (IXXI), le 15 octobre 2019 à l'ENS de Lyon. Exposé transition énergétique IXXI.
22. January 2020: Seminnar at the Department of Astrophysics (DAP) at CEA Saclay. La transition énergétique.
23. February 2020: Conférence "La transition énergétique, l'impact du numérique et Labos1point5" au congrès de la Société Informatique de France Film intervention SIF Congrès SIF.
24. June 2021: A 3-hour lecture about the energy transition, at a one week meeting in Les Houches organized by ENS de Lyon PhD students.

25. October 2021: Intervention au theatre du point du jour, à Lyon, dans le cadre "Retour Aux Sources" le vendredi 8 octobre 2021 autour du spectacle La Faute de François Hien, à propos des évènements climatiques extrêmes.
26. March 2022: Exposé de 45 minutes, suivie d'un débat pour la marche pour le futur, à Lyon.
27. July 2022: 45 minute lecture "Mitigating climate change: recent trends in the energy and ecology transitions" at the Boulder School for Condensed Matter and Materials Physics, "Hydrodynamics across scales", Boulder, USA.
28. July 2022: 45 minute lecture "Mitigating climate change: recent trends in the energy and ecology transitions" at the Geophysical Fluid Dynamics program at Woods Hole, MA, USA.
29. September 2022: 1 hour lecture at "Lycée Charles Mérieux" à Lyon.
30. Exposé pour une formation des journalistes de Bayard presse, dans le cadre de l'IMPT, March 2023.
31. Seminar "Vers un GIEC de l'Energie" au colloque "Transition Énergétique et Société" du CNRS, Paris, April 2023.
32. December 2023: Intervention au bar des Sciences, à Paris: « L'{} IA peut-elle prévoir des phénomènes extrêmes ?».

5.8 Media coverage

1. National and regional television broadcast (France 3, in France): Web.
2. Article dans le monde "Une nouvelle façon de prédire les événements météo extrêmes" Web. ou version papier Web. ou version papier journal complet : Web.
3. France culture, la méthode scientifique, le journal des sciences (de 7min43s à 9min52s et de 13min34s et à 15min15s) Web.
4. Article dans "Les Echos" Web.
5. Sciences et avenir Web.
6. CNRS, actualités scientifiques de l'Institut de Physique Web.
7. Université de Milan Web.
8. Actu-environnement « Climat : des chercheurs du CNRS améliorent la modélisation des évènements extrêmes » - Actu-environnement du 21/12/2018
9. « Climat : une avancée majeure pour la simulation des évènements extrêmes », www.techno-science.net le 30/12/2017. Web.
10. Local radio broadcast "Essentiel Radio" - 25 minutes radio broadcast, October 10, 2018 Web.
11. Un article publié dans Quanta Magazine sur nos travaux de physique statistique pour expliquer la formation de jets dans l'atmosphère de Jupiter : Web.
12. Un article publié dans Wired.com sur nos travaux de physique statistique pour expliquer la formation de jets dans l'atmosphère de Jupiter : Web.
13. Un article publié dans le journal *Lyon Capitale* sur l'impact futur du changement cliamtique à Lyon et dans sa région : Web., 2021
14. Un article avec France 3 - Web, septembre 2021
15. Article web aux Etats Unis en 2022 New ways for dynamical prediction of extreme heat waves.
16. Article en première page de la revue de la société savante américaine SIAM en 2023.
17. Il y a eu un sujet de 8 minutes sur notre travail sur la radio Suisse RTS vendredi 7 avril 2023.
18. Podcast dans le journal des sciences de France Culture sur notre travail pour prédire les canicules extrêmes, en avril 2023 (3 minutes environ).
19. Sujet vidéo de BFM Lyon sur notre travail sur la prédiction des cancicules extrêmes, en avril 2023.
20. Sujet de quelques minutes sur France info, en avril 2023.
21. Article dans 20Minutes du 24/04/2023 « L'intelligence artificielle est capable de prédire des canicules ».
22. Article dans Futura-Sciences le 04/04/2023 "Les canicules bientôt prédites par l'Intelligence artificielle ?".

23. Article Web dans France 3 Région du 05/04/2023 “Mieux prédire les canicules grâce à l’intelligence artificelle”.
24. Article dans Capital.fr du 06/04: “Canicules : une intelligence artificielle prédit les vagues de chaleur un mois avant leur arrivée”.
25. Article dans La Tribune de Lyon du 11/04/2023: “Une intelligence artificielle pour mieux prévoir les canicules”.
26. Intervention d’une heure avec deux autres invités sur France Culture dans l”émission ‘Le meilleur des mondes’ , du 22 Septembre 2023

6 Posters

1. Euler 2007.
2. KITP Conference: Frontiers of Climate Science, May 2008, Freddy Bouchet, *Equilibrium and Out of Equilibrium Statistical Mechanics of two-dimensional and geophysical flows*
3. Caltech-Pasadena, CA, Conference “Ocean-Atmosphere Energy Transport”, November 5-7 2010, F. Bouchet, A. Venaille et M. Corvellec: *Ocean Jets and Vortices as Statistical Equilibria*
4. Caltech-Pasadena, CA, Conference “Ocean-Atmosphere Energy Transport”, November 5-7 2010, F. Bouchet, E. Simonnet: *Out of equilibrium phase transitions for the large scales of two-dimensional and geostrophic turbulence*
5. Conference “Ocean Science Meeting”, Portland, OR, USA, March 2010, F. Bouchet, A. Venaille et M. Corvellec: *Ocean Jets and Vortices as Statistical Equilibria*
6. Conference “Ocean Science Meeting”, Portland, OR, USA, March 2010, B. Nadiga and F. Bouchet, *Large eddy simulation: about the equivalence between the LANS alpha model and the “Rational model” in dimension two.*
7. American Geophysical Union meeting, 12-17 December 2010, San Francisco, USA, Nonlinear geophysics session, 2 posters
8. M. Potters and F. Bouchet, EGU2012-12867 Statistical Mechanics of the Shallow Water and Primitive Equations
9. F. Ragone and F. Bouchet, EGU2017
   I guess a dozen of posters escaped this list.

