

# Curriculum Vitae - Salvatore Pascale

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## Profile

I am a climate scientist focused on understanding the impact of climate natural variability and change on the hydroclimate, with a particular emphasis on extreme events (e.g., droughts, extreme precipitation) in monsoonal, mediterranean and semi-arid climates. I am committed to excellence in mentoring, teaching, and science communication.

## Professional Experience

- 2021-present: **Junior Assistant Professor (RTDa)**, Università di Bologna, Dipartimento di Fisica ed Astronomia, Bologna, Italy.
- 2021-present: **Junior Assistant Professor of Climate Dynamics and Change**, BBS Centre for sustainability and climate change, Bologna Business School, Bologna, Italy.
- 2019-2021: **Physical Science Research Scientist**, Stanford University, Stanford, CA, USA.
- 2017-2019: **Associate Research Scientist**, Program in Atmospheric and Oceanic Sciences, Princeton University and NOAA/Geophysical Fluid Dynamics Laboratory, Princeton, NJ, USA.
- 2015-2016: **NOAA Climate & Global Change Postdoctoral Fellow**, California Institute of Technology, Pasadena, CA, USA.
- 2011-2014: **Postdoctoral Fellow**, Meteorologisches Institut, Hamburg Universität, Germany.
- 2007-2011: **Ph.D. Research Associate**, Department of Meteorology, University of Reading, Reading, UK.

## Education

- 29/03/2021: **Abilitazione Scientifica Nazione** per professore di seconda fascia, settore concorsuale 02/C1 (Astronomia, astrofisica, fisica della terra e dei pianeti)
- 12/04/2021: Abilitazione Scientifica Nazione per professore di seconda fascia, settore concorsuale 04/A4 (Geofisica)
- 2007-2011: **Ph.D. in Meteorology**, University of Reading, Reading, UK.  
Thesis title: *Maximum entropy production as a constraint on the climate system*.  
Supervisor: Prof. Jonathan Gregory.

- 2004-2007: **M.Sc. in Theoretical Physics**, 110/110 cum laude, Università degli studi di Napoli “Federico II”, Napoli, Italy.
- 2001-2004: **B.Sc. in Physics**, 110/110 cum laude, Università degli studi di Napoli “Federico II”, Napoli, Italy.

## Honors and Awards

- **World Meteorological Organization/World Weather Research Programme** (2019): awarded full travel support to attend the Workshop on Attribution of Monsoon Rainfall Climate Change, and deliver a keynote speaker seminar. Sun Yat-sen University, Zhuhai, China.
- **NOAA Climate and Global Change Fellowship** (2014-2016). Individual and highly-competitive postdoctoral fellowship. Funding agency: UCAR Visiting Scientist Programs, Boulder CO. Proposal: *Gulf Surges and large-scale waves: representation in global and limited-area models and their implications for the North American Monsoon*. Role: Principal Investigator.
- **The Reading Meteorology International PhD Studentship** (2007-2011). Full support for tuition fees, subsistence, travel and publication costs for postgraduate study in the U.K. Funded by the Department of Meteorology, University of Reading, UK.
- Travel award to the **NCAS Climate Modelling Summer School**, Sept. 2009, Cambridge, UK.

## Publications

Thirty-two peer-reviewed publications, of which thirty papers and two book chapters; [Google Scholar](#) h-index 21.

32. W. R. Boos, **Pascale, S.** (2021), “Mechanical forcing of the North American monsoon by orography”, *Nature*, 599, 611-615.
31. **Pascale, S.**, S.B. Kapnick, T.L. Delworth, H. G. Hidalgo (2021), “Natural variability vs forced signal in the 2015-19 Central American drought”, *Climatic Change*, 168,16, <https://doi.org/10.1007/s10584-021-03228-4>.
30. Zhang H., R. Seager, J. He, H. Diao **S. Pascale** (2021), “Quantifying Atmosphere and Ocean origins of North American Precipitation Variability”, *Climate Dynamics*, 56, 4051-4074.
29. Wang B., M. Biasutti, M. P. Byrne, C. Castro, C.-P. Chang, K. Cook, R. Fu, A. Grimm, K.-J. Ha, H. Hendon, A. Kitoh, R. Krishnan, J.-Y. Lee, J. Li, J. Liu, A. Moise, **S. Pascale**, M. K. Roxy, A. Seth, C.-H. Sui, A. Turner, S. Yang, K.-S. Yun, L. Zhang, T. Zhou (2021), “Monsoon Climate Change Assessment”, *Bulletin of the American Meteorological Society*, 102 (1), E1-E19.

