

## MARCO GIOVANNI GIOMETTO

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Web: <https://efpl.engineering.columbia.edu>

### HIGHER EDUCATION

*PhD Mechanical Engineering*, 2016

École Polytechnique Fédérale de Lausanne, Switzerland

*PhD Civil Engineering*, 2014

Florence and Braunschweig Universities, Italy and Germany

*MS Civil Engineering*, 2010

Padova University, Italy

*BS Civil Engineering*, 2007

Padova University, Italy

### EMPLOYMENT RECORD

*Assistant Professor*, 2018 – present

Columbia University, Department of Civil Engineering and Engineering Mechanics

*Amazon Visiting Academic*, 2021 – present

Amazon.com Inc., Amazon Prime Air Program

*Senior Research Scientist*, 2018 – 2021

Amazon.com Inc., Amazon Prime Air Program

*Postdoctoral Fellow*, 2017 – 2018

Stanford University, Department of Mechanical Engineering, Center for Turbulence Research

*Postdoctoral Fellow*, 2016 – 2017

University of British Columbia, Department of Civil and Environmental Engineering

### HONORS AND AWARDS

- *National Science Foundation CAREER Award*, 2023.
- *Office of Naval Research Young Investigator Program Award*, 2023.
- *Army Research Office Early Career Program Award*, 2022.
- *Finalist, ISSNAF Young Investigator Awards for Research in Sustainability*, 2021.
- *Provost Diversity Award*, 2021.
- *Postdoctoral Fellowship*, Center for Turbulence Research, Stanford University, 2017.
- *EDME Award for the Best Ph.D. Thesis in Mechanics*, 2016.
- *Best Oral Presentation Award*, 2016. 9th International Conference on Urban Climate, 12th Symposium on the Urban Environment, France.

- *Third prize in the Application-Centered Computational Engineering Science Visualization Contest, 2015.* École Polytechnique Fédérale de Lausanne, Switzerland.
- *Outstanding Student Paper Award, 2014.* American Geophysical Union General Assembly Conference, San Francisco.
- *Ph.D. Scholarship, 2011.* Università di Firenze and Braunschweig TU University (joint Ph.D. program), Italy.
- *Erasmus Scholarship, 2010.* Scholarship awarded by Banca San Giorgio Quinto e Valle Agno, Progetto Erasmus, Italy.
- *Erasmus scholarship, 2010.* Scholarship awarded by the Italian government for the development of a MS thesis at the International Center for Numerical Methods in Engineering, Spain.

## HONORS AND AWARDS RECEIVED BY STUDENTS

- *SEAS Teaching Fellow, 2023.* Gurpreet Singh Hora, Columbia University.
- *Lead Teaching Fellowship Award, 2023.* Gurpreet Singh Hora, Columbia University.
- *Teaching Assistant Excellence Award, 2023.* Pawan Chandiramani, Columbia University.
- *Teaching Assistant Excellence Award, 2023.* Gurpreet Singh Hora, Columbia University.
- *Teaching Assistant Excellence Award, 2023.* Atharva Sathe, Columbia University.
- *SEAS Dean's Office Fellowship, 2023.* Kealan Hennessy, Columbia University.
- *SEAS Fellow Award, 2023.* Shiv Kampani, Columbia University.
- *Columbia Engineering Alumni Association Scholar, 2022.* Hongshuo Yang, Columbia University.
- *Boris A. Bakhmeteff Research Fellowship in Fluid Mechanics, 2022.* Weiyi Li, Columbia University.
- *Bonomi Summer Scholar Award, 2022.* Michael Lawrence Garcia, Columbia University.
- *Teaching Assistant Excellence Award, 2022.* Atharva Sathe, Columbia University.
- *Teaching Assistant Excellence Award, 2022.* Beatrice Giacomini, Columbia University.
- *Frontera Computational Science Fellowship, 2021.* Gurpreet Singh Hora, Texas Advanced Computing Center.
- *Bonomi Summer Scholar Award, 2020.* Christine Blackshaw, Columbia University.
- *Boris A. Bakhmeteff Research Fellowship in Fluid Mechanics, 2019.* Beatrice Giacomini, Columbia University.
- *Outstanding Student Paper Award, 2019.* Beatrice Giacomini, American Geophysical Union General Assembly Conference, San Francisco.
- *Earl R. Peterson memorial Scholarship in Civil Engineering, 2018.* Manuel F. Schmid, University of British Columbia.
- *Doc. Mobility Fellowship, 2018.* Manuel F. Schmid, Swiss National Science Foundation.
- *Teaching Assistant Excellence Award, 2018.* Beatrice Giacomini, Columbia University.