7 Student direction, teaching, and organization of schools, conferences and workshops

7.1 Master Student direction

1. ***Nicolas Sauvage,*** ENS-Lyon, Master thesis, 04/2005-06/2005.
2. ***Renaud Pochet***, ENS-Lyon, License (L3) thesis, 06/2007-07/2007.
3. ***Supervision of 3 students of License*** (L3) of Nice university. 01/2007-04/2007.
4. ***Max Potters,*** **Master student M2,** Utrecht university, One year internship, 01/2011-01/2012.
5. ***Timothée Vaillant,*** **M2 internship, student from ENS-Lyon,** 4 months (April-July 2011).
6. ***Adrien Licari,*** **M2 internship, student from ENS-Lyon,** 4 months (April-July 2012).

7. ***Tomas Tangarife,* M2 internship, student from ENS-Lyon**, 4 months (April-July 2012).

8. ***Antoine Renaud,* Master internship, student form ENS-Cachan,** 1 year (2013-2014).

9. ***Eric Woillez,* Master 2 internship, student from ENS,** 4 months (April 2014-July 2014).

10. ***Thibault Lestang,* Master 2 internship, student from Orsay,** 5 months (February 2015-July 2015).

11. ***Valerian Jacques Dumas,* Master 2 internship, student from ENS de Lyon, Master systèmes complexes,** 6 months (February 2020-July 2020). Coencadrement avec Patrice Abry et Pierre Borgnat.

12. ***Bastien Cozian,* Master 2 internship, student from "Mines de Saint-Etienne", master de physique de l'ENS de Lyon**, 4 months (April 2020-July 2020). Encadré avec l'aide de Francesco Ragone (Post-doc).

13. ***Philippine Rouby-Poizat,* Master 1 internship, student from ENS de Lyon**, 3 months (May 2020-July 2020).

14. ***Pierre Piovesan,* Licence 3 internship, student from ENS de Lyon**, 2 months (June 2020-July 2020).

7.2 PhD student direction

1. ***Antoine Venaille,*** student at ENS-Lyon, **PhD**, co-directed by J. Sommeria (LEGI-Grenoble) and myself (Statistical mechanics of the Quasi Geostrophic model). 09/2005-10/2008. PhD manuscript.

2. ***Marianne Corvellec,*** student at ENS-Lyon, made a **PhD** under my supervision, in September 2008. Title: "Phase transitions in two-dimensional and geophysical turbulence. 09/2008-12/2011". She defended her thesis on January, 10th, 2012. PhD manuscript.

3. ***Tomas Tangarife,* PhD thesis**, ENS-Lyon, student at ENS-Lyon, September 2012-September 2015. Title: "Kinetic theory and large deviations for stochastic jets", defended on Nov., 16, 2015. PhD manuscript.

4. ***Yuki Yasuda,*** 3 month visit in ENS-Lyon (October 2014-December 2014)**, PhD student at The University of Tokyo, supervised by Kaoru Sato.**

5. ***Antoine Renaud,* PhD student codirection with Antoine Venaille, grant from ENS-Cachan, in the framework of ERC TRANSITION - The main adviser was Antoine Venaille** - (2015-2018). Title: "On wave-mean flow interactions in stratified fluids", defended on Oct., 10, 2018. PhD manuscript

6. ***Eric Woillez,* PhD student, grant from ENS-Paris, in the framework of ERC TRANSITION** (2015-2018). Title: "Stochastic description of rare events for complex dynamics in the Solar System", defended on Sep., 21, 2018. PhD manuscript.

7. ***Thibault Lestang,* PhD student, codirection with Emmanuel Levêque, funded by ERC TRANSITION** (2015-2018). Title: "Numerical simulation and rare events algorithms for the study of extreme fluctuations of the drag force acting on an obstacle immersed in a turbulent flow", defended on Sep., 25, 2018. PhD manuscript.

8. ***Dario Lucente,* PhD student, ACADEMICS project (coming from Master thesis in Roma, Italy).** (October 2018-November 2021) Title: "Predicting probabilities of climate extremes from observations and dynamics", PhD manuscript..

9. ***Ouassim Feliachi,* PhD student, codirection with Julien Barré,** (2020-2023). Title: "From Particles to Fluids: A Large Deviation Theory Approach to Kinetic and Hydrodynamical Limits", defended on Jul., 7, 2023, PhD manuscript..

10. ***Bastien Cozian,* PhD student, (coming from Mines de Saint-Etienne and master from ENS de Lyon),** "Extremes of renewable energy and their climate precursors using climate models and rare event algorithms", (October 2020-November 2023).

11. ***Valeria Mascolo,* PhD student, (coming from King's College, London),** "Computing climate extreme events using machine learning and rare events algorithms: application for heat waves and storms", within the EDIPI ITN project, (May 2021-???).

12. ***Alessandro Lovo,* PhD student, (coming from Padova university),** "Studying abrupt climate changes using machine learning and rare events algorithms", within the Critical Earth ITN project, (October 2021-???).