28. **Pascale, S.**, Kapnick S.B., Delworth T.L., Cooke W. F. (2020), "Increasing risk of another Cape Town 'Day Zero' drought in the twenty-first century", *Proceedings of the National Academy of Sciences*, 117 (47), 29495-29503.
27. Stanley T., D. Kirshbaum, **S. Pascale**, S. Kapnick (2020), "Extreme precipitation in the Himalayan landslide hotspot", [book chapter n. 55](#) in *Satellite Precipitation Measurement*, Levizzani, V., Kidd, C., Kirschbaum, D., Kummerow, C., Nakamura, K., Turk, F.J. (Eds.), Springer, 450 pp.
26. Kirshbaum D., S. Kapnick, T. Stanley, **S. Pascale**, (2020) "Changes in extreme precipitation and landslides over High Mountain Asia", *Geophysical Research Letters*, 47, e2019GL085347, DOI: 10.1029/2019GL085347. **Selected press release:** [Stanford University](#) , [NASA](#), [NOAA](#)
25. Delworth T. L., W. F. Cooke, A. A. Adcroft, M. Bushuk, J.-H. Chen, P. Ginoux, R. Gudgel, R. W. Hallberg, L. Harris, M. J. Harrison, N. Johnson, S. B. Kapnick, S.-J. Lin, F. Lu, S. Malyshev, P. C. Milly, H. Murakami, V. Naik, **S. Pascale**, D. Paynter, A. Rosati, M. D. Schwarzkopf, E. Shevliakova, S. Underwood, A. T. Wittenberg, B. Xiang, X. Yang, F. Zeng, H. Zhang, L. Zhang, M. Zhao (2020) "SPEAR - the next generation GFDL modeling system for seasonal to multidecadal prediction and projection", *Journal of Advances in Modeling Earth Systems*, 12, e2019MS001895, DOI: 10.1029/2019MS001895.
24. Johnson N., L. Krishnamurthy, A. Wittenberg, B. Xiang, G.A. Vecchi, S. Kapnick, **S. Pascale** (2020), "The role of sea surface temperature biases on North American precipitation in a high-resolution climate model", *Journal of Climate*, 33, 2427-2447.
23. **Pascale, S.**, L. Carvalho, D. Adams, C. Castro, I. F, A. Cavalcanti (2019), "Current and future variations of the Monsoons of the Americas in a warming climate", *Current Climate Change Reports*, 5, 125-144.
22. **Pascale, S.**, B. Pohl, S.B. Kapnick, H. Zhang (2019), "On the Angola Low interannual variability and its role for modulating ENSO effects in southern Africa", *Journal of Climate*, 32, 4783-4803.
21. Gonzalez-Aleman J. J., **S. Pascale**, J. Gutierrez-Fernandez, H. Murakami, M.A. Gaertner and G.A. Vecchi (2019), "Potential increase in hazard from Mediterranean hurricane activity with global warming", *Geophysical Research Letters*, 46, 1754-1764, doi: 10.1029/2018GL081253. **Press release:** [La Repubblica](#), [la Stampa](#), [AGU blog](#), [Discover Magazine](#), [El Pais](#)
20. **Pascale, S.**, S. Kapnick, S. Bordoni, T. L. Delworth (2018), "The influence of CO<sub>2</sub> forcing on the North American monsoon moisture surges", *Journal of Climate*, 31, 7949-7968.
19. Gualtieri L., S. Camargo, **S. Pascale**, F. E. Pons, G. Ekström, (2018), "The persistent signature of tropical cyclone in ambient seismic noise", *Earth and Planetary Science Letters*, 484, 287-294. **Press release:** [Princeton University](#), [EARTH Magazine](#), [CPO NOAA](#)