1. Yousefi K.<sup>†</sup>, Hora S.G.<sup>\*</sup>, Yang H.<sup>\*</sup>, Veron F., **Giometto M.G.** A machine learning model for reconstructing skin friction drag over ocean surface waves. Accepted for publication in *J. Fluid Mech.*
2. Li W.<sup>\*</sup>, **Giometto M.G.** The structure of turbulence in pulsatile flow over urban canopies. Accepted for publication in *J. Fluid Mech.* Preprint available on *arXiv*: <https://doi.org/10.48550/arXiv.2307.11203>
3. Giacomini B.<sup>\*</sup>, **Giometto M.G.** (2024) Quantification of Approaching Wind Uncertainty in Flow over Realistic Plant Canopies. In *Bound.-Layer Meteorol.*, 190, 8. <https://doi.org/10.1007/s10546-023-00848-4>
4. Sathe A.<sup>\*</sup>, **Giometto M.G.** (2024) Impact of the numerical domain on turbulent flow statistics: scalings and considerations for canopy flows. In *J. Fluid Mech.*, 979, A36. <https://doi.org/10.1017/jfm.2023.1041>
5. Schmid M.F.<sup>\*</sup>, **Giometto M.G.**, Lawrence G.A., Parlange M.B. (2024) BoundaryLayer-Dynamics.jl v1.0: a modern codebase for atmospheric boundary-layer simulations. In *Geosci. Model Dev.*, 17, 321–333. <https://doi.org/10.5194/gmd-17-321-2024>
6. Li W.<sup>\*</sup>, **Giometto M.G.** (2023) Mean flow and turbulence in unsteady canopy layers. In *J. Fluid Mech.*, 974, A33. <https://doi.org/10.1017/jfm.2023.801>
7. Akinlabi E., **Giometto M.G.**, Li D. (2023) Budgets of second-order turbulence moments over a real urban canopy. In *Bound.-Layer Meteorol.*, 188, 351–387. <https://doi.org/10.1007/s10546-023-00816-y>
8. Cui Y., Xiao S., **Giometto M.G.**, Li Q. (2022) Effects of urban surface roughness on potential sources of microplastics in the atmospheric boundary layer. In *Bound.-Layer Meteorol.*, 186, 425–453. <https://doi.org/10.1007/s10546-022-00763-0>
9. Calaf M., Vercauteren N., Katul G.G., **Giometto M.G.**, Morrison T.J., Margairaz F., Boyko V., Pardyjak E.R. (2022) Boundary-layer processes hindering contemporary numerical weather prediction models. In *Bound.-Layer Meteorol.*, 186, 43–68. <https://doi.org/10.1007/s10546-022-00742-5>
10. Akinlabi E., Maronga B., **Giometto M.G.**, Li D. (2022) Dispersive fluxes within and over a real urban canopy: A large-eddy simulation study. In *Bound.-Layer Meteorol.*, 185, 93–128. <https://doi.org/10.1007/s10546-022-00725-6>
11. Giacomini B.<sup>\*</sup> and **Giometto M.G.** (2022) A framework for uncertainty quantification in one-dimensional plant canopy flow. In *Bound.-Layer Meteorol.*, 184, 441–462. <https://doi.org/10.1007/s10546-022-00718-5>
12. Cheng Y., **Giometto M.G.**, Kauffmann P., Lin L., Cao C., Zupnick C., Li H., Li Q., Abernathey R., Gentine P. (2022) Deep learning for subgrid-scale turbulence modeling in large-eddy simulations of the atmospheric boundary layer. In *J. Adv. Model Earth Sy.*, 14, e2021MS002847. <https://doi.org/10.1029/2021MS002847>
13. Javanroodi K., Vahid M.N., **Giometto M.G.**, Scartezzini J. (2022) Combining computational fluid dynamics and neural networks to characterize microclimate extremes: Learning the complex interactions between meso-climate and urban morphology. In *Sci. Total Environ.*, 829, 154223. <https://doi.org/10.1016/j.scitotenv.2022.154223>

14. Hang C., Oldroyd H.J., **Giometto M.G.**, Pardyjak E.R., and Parlange M.B. (2021) A local similarity function for katabatic flows derived from field observations over steep- and shallow-angled slopes. In *Geophys. Res. Letters*, 48, e2021GL095479. <https://doi.org/10.1029/2021GL095479>
15. Momen M.<sup>†</sup>, Parlange M.B., and **Giometto M.G.** (2021) Scrambling and reorientation of classical atmospheric boundary layer turbulence in hurricane winds. In *Geophys. Res. Letters*, 48, e2020GL091695. <https://doi.org/10.1029/2020GL091695>
16. Giacomini B.<sup>\*</sup> and **Giometto M.G.** (2021) On the suitability of second-order accurate finite-volume solvers for the simulation of atmospheric boundary layer flow. In *Geophys. Mod. Dev.*, 14, 1409–1426. <https://doi.org/10.5194/gmd-14-1409-2021>
17. Krayenhoff S.E., Jiang T., Christen A., Martilli A., Bailey B.N., Nazarian N., Voogt J.A., **Giometto M.G.**, Stastny A., and Crawford B.R. (2020) A multi-layer urban canopy meteorological model with trees (BEP-Tree): Street tree impacts on pedestrian-level climate. In *Urban Climate*, 32, 100590. <https://doi.org/10.1016/j.uclim.2020.100590>
18. Lozano-Durán A., **Giometto M.G.**, Park G.I., and Moin P. (2020) Non-equilibrium three-dimensional boundary layers at moderate Reynolds numbers. In *J. Fluid Mech.*, 883, A20. <https://doi.org/10.1017/jfm.2019.869>
19. Comola F., **Giometto M.G.**, Parlange M.B., and Lehning M. (2019) Preferential deposition of snow and dust over hills: Governing processes and relevant scales. In *J. Geophys. Res.*, 124, 7951–7974. <https://doi.org/10.1029/2018JD029614>
20. Schmid M.F.<sup>\*</sup>, Lawrence G., and Parlange M.B., and **Giometto M.G.** (2019) Volume averaging for urban canopies. In *Bound.-Layer Meteorol.*, 173, 349–372. <https://doi.org/10.1007/s10546-019-00470-3>
21. Lenz S., Schonher M., Geier M., Krafczyk M., Pasquali A., Christen A., and **Giometto M.G.** (2019) Towards real-time simulation of turbulent wind flows in urban areas with the cumulant lattice Boltzmann method on a GPGPU. In *J. Wind Eng. Ind. Aerod.*, 189, 151–162. <https://doi.org/10.1016/j.jweia.2019.03.012>
22. Momen M.<sup>†</sup>, Bou-Zeid E., Parlange M.B., and **Giometto M.G.** (2018) Modulation of mean wind and turbulence in the atmospheric boundary layer by baroclinicity. In *J. Atmos. Sci.*, 75, 3797–3821. <https://doi.org/10.1175/JAS-D-18-0159.1>
23. Margairaz F., **Giometto M.G.**, Parlange M.B., and Calaf M. (2018) Comparison of dealiasing schemes in large-eddy simulation of neutrally-stratified atmospheric boundary-layer type flows. In *Geosci. Model Dev.*, 11, 4069–4084. <https://doi.org/10.5194/gmd-11-4069-2018>
24. **Giometto M.G.**, Lozano-Durán A., Park G.I., and Moin P. (2017) Three-dimensional transient channel flow at moderate Reynolds numbers: analysis and wall modeling. In *Ann. Res. Brief, Center for Turbulence Research*, 193–205. <https://scholar.google.com/scholar?oi=bibs&cluster=3819123587071418888&btnI=1&hl=en>
25. **Giometto M.G.**, Katul G.G., Fang J., and Parlange M.B. (2017) Direct numerical simulation of slope flows up to Grashof number  $Gr = 2^{11}$ . In *J. Fluid Mech.*, 829, 589–620. <https://doi.org/10.1017/jfm.2017.372>
26. **Giometto M.G.**, Christen A., Egli P.E., Schmid M.F.<sup>\*</sup>, Tooke R., Coops N.C., and Parlange M.B. (2017) Effects of urban trees on mean wind, turbulence and momentum exchange

within and above a realistic urban canopy. In *Adv. Water Resour.*, 106, 154–168. <https://doi.org/10.1016/j.advwatres.2017.06.018>