13. ***Brice Douet,* PhD student, (coming from Polytechnique),** "Dynamical large deviations for kinetic theories and applications to geophysical turbulent flows", (September 2022-???).

14. ***Amaury Lancelin,* PhD student, (coming from Polytechnique),** "Study of extremes events for residual loads on the electricity grid, using machine learning approaches and rare event simulations", Thèse CIFRE avec RTE, (September 2023-???).

7.3 Post-doc direction

1. ***Hidetoshi Morita,* Post-doc, ANR-STATFLOW,** 2D Stochastic Navier Stokes equation, 11/2007-08/2009

2. ***Jason Laurie,* Post-doc, ANR-STATOCEAN,** Large deviation and rare events in non-equilibrium statistical mechanics of turbulent flows, 10/2010-09/2012. Jason Laurie worked on devising a new numerical algorithm in order to numerically compute instantons and large deviations for 2D and geophysical turbulence. We also obtained theoretical results related to instanton theory and the computations of rare events in 2D turbulence. Our work on this subject is the first of this kind. I believe it will have a large impact in turbulence and the dynamics of atmosphere and oceans. This work has led to two refereed publications, several proceedings, and will lead to a third publication in preparation.
He is now, from October 2012, post-doc in the Weizmann institute, working with G. Falkovich.

3. ***Mani Mathur,* Post-doc, ANR-STATOCEAN,** Bistability in rotating tank experiments, 10/2011-09/2012, directed together with by J. Sommeria. Following the project STATOCEAN program,

M. Mathur developed an experiment in order to study bistability in rotating tank experiments. He actually observed bistable turbulent flows, and obtained very interesting data that are still analyzed currently. His work will lead to two publications.
J. Sommeria was the main supervisor. I contributed to the theoretical analysis.
M. Mathur got an fixed academic position in India starting in November 2012.

4. ***Cesare Nardini,*** **Post-doc, ANR-STOSYMAP,** one year, (March 2013-June 2014). Subject : "Computation of non-equilibrium free energy in systems with mean field interaction". This post-doc was supervised by K. Gawedzki and myself. Cesare has participated to the redaction of a paper on atmosphere jets that has been published. About the project related to computation of non-equilibrium free energies, two papers are been written currently.
Cesare Nardini got a new post-doc position to work with Martin Evans and Mike Cates at Edinburgh university.

5. ***Jeroen Wouters,*** **Post-doc, AXA Research grant,** 1 year (March 2014-March 2015). Subject: *"Large deviation analysis of the dynamics of extreme heat waves in present and future climates"*. I am supervising this post-doc position, funded through an AXA grant. The scientific aim is to use algorithms (adaptive multilevel splitting, interacting particle algorithms), aimed at computing rare events and initially developed in statistical mechanics, in order to sample efficiently the statistics of rare events in models of the Earth atmosphere. We focus on the probability to observe extreme heat waves.

6. *Francesco Ragone*, **Post-doc, AXA Research grant,** 1 year (June 2015-May 2016), Subject: *"Large deviation analysis of the dynamics of extreme heat waves in present and future climates"*. I am supervising this post-doc position, funded through an AXA grant. The scientific aim is to use algorithms (adaptive multilevel splitting, interacting particle algorithms), aimed at computing rare events and initially developed in statistical mechanics, in order to sample efficiently the statistics of rare events in models of the Earth atmosphere. We focus on the probability to observe extreme heat waves.

7. ***Julien Reygner,*** **Post-doc, ERC TRANSITION,** 1 year (September 2014-August 2015). Subject: "Large deviations beyond the Freidlin–Wentzell results". Funded through the ERC project TRANSITION. Julien Reygner, former student of Ecole Polytechnique, is a mathematician (PhD directed by Benjamin Jourdain and Lorenzo Zambotti). We work together on several theoretical problems related to the computation of Large deviations results beyond the Freidlin–Wentzell types of results (prefactor computations, large deviations for two time scale problems, ...). The project just began in September 2013. We are writing a paper about the computation of prefactors for the computation of the stationary PDF in dynamical systems in the Freidlin–Wentzell regime.

8. ***Takahiro Nemoto,*** **Post-doc, ERC TRANSITION,** 8 months (March 2015 - October 2015).

9. ***Corentin Herbert,*** **Post-doc, ERC TRANSITION,** (January 2016-September 2017).

10. ***Federico Mogavero,*** **Post-doc, ERC TRANSITION,** (October 2017-September 2018).

11. ***Francesco Ragone,*** **Post-doc, ERC TRANSITION,** (June 2018-August 2020).

12. ***Joran Rolland,*** **ATER ENS de Lyon,** (September 2018-August 2020).

13. ***George Miloshevich,* Post-doc, projet IDEX ACADEMICS,** (May 2020-May 2022).

14. ***Malo Tarpin,* Post-doc, within the Simons fundation project** "Turbulence and statistical mechanics", (June 2020-May 2022).

15. ***Jules Guioth,* Post-doc, within the Simons fundation project** "Wave turbulence", (January 2021-December 2022).

16. ***Clément Le Priol,* Post-doc, within the ANR project** "Samprace", (September 2021-August 2024).