18. **Pascale, S.**, W. R. Boos, S. Bordoni, T. L. Delworth, S. B. Kapnick, H. Murakami, G. A. Vecchi, W. Zhang (2017), "Weakening of the North American monsoon with global warming", *Nature Climate Change*, 7, 806-812, doi: 10.1038/nclimate3412. **Press release:** [Princeton University](#), [Arizona Daily Star](#), [Arizona Daily Sun](#)
17. **Pascale, S.**, S. Bordoni, S. Kapnick, G. Vecchi, L. Jia, T. L. Delworth, S. Underwood and W. Anderson (2016): "The impact of horizontal resolution on North America Gulf of California moisture surges in a suite of high-resolution coupled global models", *Journal of Climate*, 29, 7911-7936.
16. **Pascale, S.**, S. Bordoni (2016): "Tropical and extratropical controls of Gulf of California moisture surges and summertime precipitation over the southwestern United States", *Monthly Weather Review*, 144, 2695-2718.
15. Hasson S., **S. Pascale**, V. Lucarini and J. Böhrner (2016): "Seasonal cycle of precipitation over major river basins in South and South-East Asia: a review of the CMIP5 climate models data for present climate and future climate projections", *Atmospheric Research*, 180, 42-63.
14. **Pascale S.**, V. Lucarini, X. Feng, A. Porporato, S. Hasson (2016): "Projected changes of rainfall seasonality and dry spells in a high greenhouse gas emissions scenario", *Climate Dynamics*, 46, 1331-1350.
13. Linsenmeier M., **S. Pascale**, V. Lucarini (2015): "Climate of Earth-like planets with high obliquity and eccentric orbits: implications for habitability conditions", *Planetary and Space Science*, 105, 43-59.
12. **Pascale S.**, V. Lucarini, X. Feng, A. Porporato, S. Hasson (2015): "Analysis of rainfall seasonality from observations and climate models", *Climate Dynamics*, 44, 3281-3301.
11. Hasson S., V. Lucarini, **S. Pascale**, J. Böhrner (2014): "Seasonality of the hydrological cycle in major South and Southeast Asian River Basins as simulated by PCMDI/CMIP3 experiments", *Earth System Dynamics*, 5, 67-87.
10. Lucarini V., **S. Pascale** (2014): "Entropy production and coarse graining of the climate fields in a general circulation model", *Climate Dynamics*, 43, 981-1000.
9. Boschi R., V. Lucarini, **S. Pascale** (2014), "Thermodynamic insights into transitions between climate states under changes in solar and greenhouse forcing", [book chapter n. 10](#) in *Beyond the second law: entropy production and non-equilibrium systems*, RC Dewar, C Lineweaver, R Niven, K Regenauer-Lieb (eds), Springer.
8. Lucarini V., R. Blender, **S. Pascale**, F. Ragone, J. Wouters, C. Herbert (2014): "Mathematical and physical ideas for Climate Science", *Reviews of Geophysics*, 52, 809-859
7. **Pascale S.**, F. Ragone, V. Lucarini, Y. Wang, R. Boschi (2013), "Nonequilibrium thermodynamics of circulation regimes in optically-thin, dry atmospheres", *Planetary and Space Science*, 84, 48-65.

6. Hasson S., V. Lucarini, **S. Pascale** (2013): "Hydrological cycle over south and south-east Asian river basins as simulated by PCMDI/CMIP3 experiments", *Earth System Dynamics*, 4, 199-217.
5. Lucarini V., **S. Pascale**, R. Boschi, E. Kirk, N. Iro (2013), "Habitability and multistability in earth-like planets", *Astronomical Notes*, 334, 576-588.
4. Boschi R., V. Lucarini, **S. Pascale** (2013), "Bistability of the climate around the habitable zone: a thermodynamic investigation", *Icarus*, 226, 1724-1742.
3. **Pascale S.**, J. M. Gregory, M.H.P. Ambaum, R. Tailleux, V. Lucarini (2012), "Vertical and horizontal processes in the global atmosphere and the maximum entropy production conjecture", *Earth System Dynamics*, 3, 19-32.
2. **Pascale S.**, J. M. Gregory, M.H.P. Ambaum, R. Tailleux (2012), "A parametric sensitivity study of the entropy production and kinetic energy dissipation using the FAMOUS AOGCM", *Climate Dynamics*, 38, 1211-1227.
1. **Pascale S.**, J. M. Gregory, M. Ambaum, R. Tailleux (2011), "Climate entropy budget of the HadCM3 atmosphere-ocean general circulation model and of FAMOUS, its low resolution version", *Climate Dynamics*, 36, 1189-1206.

## Teaching, Supervising and Outreach Experience

### *Teaching experience*

- 2021-2022: "The climate system: components", Degree programme: Minor "The challenge of climate change", University of Bologna, Italy.
- 2020-2022: "Introduction to Climate Change", Master in Sustainability Transition Management, Bologna Business School, Bologna, Italy.
- 2020-2021: "Dynamical Meteorology" (guest lecturer), M.Sc. (*Laurea Magistrale*) in Physics of the Earth System, Dipartimento di Fisica ed Astronomia, Bologna, Italy.
- 2020-2021: "Planetary Atmospheres", B.Sc. (*Laurea Triennale*) in Astronomy, Università di Bologna, Dipartimento di Fisica ed Astronomia, Bologna, Italy.
- 2013-2014: "Theoretical Meteorology" (M.Sc. Meteorology), Hamburg Universität, Germany.
- 2012-2013: "Instabilities in Fluid Dynamics" (M.Sc. Meteorology), Hamburg Universität, Germany.
- 2008-2011: "Atmospheric Physics", "Oceanography" (B.Sc. Meteorology) and "Fluid Dynamics" (M.Sc. Atmosphere, Ocean and Climate), University of Reading, UK.