27. **Giometto M.G.**, Grandi R., Fang J., Monkewitz, P.A., and Parlange, M.B. (2016) Katabatic flow: A closed-form solution with spatially-varying eddy diffusivities. In *Bound.-Layer Meteorol.*, 162, 307–317. <https://doi.org/10.1007/s10546-016-0196-z>
28. **Giometto M.G.**, Christen A., Meneveau C., Fang J., Krafczyk M., and Parlange M.B. (2016) Spatial characteristics of roughness sublayer mean flow and turbulence over a realistic urban surface. In *Bound.-Layer Meteorol.*, 160, 425–452. <https://doi.org/10.1007/s10546-016-0157-6>

## CONFERENCE PAPERS <sup>\*</sup>Students <sup>†</sup>Postdocs and Research Staff

1. Chen M., Smyth A.W., **Giometto M.G.**, Li M.Z. Drone delivery routing with stochastic urban wind. In *26th IEEE International Conference on Intelligent Transportation Systems ITSC 2023*.
2. Yousefi K.<sup>†</sup>, Hora S.G.<sup>\*</sup>, Yang H.<sup>\*</sup>, Veron F., **Giometto M.G.** Data-driven met-ocean model for offshore wind energy applications. Accepted for publication in *Torque*.

## MANUSCRIPTS UNDER REVIEW <sup>\*</sup>Students <sup>†</sup>Postdocs and Research Staff

1. Hora S.G.<sup>\*</sup>, **Giometto M.G.** Surrogate modeling of urban boundary-layer flow. In *J. Fluid Mech.* Preprint available on *arXiv*: <https://doi.org/10.48550/arXiv.2306.17807>
2. Hora S.G.<sup>\*</sup>, Gentine P., Momen M., **Giometto M.G.** Reconstruction of three-dimensional turbulent flows from two-dimensional data using deep learning. In *Proc. Natl. Acad. Sci.*
3. Li W.<sup>\*</sup>, **Giometto M.G.** Analysis of Ansys Fluent for wall-modeled large-eddy simulation of turbulent channel flow. In *J. Fluid Eng.*
4. Wang J., Llaguno Munitxa M., Li Q., Giometto M.G., Bou-Zeid E. Wind Extremes over Built Terrain: Characterization and Geometric Determinants. In *J. Wind Eng. Ind. Aerod.*

## INVITED TALKS

1. Characterization of hurricane turbulence for wind hazard mitigation. Disaster Research Resilience Symposium, Virtual, 2023.
2. Numerical simulation of droplets and aerosol dispersion in outdoor environments: Revisiting the six-foot distance rule. CU-Improve Workshop, School of Engineering, Columbia University, NY, 2023.
3. Turbulence in unsteady urban canopy flows. Fluid Seminar, School for Engineering of Matter, Transport and Energy, Arizona State University, Tempe, AZ, 2023.
4. Modeling and understanding atmospheric transport in urban areas. First International Workshop on Fast Atmospheric Transport and Dispersion CFD Modeling, Virtual, 2022.
5. Characterization of hurricane boundary layer turbulence for wind hazard mitigation. Thornton Tomasetti, New York, NY, 2022.
6. Characterization of hurricane turbulence for wind hazard mitigation. Disaster Research Resilience Symposium, Virtual, 2022.

7. Characterizing hurricane turbulence via numerical simulations. Massachusetts Institute of Technology, Parsons Laboratory Seminar Series, Virtual, 2021.
8. Computational modeling of land-atmosphere interaction for sustainable urban development. ISSNAF Young Investigator Award, Virtual, 2021.
9. Atmospheric turbulence in tropical cyclones and its impact on offshore structures. China University of Petroleum, Virtual, 2021.
10. Modeling land-atmosphere interaction for a sustainable and resilient urban development. 20 years of PhD program: memories and perspectives from the alumni, International PhD School in Civil and Environmental Engineering, Florence, Italy, 2021.
11. Insight into the structure of hurricane boundary layer mean flow and turbulence. Fluid Dynamics Research Consortium, Department of Mechanical Engineering, Penn State University, State College, PA, 2021.
12. Quantifying the impact of flow unsteadiness on momentum and scalar transfer in urban environments. Meteorology And Climate - Modeling for Air Quality, Air Quality Research Center, University of California Davis, Davis, CA, 2021.
13. Tackling turbulence with artificial neural networks. Thornton Tomasetti, New York, NY, 2021.
14. Insight into the structure of hurricane boundary layer mean flow and turbulence. Cornell Fluids Seminar, Sibley School of Mechanical and Aerospace Engineering, Cornell University, Ithaca, NY, 2021.
15. Drag and drag partition in vegetated urban canopies. Department of Meteorology and Atmospheric Science, Penn State University, State College, PA, 2021.
16. Quantifying the impact of trees on turbulent transport in the urban boundary layer: insight from large-eddy simulation and theoretical models. Department of Mechanical Engineering, The City College New York, New York, NY, 2020.
17. Large-eddy simulation in urban areas: the impact of urban trees. Department of Environmental Engineering, Freiburg University, Freiburg, Germany, 2019.
18. Characterizing atmospheric turbulence over and within urban environments: challenges and opportunities, Amazon Prime Air, Seattle, WA, 2018.
19. Boundary-layer flows over urban canopies and drainage flows: numerical analysis and analytical modeling. Institute for Atmospheric and Earth System Research, Helsinki University, Helsinki, Finland, 2017.
20. Characterization of buoyancy-driven turbulent flows over inclines. CTR Tea Seminar Series, Stanford University, Stanford, CA, 2017.
21. Turbulent transport in complex boundary-layer flows. Department of Civil Engineering and Engineering Mechanics, Columbia University, New York, NY, 2017.
22. Numerical simulations of katabatic flows. Complex Fluids Laboratory, University of British Columbia, Vancouver, Canada, 2014.
23. An immersed meshless method for simulation of fluid-structure interaction. Department of Geophysical Sciences, University of Lausanne, Lausanne, Switzerland, 2013.