7.4 Member of PHD or HDR committees

7.4.1 PHD committees

1. Joran Roland (Paul Maneville), Ecole Polytechnique, Palaiseau, France, PHD, 2012, **rapporteur**.

2. Simon Thalabard (Bérengère Dubrulle), CEA Saclay, France, PHD, 2013.

3. Nguyen Thu Lam (Jorge Kurchan), ESPCI, Paris, France, PHD, 2013.

4. Tanguy Laffargue (Frédéric van Wijland), LMSC, Paris, France, PHD, January 2015, **rapporteur**.

5. Navid Constantinou (Petros Ioannou), Athen university, Greece, PHD, February 2015, **rapporteur**.

6. Maxime Champion (Angel Alastuey), ENS-Lyon, PHD, June 2015, **president.**

7. Hadrien Vroylandt (Gatien Verley), Laboratoire de Physique Théorique, Université Paris Sud, September 2018.

8. Aurore Dupré (Philippe Drobinski), LMD, Ecole Polytechnique, January 2020.

9. Pierre Marie Boulvard (Sergei Kuksin), Université de Paris, May 2021.

10. Adrian Van Kan (Alexandros Alexakis), ENS, Paris, September 2021.

11. Daphné Lemasquerier (Michael Le Bars et Benjamin Favier), IRPHE, Université d'Aix Marseille, October 2021, **president**.

12. Nam Hoang Hoai (Jacques Laskar), Observatoire de Paris, Université PSL, January 2023, **president.**

I am quite sure this list is not complete.

7.4.2 HDR committees

1. Basile Gallet, CEA Saclay, France, 2023, **rapporteur**.

7.5 Teaching

I am "agrégé de mathématiques", a competitive examination that allow one to teach in High Schools and up to the undergraduate level in French "classes préparatoires" or in French universities.

During my military service I have been teacher in a French high school in Italy for 2 years.

I have been "moniteur" during my PhD thesis (3 y., 60 h./y.), the first year in mathematics and the two next years in physics and "Agrégé Préparateur" at ENS-Lyon during one year (192 h./year, mainly in License and for students preparing "Agrégation").

I have also participated to the Master of physics (M2) of ENS-Lyon (TD in "nonlinear dynamics", during 2 years).

Basically I have taught mathematics in all classes, with only few exceptions, from "5^{eme}(12 years old students)" to the third year of License at university", and physics from "première (16 years old students)" to the Master degree.

This next list concerns only my most recent teaching, basically from 2005.

1. **Examiner for ENS's applications** - "Oral physique, section PC" 2005-2006-2007-2008-2009-2010-2011. 40 h. per year.

2. **Examiner for ENS's applications** - "TIPE, section PC" 2006. 20h.

3. **Examiner for ENS's applications** - "Ecrit physique - Composition d'un énoncé + corrections" 2007

4. Préparation à l'agrégation de physique ENS-Lyon - Composition d'un sujet de concours + correction. December 2007, January 2008. 30 h.

5. Master M1 Nice. Out of equilibrium statistical physics. 2007-2008. 30 h.

6. Lecture, "Hydrodynamics and turbulence", Master M2 Sciences de la Matière of ENS-Lyon-UCB Lyon, 17 h., 2010-2011, 2011-2012, 2012-2013 and 2013-2014

7. **Examiner for Ecole Polytechnique applications** - "Ecrit physique - corrections" 2011, 2012, 2013, 2014.

8. Lecture in the framework of "Cours alterdisciplinaires", at ENS-Lyon, "Quatre problématiques de la physique contemporaine", 24h., 2011-2012, and 20h. in 2012-2013, 2013-2014, 2014-2015, and 2015-2016.

9. Lecture "Large deviation in physics", Master M2 Sciences de la Matière of ENS-Lyon-UCB Lyon, 18 h., 2016-2017, 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022.

10. Lecture "Changement climatique et transition énergétique", Cycle Anthropocène, ENS de Lyon, 2 h., 2019.

11. Lecture "Changement climatique, impact du changement climatique, transition énergétique", UE environnement pour les élèves de L3 de l'ENS de Lyon -toutes disciplines, 4h. + 12h de tutorat, 2019, 2020, 2021, 2022.

12. Lecture **"Changement climatique, impact du changement climatique, transition énergétique",** cours de découverte du M1 sciences de la matière, ENS de Lyon, 24 heures, 2020, 2022, 2023. Cours totalement nouveau, en particulier son volet transition énergétique, qui n'a pas d'équivalent dans le système universitaire français ou à l'étranger, et qui m'a demandé beaucoup de travail.

13. Lecture within the program **"Enjeux écologiques du XXIème siècle"**, coordinated by Ivar Ekeland, at Université Paris Dauphine. 4h. of lectures in January 2022 and 4h. in 2023, **"Nouveaux enseignements du rapport du GIEC AR6-WGI de 2021 et discussion des incertitudes",** to an audience of Licence mathematics students.

14. Since October 2022, I occupy a position of "professeur attaché" at l'ENS/PS," where I teach each year **about 100 to 110 hours "equivalent TD"**. The aim of my position is to cover the interdisciplinarity, between climate science and transition sciences on one hand, and mathematics, theoretical physics and computer sciences on the other hand. Since 2022, I give each year a course on **"Physics of climate" for Master 1 physics student at ICFP (ENS/PSL)** (16 hours of lectures + 16 hours of tutorials I prepared). Since 2023, I give each year **a 30-hour course on "The energy transition"** with about 60 students coming from the full spectrum of disciplines in ENS/PSL from physics and geosciences up to social sciences and humanities. The aim of this course is to provide the scientific basis and the order of magnitudes which are key to understand the basis of the current possible scenario for the energy transition at the global, European or national scale. This course is given within CERES and the geoscience department at ENS/PSL. Since 2023, I teach an introduction to the energy transition to all students of ENS/PSL at the Licence 3 level (4 hours of lectures). Together with Basile Gallet, we share a course on **the theoretical and mathematical aspects of climate dynamics, for the master "Modélisation mathématique et Physique macroscopique" de l'ENS/PSL,** to mathematicians and physicists (for me: 8 hours of lectures and 4 hours of tutorials each year). Together with Jean Louis Dufresne and Christophe Cassou, we share **an introductory course on "Physics of climate", at the L3 level, for geoscientists of ENS/PSL** (for me 6 hours of lectures each year). I share with Gianluca Meneghello a course on **"Geophysical Fluid Dynamics" at the Master 1 level**, in the geoscience Master of ENS/PSL (for me 10 hours of lectures each year).