### *Research Students Supervised*

- 2022: Co-supervisor (correlatore) for Carlo Grancini, M.Sc student in "Fisica del Sistema Terra", University of Bologna. *Thesis' title*: Initial Validation of an Agile Coupled Atmosphere-Ocean General Circulation Model.
- 2020: Main supervisor for Terachet Rojrachsombat, summer intern undergraduate student, Stanford University. Project title: *Understanding changes in the North American monsoon rainfall and circulation in CMIP6 projections*.
- 2018: Main supervisor for Laura Queen, Summer intern at NOAA/GFDL. Project title: *Examining the impact of global warming on U.S. river hydrology*.
- 2017: Co-supervisor (main supervisor: S. Kapnick) for Haylie Mikulak, Summer intern at NOAA/GFDL. Project title: *Examining the impact of global warming on shipping days for corn, soybeans and wheat*.
- 2013-2014: Main thesis advisor for M. Linsenmeier, B.Sc. student, Meteorologisches Institut, Hamburg Universität. Project title: *Climate of Earth-like planets at high obliquity and eccentric orbits: Implications for habitability conditions*.
- 2012-2015: Co-supervisor (main supervisor: V. Lucarini) for R. Boschi, Ph.D. student, Meteorologisches Institut, Hamburg Universität. Project title: *A thermodynamic investigation into the bistability of climates around the habitable zone*.

### Outreach

- Speaker in the *Business 4 Climate Podcast* series by Bologna Business School [link](#)
- Outreach program for WMO/WWRP at the Workshop on Attribution of Monsoon Rainfall Climate Change, Sun Yat-sen University, Zhuhai, China, December 2-3, 2019
- New Jersey Ocean Fun Days outreach event, 2018:  
<http://njseagrant.org/education/special-events/ocean-fun-days/>
- Interview with *la Repubblica*, *Corriere della Sera*, *la Stampa*, *EARTH Magazine*, *Arizona Daily Star*, *Arizona Daily Sun*, *Princeton University News*, *NOAA*, *Stanford University*.

### Invited Seminars

- 2021 - University of Trento, Italy.
- 2021 - Consiglio Nazionale delle Ricerche (CNR), Italy
- 2020 - Geophysical Fluid Dynamics Laboratory, Princeton, NJ
  - SMILE (Single Model Initial-condition Large Ensemble) invited webinar
- 2019 - University of California, Berkeley, CA
  - Stanford University, CA
  - Rutgers University, New Brunswick, NJ

- 2018 - Yale University, New Haven, CT
  - Florida State University, Tallahassee, FL
  - University of Nevada, Reno, NV
  - Penn State, State College, PA
  - University of Florida, Gainesville, FL
- 2017 - University of Reading, Reading, UK
  - Rutgers University, New Brunswick, NJ
- 2016 - Yale University, New Haven, CT
  - Lamont-Doherty Observatory, Columbia University, Palisades, NY
  - Geophysical Fluid Dynamics Laboratory, Princeton, NJ
  - NASA Jet Propulsion Laboratory, Pasadena, CA
- 2015 - Caltech, Pasadena, CA
- 2014 - ETH, Zürich, Switzerland
  - Paris-Saclay - CEA, Paris, France
- 2013 - Zentrum für Interdisziplinäre Forschung, University of Bielefeld, Germany
- 2012 - Department of Physics, Oxford, UK

## **Presentations at Conferences, Workshops and Summer Schools (first author only)**

(Oral presentation denoted with \*\*)