1. **Giometto M.G.**, Schmid M.F.<sup>†</sup>, Massey J. (2024) Automated surface models from light detection and ranging data for low-altitude microscale weather simulations. In 24th Conference on Aviation, Range, and Aerospace Meteorology, 104th AMS Annual Meeting, Baltimore, MD.
2. Kenneth J.D., . . . , **Giometto M.G.** (2024) CoURAGE! An Atmospheric Campaign to Advance Our Understanding of Urban Climate and Air Quality in Complex Regional Environments. In 104th AMS Annual Meeting, Baltimore, MD.
3. Jung J.<sup>†</sup>, Schmid M.F.<sup>†</sup>, Fish J., Weng E., Lawrence D.M., **Giometto M.G.** (2023) Canopy flow modeling using multiscale homogenization techniques. In AGU Fall Meeting, San Francisco, CA.
4. Verma S., May P., Kepert J.D., Mateen S., Biswal B., Parlange M.B., **Giometto M.G.** (2023) Hurricane boundary layer depth determination from large-eddy simulations. In AGU Fall Meeting, San Francisco, CA.
5. Schmid M.F.<sup>†</sup>, **Giometto M.G.** (2023) Automated processing of LiDAR data for high-fidelity flow modeling. In AGU Fall Meeting, San Francisco, CA.
6. Sathe A.<sup>\*</sup>, **Giometto M.G.** (2023) Domain size impact on turbulent flow statistics: scalings and considerations for canopy flows. In AGU Fall Meeting, San Francisco, CA.
7. Hora G.S.<sup>\*</sup>, **Giometto M.G.** (2023) Data-driven surrogate modeling for urban boundary-layer flow. In AGU Fall Meeting, San Francisco, CA.
8. **Giometto M.G.**, Giacomini B.<sup>\*</sup> (2023) Quantification of approaching wind angle uncertainty in flow over realistic plant canopies. In AGU Fall Meeting, San Francisco, CA.
9. Mateen S., Verma S., Biswal B., **Giometto M.G.**, Tapper N.J., Parlange M.B. (2023) Effects of atmospheric stability and turbulence on urban canopy heat transport: a large eddy simulation study. In AGU Fall Meeting, San Francisco, CA.
10. Hora G.S.<sup>\*</sup>, **Giometto M.G.** (2023) Surrogate modeling of urban boundary-layer flow. In APS DFD Meeting, Washington, DC.
11. Sathe A.<sup>\*</sup>, **Giometto M.G.** (2023) Impact of numerical domain on turbulent flow statistics: scalings and considerations for canopy flows. In APS DFD Meeting, Washington, DC.
12. **Giometto M.G.**, Li W.<sup>\*</sup> (2023) Coherent structures in unsteady flow over urban canopies. In APS DFD Meeting, Washington, DC.
13. Yousefi, K.<sup>†</sup>, Hora G.S.<sup>\*</sup>, Yang, H., Veron, F., **Giometto M.G.** (2023) Reconstruction of skin friction drags for surface waves using convolutional neural network. In APS DFD Meeting, Washington, DC.
14. Akinlabi E.O., Maronga B., **Giometto M.G.**, Li D. (2023) The relevance of dispersive fluxes within and over the real urban canopy: a large-eddy simulation study. In AMS Annual Meeting, Denver, CO.
15. Oldroyd H.J., Hang C., **Giometto M.G.**, Pardyjak E.R., Parlange M.B. (2023) A similarity turbulence parameterization of land-atmosphere interactions for katabatic slope flows. In AMS Annual Meeting, Denver, CO.
16. Yousefi K.<sup>†</sup>, Zappa C.J., **Giometto M.G.** (2022) Wind stress modeling above ocean waves based on a dynamic surface roughness approach. In AGU Fall Meeting, Chicago, IL.

17. Shefali V., Biswal B., **Giometto M.G.**, Parlange M.B. (2022) Hurricane boundary layer depth determination using a large eddy simulation model. In AGU Fall Meeting, Chicago, IL.
18. Li W.\*, **Giometto M.G.** (2022) Turbulence in unsteady urban canopy flow. In AGU Fall Meeting, Chicago, IL.
19. Sathe A.\*, **Giometto M.G.** (2022) Impact of numerical domain on turbulent flow statistics: scalings and considerations for canopy flows. In AGU Fall Meeting, Chicago, IL.
20. **Giometto M.G.**, Giacomini B.\* (2022) Uncertainty quantification in three-dimensional plant canopy flow. In AGU Fall Meeting, Chicago, IL.
21. Hora G.S.\*, Vondrick C., Gentine P., Momen M.†, **Giometto M.G.** (2022) Reconstruction of 3D turbulent flow fields from 2D images using deep learning. In AGU Fall Meeting, Chicago, IL.
22. Mateen S., **Giometto M.G.**, Parlange M.B. (2022) Role of wind in the modulation of urban surface temperatures. In AGU Fall Meeting, Chicago, IL.
23. Cheng Y., **Giometto M.G.**, Kauffmann P., Lin L., Cao C., Zupnick C., Li H., Li Q., Huang Y., Abernathey R., Gentine P. (2022) Deep learning for subgrid-scale turbulence modeling in large-eddy simulations of the convective atmospheric boundary layer. In AGU Fall Meeting, Chicago, IL.
24. **Giometto M.G.**, Li W.\* (2022) Unsteady boundary layer flow in urban canopies. In APS DFD Meeting, Indianapolis, IN.
25. Yang H.\*, Hora G.S.\*, Veron F., Yousefi K.†, **Giometto M.G.** (2022) Estimation of surface viscous stress from wave profiles using deep neural networks. In APS DFD Meeting, Indianapolis, IN.
26. Yousefi K.†, Zappa C., **Giometto M.G.** (2022) Dynamic surface drag modeling of wind over ocean waves. In APS DFD Meeting, Indianapolis, IN.
27. Li W.\*, **Giometto M.G.** (2021) Mean flow and turbulence dynamics in non-stationary atmospheric boundary layer over urban-like roughness. In AGU Fall Meeting, Virtual.
28. Cui Y., Li Q., Xiao S., **Giometto M.G.** (2021) Effects of urban surface roughness on potential sources of microplastics in the atmospheric surface layer. In AGU Fall Meeting, Virtual.
29. Wang J., Bou-Zeid E., Li Q., **Giometto M.G.**, Munitxa M.L. (2021) Understanding the extreme winds over built surfaces. In AGU Fall Meeting, Virtual.
30. Everard K., Katul G., Lawrence G., Christen A., Li W.\*, **Giometto M.G.**, Parlange M.B. (2021) Role of canopy density and structure on the applicability of Taylors frozen turbulence hypothesis. In AGU Fall Meeting, Virtual.
31. **Giometto M.G.**, Momen M.†, Parlange M.B. (2021) Insight on the structure of hurricane boundary-layer mean flow and turbulence. In Engineering Mechanics Institute Conference and Probabilistic Mechanics & Reliability Conference 2021, Virtual.
32. Giacomini B.\*, **Giometto M.G.** (2021) On the suitability of second-order accurate finite-volume solvers for the simulation of atmospheric boundary layer flow. In Engineering Mechanics Institute Conference and Probabilistic Mechanics & Reliability Conference 2021, Virtual.