15. With several colleagues of ENS/PSL in Paris and Dauphine/PSL, we are building and designing a new Master program Science de la Durabilité, for PSL university aim at teaching the sciences of ecology and energy transition. It is aimed at teaching the sciences of ecology and energy transition (durability sciences). The project is led by Corinne Robert and Amaury Lambert. I am part of the teaching staff (équipe pédagogique). I am actively participating at designing the curriculum (maquette pédagogique).

7.6 Conference and school organization

1. From 2005 to 2009, I organized ***(with J. Bec and F. Gallaire)*** the **"Rencontres niçoises de mécanique des fluides"** . Half day meeting, for fluid mechanician of the Nice area (INLN, Observatoire (OCA), Lab. Dieudonné (mathematics), LPMC, CEMEF). Monthly. ***Web.***

2. **Meeting « Physical Oceanography »**, May 2007, in Nice. Workshop on theoretical problems related to ocean dynamics. 30 participants.

3. From 2007 to 2009 (3 editions), **I was the organizer** of a thematic school on **nonlinear dynamics and statistical physics : "Aux Rencontres de Peyresq".** Yearly, one week long school with 30 participants. Scientific committee: Y. Pomeau, E. Perez, P. Glorieux, P. Coullet, P. Clavin. ***Web.***

4. **I was the main organizer,** together with J. Bec and D. Vincenzi, an **international conference TURBULENCE AND STATISTICAL MECHANICS,** held in **"Les Houches, France, 2-6 March 2009"**. Scientific program : fundamental problems in turbulence with an emphasis on its relations with statistical mechanics. Scientific committee: *E. Bodenschatz, G. Falkovich, U. Frisch, S. Kuksin, S. Nazarenko, R. Pandit, G. Parisi, J.-F.Pinton, I. Procaccia, A. Pumir and A. Vulpiani.* Organizing committee: J. Bec, F. Bouchet, F. Gallaire, E. Simonnet, D. Vincenzi. ***Web.***

5. Workshop "Computation of rare events" in ENS-Lyon. June 2011. (One day meeting with 25 participants mainly from French laboratories)

6. **I was the main organizer of the international conference "Computation of transition trajectories and rare events in non-equilibrium systems"** that was held from June 11, 2012 to June 15, 2012 at ENS-Lyon, France. 80 participants. ***Web.***
   The participants and speakers include: Chandler D., Del Moral P., Derrida B., Gawedzki K., Kurchan J., Schütte C., Van den Eijnden E., Allen R., Bolhuis P., Ciliberto S., Evans M., Falkovich G., Grassberger P., Janke W., Maes C., Mukamel D., Petrelis F., Pinton J.F., Sander L., Seifert U., Tailleur J., Van Wijland F., Vergassola M., ten Wolde P.R., Zaboronski O., Zuckerman D.

7. Co-organizer of the workshop « Equilibrium and out-of-equilibrium properties of systems with long-range interactions » August 27-31, 2012 – Centre Blaise Pascal – ENS de Lyon, France. An international audience of 50 participants. The main organizer was S. Ruffo.

8. Main organizer, with A. Venaille, of the three day international workshop **Numerical modeling and theoretical challenges in atmosphere and ocean turbulence**, held at ENS-Lyon in October 2013. Web.

9. Main organizer, with F. Ait Chaalal, of the international conference **Theoretical Advances in Planetary Flows and Climate Dynamics**, held at the Physics School of Les Houches, March 2-6, 2015. Web.

10. Organizer of a 4 day international workshop ***« Statistical mechanics and computation of large deviation rate functions",*** held at ENS-Lyon in June 2015. Web.

11. Co-organizer with Tony Lelièvre, of a 2 day workshop ***"Adaptive Multilevel Splitting et événements rares",*** held at Ecole des Ponts ParisTech, Champs-sur-Marne, Paris, on June 28-29 2016. Web.

12. Co-organizer with Colm Connaughton, Ira Didenkulova, and Alexandra Tzella, of a 5 day international symposium ***" Extreme events in the Earth and planetary sciences ",*** held at the mathematics department of the university of Warwick, 04 - 08 July 2016. Web.

13. Main organizer with Tapio Schneider and Antoine Venaille, of a one month summer school ***" Fundamental aspects of turbulent flows in climate dynamics "***, held at the Physics school of Les Houches, France, July 31-August 25 2017. Web. This school gathered the best specialist worldwide to give lectures, and 55 international participants.

14. Organizer with Jean Michel Maillet, Marco Mazzuchelli et Andrien Kassel, of the workshop ***"ENS de Lyon meets SISSA"***, held at Lyon, France December 5-6, 2017, 45 participants. Web.

15. Co-organizer with Giovanni Gallavotti, Andrea Gambassi, Valerio Lucarini, Matteo Marsili and Stefano Ruffo, of the workshop ***"Nonequilibrium Systems in Physics, Geosciences, and Life Sciences"*** held at the Abdus Salam ICTP in Trieste, from May 15th to May 24th, 2018 Web.

16. Co-organizer, with Henk Dijkstra, of one workshop, within the European projet ITN Critical-Earth : **"Machine Learning and the Physics of Climate, and Extreme Events in Weather and Climate"**, April 25-29 2022, Utrecht (about 60 participants).