- 2022 - \*\* 4th National Conference of the Italian Association of Atmospheric Science and Meteorology (AISAM), Milan, Italy.
  - \*\*EGU General Assembly, Vienna.
- 2021 - \*\*International School on Migration. Session: Sustainability and Climate Change: from challenges to shared solutions for the future, Bologna, Italy.
- 2019 - \*\*Workshop on Attribution of Monsoon Rainfall Climate Change, WMO/WWRP Working Group on Tropical Meteorology Research, Sun Yat-sen University, Zhuhai, China.
  - \*\*27th IUGG General Assembly, Montréal, Canada
  - Workshop on Correlated Extremes, Columbia University, NY
  - \*\* AGU fall meeting, San Francisco, CA.
- 2018 - \*\*AMS 33rd Conference on Hurricanes and Tropical Meteorology, Ponte Vedra, FL
  - AMS annual meeting, Austin, TX
  - AGU fall meeting, Washington DC
- 2017 - AGU fall meeting, New Orleans, LA
- 2016 - \*\*AGU fall meeting, San Francisco, CA
  - \*\*AMS 32nd Conference on Hurricanes and Tropical Meteorology, San Juan, PR

- Model Hierarchies Workshop (World Climate Research Programme), Princeton University, NJ
  - \*\*The Summer Institute for the NOAA Climate and Global Change Postdoctoral Fellowship Program and the PACE Fellowship Program, Steamboat Springs, Colorado
- 2015 - AGU fall meeting, San Francisco, CA
- Monsoon and ITCZ Workshop, Columbia University, New York, NY
  - 20th Conference on Atmospheric and Oceanic Fluid Dynamics, Minneapolis, MN
  - Monsoons - Past, Present and Future workshop, Caltech, Pasadena, CA
  - Tropical extremes: A workshop on high-impact weather events in monsoon regions, Yale Climate & Energy Institute, New Haven, CT
- 2013 - AGU fall meeting, San Francisco, CA
- PLATO 2.0 Science Workshop, ESTEC, Noordwijk, NL
- 2012 - AGU fall meeting, San Francisco, CA
- Characterizing and Modeling Extrasolar Planetary Atmospheres Theory and Observation, Max Planck for Astronomy, Heidelberg, Germany
- 2011 - EGU General Assembly, May, 2011, Vienna, Austria
- 2010 - \*\*EGU General Assembly, Vienna, Austria
- Climate Thermodynamics Workshop, University of Reading, Department of Meteorology, UK
- 2009 - EGU General Assembly, Vienna, Austria
- NCAS Climate Modelling Summer School, Cambridge, UK
- 2008 - Max-Planck-Institute for Biogeochemistry, Jena, Germany.

## **Professional Services and Synergistic Activities**

### *Workshop Organization and Panelist*

- Member of CLIVAR/GEWEX Monsoon Panel (2022-2024). [Link to CLIVAR webpage](#)
- Invited panelist of the World Meteorological Organization (WMO)/World Weather Research Programme (WWRP) Working Group on Tropical Meteorology Research, “Identification and attributions of climate change in monsoon heavy rainfall”, Sun Yat-sen University, Zhuhai, China, December, 2019.
- Organizer and chair for the session “High-Impact Weather and Climate Extremes”, 27th IUGG General Assembly, Montréal, Canada, July 2019.
- Organizer and convener of the session “Monsoons: Observations, Subseasonal, Seasonal, and Interannual to Decadal Variability, Forecast, Climate Change and Extremes”, 2018 AGU Fall Meeting, Washington DC, December 2018.
- Member of the program committee for the 33rd AMS Conference on Hurricanes and Tropical Meteorology, Ponte Vedra, FL, April 2018.
- Organizer and main convener of the session “A21F/A24D: Monsoons of the Americas, Teleconnections, and the Subseasonal to Decadal Earth System Prediction Capability”, 2017 AGU Fall Meeting, New Orleans, LA, December 2017.



- Assisted in organizing the workshop "Monsoons: Past, Present and Future" at the California Institute of Technology, Pasadena, CA, May 2015.
- Assisted in organizing the workshop "Climate Thermodynamics 2010" at University of Reading, Department of Meteorology, April 2010.

### *Referee*

- **Proposals (panelist and reviewer):** NASA ROSES solicitation (2018), National Science Foundation (2019-present).
- **Manuscripts:** Nature Climate Change, Nature Geosciences, Journal of Climate, Climate Dynamics, Quarterly Journal of the Royal Meteorological Society, Geophysical Review Letters, Journal of Atmospheric Sciences, Journal of Applied Meteorology and Climatology, Earth System Dynamics, Atmospheric Research, Hydrological Processes, Journal of Advances in Modeling Earth Systems, Water Resources Research, Entropy, Journal of Advances in Modeling Earth Systems.

### *Membership Scientific Associations (2010-present)*

European Geosciences Union, Royal Meteorological Society, American Geophysical Union, American Meteorological Society.

## **Language skills**

Italian (native speaker), English (fully proficient), German (intermediate), Spanish (basic).

*Last update: December 2021*