33. Giacomini B.<sup>\*</sup>, **Giometto M.G.** (2020) On the sensitivity of flow statistics to parameter uncertainty in flow over plant canopy. In AGU Fall Meeting, Virtual.
34. Giacomini B.<sup>\*</sup>, **Giometto M.G.** (2020) Uncertainty quantification in canopy turbulence. In AGU Fall Meeting, Virtual.
35. Schmid M.F.<sup>\*</sup>, **Giometto M.G.**, Parlange M.B. (2020) Sheltering of roughness elements in analytical models for drag and drag partitioning. In AGU Fall Meeting, Virtual.
36. Schmid M.F.<sup>\*</sup>, **Giometto M.G.**, Parlange M.B. (2020) Towards optimal numerics for the simulation of boundary-layer flows. In 73st Annual Meeting of the APS Division of Fluid Dynamics, Virtual.
37. Momen M.<sup>†</sup>, **Giometto M.G.**, Parlange M.B. (2019) Large-eddy simulations of hurricane boundary layers and scrambling of coherent turbulence structures. In AGU Fall Meeting, San Francisco, CA.
38. **Giometto M.G.**, Schmid M.F.<sup>\*</sup>, Parlange M.B. (2019) Drag and drag partition over vegetated urban canopies. In AGU Fall Meeting, San Francisco, CA.
39. Parlange M.B., Schmid M.F.<sup>\*</sup>, Lawrence G.A., **Giometto M.G.** (2019) Horizontal averaging of urban canopy flows. In AGU Fall Meeting, San Francisco, CA.
40. Giacomini B.<sup>\*</sup>, **Giometto M.G.** (2019) Quality and reliability of general-purpose finite-volume solvers for the simulation of atmospheric boundary layer flow. In AGU Fall Meeting, San Francisco, CA.
41. Gentine P., Cheng Y., **Giometto M.G.**, Kauffmann P., Lin L., Cao C., Zupnick C., Li H., Li Q., Abernathy R., (2019) Deep learning for subgrid-scale turbulence modeling in large-eddy simulations of the atmospheric boundary layer. In AGU Fall Meeting, San Francisco, CA.
42. Schmid M.F.<sup>\*</sup>, **Giometto M.G.**, Parlange M.B. (2019) Turbulent flow simulations with the Julia programming language. In APS DFD Meeting, Seattle, WA.
43. Giacomini B.<sup>\*</sup>, **Giometto M.G.** (2019) Quality and reliability of general-purpose finite-volume solvers for the simulation of atmospheric boundary layer flow. In APS DFD Meeting, Seattle, WA.
44. Li W.<sup>\*</sup>, Katul G.G., Chamecki M., Parlange M.B., **Giometto M.G.** (2019) Quality and reliability of general purpose finite-volume solvers for wall-modeled large-eddy simulation of channel flow at a moderate Reynolds number. In APS DFD Meeting, Seattle, WA.
45. Schmid M.F.<sup>\*</sup>, **Giometto M.G.**, Parlange M.B. (2018) Atmospheric boundary-layer simulations with the Julia programming language. In AGU Fall Meeting, Washington, DC.
46. Li W.<sup>\*</sup>, Chamecki M., Parlange M.B., **Giometto M.G.** (2018) A new algebraic subgrid-scale model for flow within vegetation canopies. In AGU Fall Meeting, Washington, DC.
47. **Giometto M.G.**, Schmid M.F.<sup>\*</sup>, Parlange M.B. (2018) Aerodynamic roughness parameters of vegetated urban canopies. In AGU Fall Meeting, Washington, DC.
48. Hang C., **Giometto M.G.**, Oldroyd H.J., Pardyjak E., Parlange M.B. (2018) Similarity function for katabatic flows from field observations. In AGU Fall Meeting, Washington, DC.

49. Momen M.<sup>†</sup>, Parlange M.B., **Giometto M.G.** (2018) Large-eddy simulations and turbulence statistics of the hurricane boundary layer. In AGU Fall Meeting, Washington, DC.
50. Everard K., **Giometto M.G.**, Hang C., Parlange M.B., Lawrence G. (2018) On the parameterization of turbulence in katabatic flow. In AGU Fall Meeting, Washington, DC.
51. Schmid M.F.\*, **Giometto M.G.**, Lawrence G.A., Parlange M.B. (2018) Volume averaging for urban canopies. In APS DFD Meeting, Atlanta, GA.
52. **Giometto M.G.**, Schmid M.F.\*, Christen A., Salesky S.T., Parlange M.B. (2018) Aerodynamic roughness parameters of vegetated urban canopies. In 10th International Conference on Urban Climate, New York, NY.
53. Schmid M.F.\*, **Giometto M.G.**, Parlange M.B. (2018) Relating the horizontally averaged wind profile to the geometry of idealized urban surfaces. In 13th World Congress in Computational Mechanics, New York, NY.
54. **Giometto M.G.**, Lozano-Duran A., Park G.I., Moin P. (2018) Analysis of three-dimensional transient channel flow at moderate Reynolds numbers. In 13th World Congress in Computational Mechanics, New York, NY.
55. Momen M.<sup>†</sup>, Bou-Zeid E., **Giometto M.G.**, Parlange M.B. (2018) Exploring the impact of baroclinicity and stability on the atmospheric boundary layer. In 23rd Symposium on Boundary Layers and Turbulence, American Meteorological Society, Oklahoma City, OK.