17. I was the main organizer, with the other members of the GDR organizing committee, of the meeting **"Journées de lancement du GDR Défis théoriques pour les sciences du climat",** June 15-19 2022, Paris, (about 110 in person and 50 online participants) Web.

18. I was the main organizer, with Anne-Laure Fougères, Corentin Hebert, Laure Saint-Raymond and Antoine Venaille, of **a school on the concept of "Climate sensitivity"** (September 19-21 2022). The school presented four educational courses aimed at scientists, both novices and specialists in climate dynamics. The concept of climate sensitivity is fundamental to the study of climate change and its impacts. It is also an ideal subject for a general overview of the climate sciences and their scientific interest. This school was organized by the **GDR Défis théorique pour les sciences du climat**, in collaboration with the **Institut des Mathématiques pour la Planète Terre (IMPT)** and was part of a "Mathematics and Theoretical Physics" thematic semester funded by LABEX MILYON. The school was followed by **a two-day workshop** dedicated to mathematics and theoretical physics in climate science, from September 21 to 23, 2022. (about 120 in person and 60 online participants) **Hyperlien website.**

19. I was an organizer, together with Ronan Fablet (main organizer) of **Workshop on Artificial Intelligence for Ocean, Atmosphere and Climate Dynamics**. This workshop was organized within the framework of the GDR "Theoretical Challenges for Climate" and the LEFE/MANU program, with the aim of reviewing and discussing advances and challenges in AI/learning-based frameworks for ocean-atmosphere-climate sciences. Globally, the availability of large amounts of simulation and observational data and the emergence of artificial intelligence technologies (big data architectures, GPUs, prolific learning) are opening up new opportunities to explore open questions in ocean, atmospheric and climate sciences through a data-driven paradigm, rather than a "classical" physical paradigm. One of the central scientific challenges lies precisely in the ability to unify these two paradigms. The workshop brought together experts in applied mathematics, AI and geosciences to explore, review, discuss and advance these challenges. **Website**.

20. I was the main organizer, with the other members of the GDR organizing committee, of the **2023 annual meeting GDR Défis théoriques pour les sciences du climat",** June 5-7 2023, IHP Paris, (about 130 in person and 45 online participants) Website.

21. I was the main organizer, with Sophie Godin Beekmann, Freddy Bouchet, Davide Faranda, Corentin Herbert, Guillaume Lapeyre, Juliette Mignot, and Gilles Pinay, of a double workshop: **Predictability in atmospheric sciences and Tipping points.** Two joint symposia on predictability issues in atmospheric, oceanic and climate sciences (October 2 to 3, 2023), on the one hand, and on the science of tipping points (October 4 to 6, 2023), on the other, were organized at the Institut Henri Poincaré, Paris. For further information and to register, please visit the **Website.** These workshops were organized within the framework of the **GDR Défis théorique pour les sciences du climat**, and co-funded by the MITI of CNRS.

8 Collective responsibilities and research management

8.1 Grants

1. Fellow of a **grant "Lavoisier"** (french government - post-doc in Florence), of a **Marie Curie RTN post-doc** (Rome). I have been Agrégé préparateur (ENS-Lyon).

2. **Leader** of the **ANR-JC project STATFLOW**, funded in 2006 (2006-2009). (ANR is the french research agency, similar to the NSF in the USA). Scientific project: Out of equilibrium statistical mechanics (kinetic theory) for 2D turbulence and application of equilibrium statistical mechanics to ocean flows. We study the statistics of the large scale turbulence, for two dimensional or simple geophysical models. The participants are a specialist of the *numerical stability of 2-D and 3-D flows* (F. Gallaire, sec. CNRS no 10), by a *mathematician of geophysical flows and kinetic theory* (F. Rousset, sec. 01) and a specialist of the low frequency variability of *ocean dynamics* (E. Simonnet, sec. 19) and myself (sec. 02), physicist of the *statistical mechanics of geophysical flows*. Financement de 120 000 euros par l'ANR.

3. Grants for funding "Aux Rencontres de Peyresq" (twice), several fundings for the "Rencontres Niçoises de mécanique des fluides" (see above). The conference "Turbulence and Statistical Mechanics" in Les Houches is already partly funded thanks to several funding.

4. Member of **ANR project INTERLOPE**, led by J. Barré, from Lab. Dieudonné, in Nice. Program "Jeune Chercheur". Scientific project: long range interactions and cold atoms.
Web

5. **Leader** of the **ANR project STATOCEAN:** "Out of equilibrium statistical mechanics of geophysical flows and applications to the Kuroshio current (east of Japan) and to the Zapiola anticyclone (east of Argentina)". Program SYSCOMM, funded in 2009 (2009-2012). (ANR is the french research agency, similar to the NSF in the USA). Scientific project: Non equilibrium statistical mechanics (computation or rare events and transition probabilities using instanton theory) for 2D turbulence and study of bistability in ocean flows (Kuroshio current) and experiments. This project involves three laboratories: ENS-Lyon (F. Bouchet), LEGI Coriolis - Grenoble (J. Sommeria), and LPO (Laboratoire de la Physique des Oceans) - Brest (X. Carton), pour un financement de 320 000 euros par l'ANR.
Web

6. Member of **ANR project STOSYMAP**: "STOCHASTIC SYSTEMS IN MATHEMATICS AND MATHEMATICAL PHYSICS", led by the mathematicians A. Shirykyan (Université de

Cergy), and S. Kuksin (Ecole Polytechnique). Other participants include A. Debouard, A. Debusche, E. Gautier, K. Gawedzki, Y. Le Jan. Scientific project: Invariant measures of stochastic partial differential equations, with an emphasis on the 2D Navier-Stokes equations.
Web

7. **AXA grant - Jeroen Wouters (March 2014-March 2015) followed by Francesco Ragone (May 2015-April 2016).** This AXA grant has funded two years of post-doc for the research project *"Large deviation analysis of the dynamics of extreme heat waves in present and future climates"*

8. **ERC consolidator grant TRANSITION**: Large Deviations and Non Equilibrium Phase Transitions for Turbulent Flows, Climate, and the Solar System. March 2014 - February 2019. $1,200,000$ euros.