## FUNDED PROJECTS

1. *Years:* 2024-2029  
*Title:* CAREER: Characterization of Turbulence in Urban Environments for Wind Hazard Mitigation  
*Sponsor:* National Science Foundation  
*Funds:* \$585,000  
*Investigators:* Giometto M.G.
2. *Years:* 2024-2027  
*Title:* Collaborative Research: Sea-State-Dependent Drag Parameterization Through Experiments and Data-Driven Modeling  
*Sponsor:* National Science Foundation  
*Funds:* \$299,614  
*Investigators:* Giometto M.G.
3. *Years:* 2024-2027  
*Title:* Physics-Data Driven Surface Flux Parameterization for Flow in Complex Terrain  
*Sponsor:* National Science Foundation  
*Funds:* \$523,860  
*Investigators:* Giometto M.G.
4. *Years:* 2024  
*Title:* Columbia Morningside Park Pond Project (CMP<sup>3</sup>)  
*Sponsor:* Columbia University  
*Funds:* \$26,250  
*Investigators:* Giometto M.G. (PI), Brügger A., Goes J.I., Hunnicutt W.A., Myers, K.

5. *Years:* 2024-2027  
*Title:* Young Investigator Program: Physics-Data Driven Surface Flux Parameterization for Air-Sea Interaction  
*Sponsor:* Office of Naval Research  
*Funds:* \$743,466  
*Investigators:* Giometto M.G.
6. *Years:* 2023-2024  
*Title:* Light Detection and Ranging System for Land-Atmosphere Interaction Research  
*Sponsor:* Army Research Office  
*Funds:* \$240,771  
*Investigators:* Giometto M.G.
7. *Years:* 2023-2024  
*Title:* Distributed Sensor Network for Land-Atmosphere Interaction Research  
*Sponsor:* Army Research Office  
*Funds:* \$70,335  
*Investigators:* Giometto M.G.
8. *Years:* 2023-2026  
*Title:* Collaborative Research: Evaluating and Parametrizing Wind Stress over Ocean Surface Waves Using Integrated High-resolution Imaging and Numerical Simulations  
*Sponsor:* National Science Foundation  
*Funds:* \$652,118 (\$109,435 to Giometto)  
*Investigators:* Yousefi K., Zappa C., Giometto M.G. (Co-PI)
9. *Years:* 2023  
*Title:* Decentralized Information Management in the Environmental and Computational Sciences  
*Sponsor:* Army Research Office  
*Funds:* \$30,000  
*Investigators:* Giometto M.G. (PI), Earls C.
10. *Years:* 2023-2024  
*Title:* Distributed Sensor Network for Land-Atmosphere Interaction Research  
*Sponsor:* Army Research Office  
*Funds:* \$178,296  
*Investigators:* Giometto M.G.
11. *Years:* 2023-2024  
*Title:* Prime Air Hyperlocal Wind Model  
*Sponsor:* Amazon.com Inc., Prime Air Program  
*Funds:* \$231,309  
*Investigators:* Giometto M.G.
12. *Years:* 2023-2026  
*Title:* SCC-IRG Track 1: Preparing for Future Pandemics: Subway Crowd Management to Minimize Airborne Transmission of Respiratory Viruses (Way-CARE)  
*Sponsor:* National Science Foundation  
*Funds:* \$2,500,000 (\$260,703 to Giometto)  
*Investigators:* Di X., McNeill V.F., Giometto M.G. (Co-PI), Jiang X., Fuchs E.

13. *Years:* 2022  
*Title:* Distributed Sensor Network of Meteorological Towers  
*Sponsor:* Columbia University  
*Funds:* \$23,133  
*Investigators:* Giometto M.G. (PI), McNeill V.F.
14. *Years:* 2022-2023  
*Title:* Virtual and Augmented Reality for Urban Climate Modeling  
*Sponsor:* Columbia University, Emerging Technologies Consortium  
*Funds:* \$20,000  
*Investigators:* Giometto M.G.
15. *Years:* 2022-2025  
*Title:* Early Career Program: Quantifying the Impact of Surface Uncertainties on the Aerodynamic Properties of Built Environments  
*Sponsor:* Army Research Office  
*Funds:* \$360,000  
*Investigators:* Giometto M.G.
16. *Years:* 2022-2023  
*Title:* Defense University Research Instrumentation Program: Aerial Light Detection and Ranging System for Land-Atmosphere Interaction Research  
*Sponsor:* Army Research Office  
*Funds:* \$201,859  
*Investigators:* Giometto M.G.
17. *Years:* 2022-2025  
*Title:* Characterization of Hurricane Boundary Layer Turbulence for Wind Hazard Mitigation  
*Sponsor:* U.S. Department of Commerce, National Institute for Standards and Technology  
*Funds:* \$389,146  
*Investigators:* Giometto M.G.
18. *Years:* 2022-2024  
*Title:* Physics-Data Driven Surrogate Models for Vegetation-Atmosphere Interaction: Improved Parameterization of Turbulent Exchanges Between Plant Canopies and the Atmosphere  
*Sponsor:* LEAP Science and Technology Center at Columbia University  
*Funds:* \$276,039  
*Investigators:* Giometto M.G. (PI), Fish J., Ensheng W., Vondrick C., Lawrence D.
19. *Years:* 2021-2024  
*Title:* Snow Transport in Katabatic Winds and Implications for the Antarctic Surface Mass Balance: Observations, Theory, and Numerical Modeling  
*Sponsor:* National Science Foundation  
*Funds:* \$628,817 (\$390,064 to Giometto)  
*Investigators:* Giometto M.G. (PI), Das I.
20. *Years:* 2021-2023  
*Title:* Towards a Mechanistic Epidemiological Model via Computational Fluid Dynamics and Individual-Based Modeling  
*Sponsor:* Columbia University

*Funds:* \$170,000

*Investigators:* Giometto M.G. (PI), McNeill V.F., Shaman J., Sobel A.H.

21. *Years:* 2021-2023

*Title:* Heat And The City: Supporting Urban Planning in Marginalized Neighborhoods Via Coordinated Experiments and Simulations

*Sponsor:* Columbia University

*Funds:* \$25,000

*Investigators:* Giometto M.G.