9. **I was one of the 5 PIs of the multisite** IDEX Grant ACADEMICS **(Université de Lyon) 2018-2021. 1,200,000 euros for 5 PI. Subject: Several aspects of machine learning, including applications to climate dynamics.**

10. I am one of the 9 PIs of a grant from the SIMONS foundation. Title: "Revisiting the turbulence problem using statistical mechanics: Large deviations, anomalies and cascades". **2,000,000 dollars for 9 PIs.** 2019-2023.

11. I am part of a grant from the SIMONS foundation. "Simons collaboration on wave turbulence", 2019-2023.

12. I am one of the PIs of the **European ITN project CriticalEarth** (H2020-MSCA-ITN-2020). Title: "Multiscale and Critical Transitions in the Earth System". The aim is to work on possible abrupt transitions for the Earth climate. This project funds one PhD at ENS de Lyon, 2021-2024

13. I am one of the PIs of the **European ITN project EDIPI** (H2020-MSCA-ITN-2020). Title: "European weather Extremes: DrIvers, Predictability and Impacts". The aim is to improve the prediction of climate extremes and of their probabilities. This project funds one PhD at ENS de Lyon.

14. I am **one of the two PIs** of the ANR grant SAMPling RAre Climate Events (SAMPRACE). 2020-2024. This projects funds, among others, a 2-year post-doc position at ENS de Lyon.

15. I am the PI of a project **"New computational and mathematical tools to study extremes of electricity demand and renewable production"**, in collaboration with RTE, funded by IMPT (Institut de Maths pour la Planète Terre). This projects funds 18 months of post-doc. 2022-2025.

16. I am leading the **framework agreement between IPSL and RTE: Project for a pluriannual collaboration on scenarios for future electricity mix.** This project involve about 15 researchers from IPSL which collaborate with the R/D team at RTE dealing with climate/energy relation, the resilience of the electricity system, and integration of renewable energy in future scenarios. 650 000 €, 2023-2028.

17. I am **one of the 20 PIs** of the European **HORIZON_RIA Grant ClimTip,** HORIZON-CL5-2023-D1-01-02, 2024-2028, dedicated to the study of climate tipping points and to the development of new methodologies for futur studies of tipping points. This project gathers 20 European partners to work on this subject. Total budget 10 M€, ENS/PSL budget: 241 k€.

18. I am one of the two leaders of the grant **Climaths**, part of the **PEPR MathsVives**, funded in 2023. The project Climaths (2024-2029) gathers about 15 researchers to work on key problems for the relation between mathematics, theoretical physics, and climate sciences. Budget 1M€, ENS/PSL budget: 145 k€.

8.2 Collective responsibilities

1. I was a member of INLN lab council until I left INLN in 2009.

2. I was member of the scientific committee of GDR Phenix from 2007 until 2009.

3. I am editor of ***JSTAT, theory and experiment,*** since 2014.

4. **I was member of the "Comité national du CNRS" from September 2016 until June 2019**

5. I was member of the COPIL of the labex IMUST, in Lyon, since February 2017 and until February 2018.

6. I was member of the "Conseil du laboratoire" de l'ENS de Lyon since 2015 and until 2020.

7. I was member of the executive committee (COMEX) of the Labex MI-Lyon, in Lyon, since June 2018 and until 2021.

8. I was elected member of the "Conseil d'administration" de l'Institut Henri Poincaré, in Paris, since September 2019 and until 2023.

9. I am member of the scientific committee of the program LEFE-MANU, aimed at gathering applied mathematicians and computer scientists for geophysical fluid dynamics and climate, since 2021.

10. **I am member of the bureau and of the scientific committee of the Institut des Mathématiques pour la Planète Terre (IMPT),** aimed at making links between mathematicians and people from any other scientific fields, for developing Earth and environment related researches; since the creation in 2020-2021.

11. I am member of the scientific committee of "L'école de physique des Houches", since 2020.

12. GDR "Défis théorique pour les sciences du climat". I have coordinated the construction of the Groupement De Recherche (GDR) "Défis théoriques pour les sciences du climat" in 2020-2021, and I am coordinating it since its official start in January 2022. This GDR "Theoretical Challenges for Climate Sciences", gathers the French community of theoreticians: physicists, climatologists, oceanographers, atmospheric scientists, mathematicians, computer scientists, numerical scientists, machine learners, who work on climate sciences. Its aim is to develop innovative theoretical and numerical tools to overcome current scientific gaps. Approaches in statistical physics, turbulence modeling, mathematics and machine learning will help to deepen

the understanding of fundamental mechanisms, improve models, and better predict extreme climate events to reduce uncertainties about the impacts of climate changes. This GDR has a strong interdisciplinary vocation and involves researchers from several CNRS institutes, many other French scientific organizations, and private companies.

13. I created the worldwide colloquium One World Mathematics of Climate. It is is an online platform which aims at gathering the best scientists from all over the world on the subject of mathematics, theoretical physics and statistical mechanics for modeling and understanding climate.