22. *Years:* 2021-2022

*Title:* Multiscale Modeling of Hurricane Boundary Layer Flows

*Sponsor:* Computing Research Association

*Funds:* \$259,605

*Investigators:* Giometto M.G.

23. *Years:* 2019-2021

*Title:* Tracking Air Pollutants and Reconstructing 3-D Scalar Fields from 2-D Satellite Images via Machine Learning

*Sponsor:* Data Science Institute at Columbia University

*Funds:* \$190,000

*Investigators:* Giometto M.G. (PI), Gentine P., Vondrick C., Momen M.

24. *Years:* 2018

*Title:* GPU-accelerated Computing for CUIT Habanero Cluster

*Sponsor:* Columbia University

*Funds:* \$39,000

*Investigators:* Gentine P., Agrawal D., Sun W.C., Giometto M.G. (Co-PI), Waisman H.

## **FUNDED HIGH PERFORMANCE COMPUTING PROJECTS**

1. *Years:* 2023-2024

*Title:* Fundamental and Applied Studies of Turbulent Flow Phenomena in the Environment

*Sponsor:* Advanced Cyberinfrastructure Coordination Ecosystem: Services & Support

*Funds:* 27,000,000 core hours on the Purdue Anvil system. The estimated value of these resources is \$112,320

*Investigators:* Giometto M.G. (PI), Sathe A.S., Schmid M.F.

2. *Years:* 2023-2024

*Title:* Fundamental and Applied Studies of Turbulent Flow Phenomena in the Environment

*Sponsor:* Texas Advanced Computing Center

*Funds:* 144,000 node hours on the Frontera cluster. The estimated value of these resources is \$33,546

*Investigators:* Giometto M.G. (PI), Sathe A.S.

3. *Years:* 2022-2023

*Title:* Fundamental and Applied Studies of Turbulent Flow Phenomena in the Environment

*Sponsor:* Extreme Science and Engineering Discovery Environment

*Funds:* 240,000 node hours on the Stampede2 system, 5,364,000 core hours on the Purdue

Anvil system, and 5,000 GPU Hours on the Expanses system. The estimated value of these resources is \$89,918

*Investigators:* Giometto M.G. (PI), Schmid M.F., Sathe A.S.

4. *Years:* 2021-2022

*Title:* Fundamental and Applied Studies of Turbulent Flow Phenomena in the Environment

*Sponsor:* Extreme Science and Engineering Discovery Environment

*Funds:* 150,000 node hours on the Stampede2 system and 3,600,000 core hours on the Bridges-2 system. The estimated value of these resources is \$56,055

5. *Years:* 2021-2022

*Title:* AWS Cloud Credits for Research for Scholars and Amazon Visiting Academics

*Sponsor:* Amazon Web Services

*Funds:* \$100,000 in Amazon Web Services Cloud Credits

*Investigators:* Giometto M.G. *Investigators:* Giometto M.G. (PI), Li W.

6. *Years:* 2020-2021

*Title:* Characterizing the Impact of Air Currents on Droplets and Aerosols Dispersion

*Sponsor:* COVID-19 High Performance Computing Consortium

*Funds:* 600,000 node hours on the Stampede2 and Frontera systems. The estimated value of these resources is \$155,759

*Investigators:* Giometto M.G. (PI), Hora G.S.

7. *Years:* 2020-2021

*Title:* Turbulence Structure of Extreme Winds in Hurricanes and Its Impacts on Urban and Coastal Environments

*Sponsor:* Extreme Science and Engineering Discovery Environment

*Funds:* 81,387 node hours on the Stampede2 system. The estimated value of these resources is \$21,128

*Investigators:* Giometto M.G.

8. *Years:* 2019-2020

*Title:* Turbulence Structure of Extreme Winds in Hurricanes and its Impacts on Urban Environments

*Sponsor:* Extreme Science and Engineering Discovery Environment

*Funds:* 106,454 node hours on the Stampede2 system, equivalent to \$27,635

*Investigators:* Giometto M.G. (PI), Momen M.

## EDITORSHIPS AND REVIEWS

- *Associate Editor:* Journal of the Atmospheric Sciences (JAS), 2021 – present
- *Reviewer of manuscripts for:* Journal of Fluid Mechanics, Physical Review Fluids, Physics of Fluids, Boundary-Layer Meteorology, Journal of the Atmospheric Sciences, Journal of Geophysical Research, Quarterly Journal of the Royal Meteorological Society, Environmental Fluid Mechanics, Journal of Wind Engineering & Industrial Aerodynamics, Geophysical Model Development, Theoretical and Applied Climatology, Journal of Urban Climate, Building and Environment, Agricultural and Forest Meteorology, Atmospheric Science Letters, Journal of Engineering Mechanics, Risk and Uncertainty in Engineering Systems Part B: Mechanical Engineering, Urban Forestry and Urban Greening, Journal of Renewable and Sustainable Energy, Atmospheric Chemistry and Physics.

- *Reviewer of proposals for:* National Science Foundation, Army Research Office.

## MEMBERSHIP IN PROFESSIONAL SOCIETIES

- American Geophysical Union (AGU)
- American Meteorological Society (AMS)
- American Society of Civil Engineers (ASCE)
- Engineering Mechanics Institute (EMI)
- American Physical Society (APS)

## SERVICE TO THE SCIENTIFIC COMMUNITY

- *Committee member:* Engineering Mechanics Institute (EMI), Fluid Dynamics Technical Committee, 2021 – present.
- *Mentor:* Young Italian Scientists & Scholars in North America Foundation Mentoring Program, 2022 – present.
- *Chair:* Fluid Dynamics Student Paper Competition, Engineering Mechanics Institute, 2022 – present.
- *Convener and session chair:* Advances in modeling wind and its effects on the built environment, Engineering Mechanics Institute Conference, Chicago, IL, 2024.
- *Convener and session chair:* Boundary Layer Processes and Turbulence, AGU Fall Meeting, San Francisco, CA, 2023.
- *Session chair:* Geophysical Fluid Dynamics: Atmospheric I, American Physical Society, Division of Fluid Dynamics 76th Annual Meeting in Washington, D.C., 2023.
- *Convener and session chair:* Analysis and Prediction of Wind Effects on the Built Environment, Engineering Mechanics Institute Conference, Atlanta, GA, 2023.
- *Convener and session chair:* Analysis and Prediction of Wind Effects on the Built Environment, Engineering Mechanics Institute Conference, Baltimore, MD, 2022.
- *Convener and session chair:* Boundary Layer Processes and Turbulence, AGU Fall Meeting, Chicago, IL, 2022.
- *Convener and session chair:* Boundary Layer Processes and Turbulence, AGU Fall Meeting, New Orleans, LA, 2021.
- *Convener and session chair:* Analysis and Prediction of Wind Effects on the Built Environment, Engineering Mechanics Institute Conference, Virtual, 2021.
- *Session chair:* Boundary Layer Processes and Turbulence, AGU Fall Meeting, Virtual, 2020.
- *Program committee member:* NY Scientific Data Summit, 2019.
- *Member of the organizing committee:* World Congress in Computational Mechanics, 2018.
- *Convener and session chair:* Advances in numerical modeling and physical understanding of turbulent boundary-layer flows, World Congress in Computational Mechanics, 2018.
- *Session chair:* Numerical modeling of urban processes, 10th International Conference on Urban Climate, 2018.

## SERVICE TO THE UNIVERSITY

- *Affiliated member*: Earth Institute, Columbia University, 2021 – present.
- *Member*: Data Science Institute, Columbia University, 2018 – present.
- *Chair*: Communications Committee, Department of Civil Engineering and Engineering Mechanics, Columbia University, 2020 – present.
- *Member*: MS Specialization in Computational and Data Driven Engineering Mechanics committee, Department of Civil Engineering and Engineering Mechanics, Columbia University, 2020 – present.
- *Member*: Faculty Hire Committee, Department of Civil Engineering and Engineering Mechanics, Columbia University, 2023 – present.
- *PhD defense committee member*:
  1. Fabien Margairaz, Mechanical Engineering, University of Utah, 2018.
  2. Braden Czapla, Mechanical Engineering, Columbia University, 2018.
  3. Kun Wang, Civil Engineering and Engineering Mechanics, Columbia University, 2019.
  4. Cheng Yu, Earth and Environmental Engineering, Columbia University, 2020.
  5. Ioannis Petromichelakis, Civil Engineering and Engineering Mechanics, Columbia University, 2020.
  6. Arvind Srinivasan, Mechanical Engineering, Columbia University, 2020.
  7. Chunlin Wu, Civil Engineering and Engineering Mechanics, Columbia University, 2021.
  8. Nikolaus Vlassis, Civil Engineering and Engineering Mechanics, Columbia University, 2021.
  9. Manuel Schmid, Civil Engineering, University of British Columbia, Canada, 2022.
  10. Yang Yu, Civil Engineering and Engineering Mechanics, Columbia University, 2023.
- *Organizer*: Civil Engineering and Engineering Mechanics Department seminar series, 2021 – 2023.
- *Coursework / Career advisor*: 4× BS and 4× MS students per year in Civil Engineering and Engineering Mechanics, Columbia University, 2021 – present.
- *Coursework / Career advisor*: Prospective Columbia Egleston Scholars (top 1% of the undergraduate Columbia Engineering applicants), 2022.
- *Outreach*: Faculty mentor for the Amazon Summer Undergraduate Research Experience (SURE) Program (2 undergraduate students per year join PI Giometto's lab to conduct summer research activities), 2021 – 2023.

## COURSES TAUGHT

- Undergraduate: Fluid Mechanics, 2018 – present.
- Graduate: Turbulence Theory and Modeling 2018 – present.

## ADVISING EXPERIENCE

*Postdocs and Research Staff:*

- Jérémie Janin, 2023 – present
- Weiyi Li, 2023 – present
- Manuel Schmid, 2023 – present
- Jaeyoung Jung, 2023 – present
- Amos Fishman-Resheff, 2024 – present
- Kianoosh Yousefi, 2021 – 2022, now Assistant Professor at UT Dallas
- Mostafa Momen, 2018 – 2019, now Assistant Professor at the University of Houston

*PhD Students:*

- Kishore Sathia, 2023 – present
- Pawan Chandiramani, 2022 – present
- Atharva Sathe, 2021 – present
- Gurpreet Singh Hora, 2020 – present
- Beatrice Giacomini, 2018 – 2023, now at Virtu Financial Operating LLC
- Weiyi Li, 2018 – 2023, now Postdoc at the Environmental Flow Physics Laboratory
- Manuel Schmid (co-advised with Prof. M.B. Parlange), 2018 – 2022, now Postdoc at the Environmental Flow Physics Laboratory

*Master Students:*

- Kealan Hennessey, 2022 – 2023
- Hongshuo Yang, 2021 – 2023
- Kiran Sreenivasa, 2022
- Zejian You, 2021 – 2022
- Arunit Maity, 2021
- Yicheng Li, 2019 – 2021
- Tieliang Huang, 2019 – 2020

*Undergraduate Students:*

- Anna Zueva, 2024 – present
- Mari Chikaarashi, 2024 – present
- Ana Mateo-Jerez, 2024 – present
- Emily Shang, 2024 – present
- Kyle Chen, 2024 – present
- Sky Mingyang Sun, 2024 – present
- Shiv Kampani, 2022 – present
- Doyup Kwon, 2023
- Pierce Rubenstein, 2023
- Hayato Takai, 2022 – 2023
- Justin Walkup, 2022 – 2023
- Michael L. Garcia, 2021 – 2022
- Andrei Coman, 2021 – 2022
- Meera Mavroidis, 2021
- Onyinyechi Obineche, 2021
- Daniel Kolano, 2020 – 2021
- Christine Ye Shu Blackshaw, 2020 – 2021

- Shinya Michael Kondo, 2018 – 2020
- Cheng Bi, 2018 – 2019

*Visiting Scholars:*

- Sofia Farina, PhD student, University of Trento, Italy, 2022 – 2023.
- Simone Boi, Postdoc, Helsinki University, Finland, 2020.
- Jean Lac, BS student, ENS Paris Saclay, France, 2020.
- Sophie Abramian, BS student, ENS Paris Saclay, France, 2018 – 2019.
- Yuxi Guan, PhD student, Wuhan University, China, 2018 – 2019.