8.3 Panel and committee member

1. I was member of the "commission de spécialistes", section 29, of Nice university in 2008.
2. Panel member for the review and evaluation of the program ***Mathematics of the planet Earth*** of **NWO (Netherland funding agency)**, 2015.
3. Panel member for VQR (Valutazione Qualita Ricerca) aimed at evaluating public research in Italy, 2016, 2017.
4. Project evaluations for BELSPO, the Belgium research agency, 2016.
5. I wrote several promotion reports for USA and GB universities.
6. I was member of a CNRS "mission pour l'interdisciplinarité" committee for the AMI OASIC grant in May 2017.
7. I was evaluator for the grants "Make Our Planet Great Again" in 2017 and 2018.
8. I have been reviewer for about 10 ANR projects (2 in 2019).
9. Member of the selection committee for the position 26PR0565, for the Camille Jordan institute, UJM, Saint Etienne, in May 2018.
10. I evaluated one project CNRS-Momentum 2018
11. I evaluated two projects for INSU (AO project and another one) in 2018.
12. Member of the HCERES evaluation committee of IPhT in CEA-Saclay, January 2019
13. I am evaluator for the H2020 MSCA ITN program since 2020 (mathematics panel).
14. I am evaluator for the H2020 MSCA IF program since 2020 (geophysics panel).
15. I evaluated one project of the Alexander Von Humbolt foundation in Germany in 2020.
16. I was external member of a team-project at INRIA in 2020.
17. In spring 2020, at the request of the Institut de Physique at CNRS, I made a survey and wrote a 25 pages document called "Recensement des forces et des structures dans les domaines de la physique et de la dynamique du climat, au sein de l'Institut de Physique du CNRS. Prospective et propositions pour l'INP.", with a prospective analysis for CNRS and beyond CNRS.

18. I evaluated one project, that aimed at funding research teams for the next five years, for a total amount of 10 M€, for NWO (Netherland's funding agency), 2021.

19. Member of the HCERES evaluation committee of MSC at Université Paris-Cité, November 2023.

20. I am referee for the most important reviews in my field, including Phys. Rev. Lett. Phys. Rev. E, J. Stat Phys., EPJB, EPL, Physica D and J. Fluid. Mech. I refer about eight to ten articles a year.

This list is surely quite incomplete.

9 Past mobility and collaborations

9.1 Laboratory change

I have been post-doc in Roma (with A. Vulpiani), from January 2003 to august 2003, agrégé préparateur in ENS-Lyon from September 2003 to September 2004. My CNRS position began in November 2004. I stayed in ENS-Lyon for a one year period, in order to finish some ongoing research with T. Dauxois. I worked in INLN, in Nice, from November 2005 until July 2009. I passed a one year sabbatical in CNLS-Los Alamos-USA, between August 2009 and July 2010. Since August 2010 I am member of "Laboratoire de physique" in ENS-Lyon.

9.2 Mobility at ENS Paris

Since the beginning of my scientific career, I develop multidisciplinary and transdisciplinary sciences between mathematics, physics, and geosciences (climate, atmosphere, and ocean dynamics). ENS de Lyon has been a very nice institution to develop this science, where I collaborated with colleagues in physics, mathematics, astrophysics, and geophysics. I have created a small climate and statistical physics group there at the Laboratoire de Physique. However, I feel the need to be closer to the climate and atmosphere science community in France, located mainly in Paris area. I have multiple motivations: for my theoretical science to have larger impact on applications in climate, to have a richer potential for collaborations with the atmosphere, climate, and energy scientific communities, to respond to the demand of students in physics and mathematics at ENS for multidisciplinary sciences related to the climate problems and contemporary environmental issues, and to be at the same time in an environment favorable to interactions in theoretical physics, statistical physics, mathematics and machine learning.

ENS in Paris, its geophysics, physics, and mathematics departments, the Laboratoire de Météorologie Dynamique (LMD) at ENS in Paris (a lab which is part of IPSL: Institut Pierre Simon Laplace, the main federation for climate sciences in France), are ideal institutions for this project. For this reason, I just made a mobility request at CNRS, to join Laboratoire de Météorologie Dynamique at ENS. This CNRS mobility is associated with a position of professor at ENS/PSL (professeur attaché à l'ENS et PSL), within the geophysics department at ENS. The aim of this CNRS mobility and the "professeur attaché" positions is to develop multidisciplinarity between geophysics, physics, mathematics, and computer sciences at ENS. I will teach both in geophysics and physics, and on the long run develop specific teaching programs related to this multidisciplinarity. Both the CNRS

mutation and the "professeur attaché" positions might be effective by October 1st, 2022, subjected to administrative constraints.

9.3 Periods of research abroad

I passed two years in Italy during my post-doc. Since I have a fixed research position in CNRS, I have been visitor of labs. abroad :

1. I have been invited in the *Waseda University, Tokyo, Japan,* as invited professor in the physics department, in the group of K.I. Maeda, in September 2005.

2. I have been invited in the *Weizmann Institute, Rehovot, Israel,* as invited professor in the physics department, in the group of D. Mukamel, in November 2005.

3. I was invited for a one year sabbatical in CNLS-Los Alamos-USA, between August 2009 and July 2010.

4. In 2013, I was a fellow of the "Institute of Advanced Study fellowship" in the mathematics department of Warwick University, Great Britain, for a two month period.

5. I have been invited in the *Courant Institute for Mathematical Sciences, NYU, USA,* as invited professor, in the group of E. Vanden-Eijnden in October 2016 and November 2018.

9.4 Collaborators

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