PIERRE GENTINE
Maurice Ewing and J. Lamar Worzel Professor
Department of Earth and Environmental Engineering
Department of Earth and Environmental Sciences
Columbia University
500 West 120th Street, Mudd 842C, New York, NY 10027
Phone: (347) 401 0345, Fax: (212) 854 7081
Email: pg2328@columbia.edu

FIELDS OF SPECIALIZATION

- Continental hydrological and carbon cycles, with a focus on the physics of biosphere-atmosphere interactions, ecohydrology, remote sensing, turbulence and convection and machine learning.

EDUCATION

2007-2010	Ph. D., Civil and Environmental Engineering, Massachusetts Institute of Technology Advisor: Dr. Dara Entekhabi Dissertation Title: Spectral behavior of the land-atmosphere system
2004-2006	M.Sc., Civil and Environmental Engineering, Massachusetts Institute of Technology
1997-2002	M.Eng. – "Ingénieur" degree SupAéro – French National Aeronautical and Space Engineering school, Applied Mathematics, Toulouse, France

PROFESSIONAL RECORD

2021-	Director, National Science Foundation Science and Technology Center (STC) Learning the Earth with Artificial intelligence and Physics (LEAP), Columbia University
2021-	Maurice Ewing and J. Lamar Worzel Professor of Geophysics, Columbia University
2021-	Full Professor, Columbia University
2018-	Faculty member, Earth Institute, Columbia University (by nomination)
2018-	Faculty member, Data Institute, Columbia University (by nomination)
2017-	Tenured Associate Professor, Earth and Environmental Engineering, Columbia University
2016-2017	Associate Professor, Earth and Environmental Engineering, Columbia University
2013-2017	Junior faculty, Earth Institute, Columbia University (by nomination)
2011-2016	Assistant Professor, Earth and Environmental Engineering, Columbia University
2009-2011	Instructor, Applied Physics and Applied Mathematics, Columbia University
2006-2007	Quantitative Engineer – Natixis equity derivatives
2002-2004	Engineer – French Space Agency (CNES)

HONORS AND AWARDS

- Humboldt award (2021 – declined offer)
- National Science Foundation Science and Technology Center (STC) award (2021)
- Maurice Ewing and J. Lamar Worzel endowed professorship (2021)
- European Research Council Synergy Award (2019)
- Columbia University nominated candidate for the 2019 Blavatnik award
- American Geophysical Union (AGU)
  Global Environmental Change Early Career Award (2017)
- American Meteorological Society (AMS) Clarence Meisinger Award (2017)
- Invited scientist at ECMWF (European Centre for Medium range Weather Forecast - 2016)
- NSF CAREER award (2016)
- Department of Energy (DOE) Early Career award (2015)
- NASA New Investigator Program (early career) award (2014)
- Excellence in refereeing – Geophysical Research Letters (2013)
- Invited professorship award – Wageningen University (2013)
- Invited professorship award – Ecole Normale Superieure (2012)
- Shoettler fellowship MIT (2004-2006)

PUBLICATIONS: PEER REVIEWED JOURNAL ARTICLES

(Students are in bold red, Post-Docs are underlined, co-advised students are in bold and italic)

In press/published

1. Davis SJ, Liu Z., et al., **Gentine P**, Ciais P. (2022). Emissions rebound from the COVID-19 pandemic *Nature Cliamte Change*, doi: 10.1038/s41558-022-01332-6
2. Zhou K, Zhang, Q, Xiong L, & **Gentine P** (2022). Estimating evapotranspiration using remotely sensed solar-induced fluorescence measurements. *Agricultural and Forest Meteorology*, 314, 108800, https://doi.org/10.1016/j.agrformet.2021.108800
3. Xi X, **Gentine P**, Zhuang Q, & Kim S (2022). Evaluating the Variability of Surface Soil Moisture Simulated Within CMIP5 Using SMAP Data. *Journal of Geophysical Research: Atmospheres*, 127(5), https://doi.org/10.1029/2021jd035363
4. Fu J, Kang S, Zhang L, Li X, **Gentine P**, & Niu J (2022). Amplified warming induced by large-scale application of water-saving techniques. *Environmental Research Letters*, 17(3), 34018, https://doi.org/10.1088/1748-9326/ac4b52
5. **Green JK**, Ballantyne A, Abramoff R, **Gentine P**, Makowski D & Ciais P (2022). Surface temperatures reveal the patterns of vegetation water stress and their environmental drivers across the tropical Americas. *Global Change Biology*, https://doi.org/10.1111/gcb.16139
6. Wang R, **Gentine P**, Li L, Chen J, Ning L, Yuan L, & L G (2022). Observational evidence of regional increasing hot extreme accelerated by surface energy partitioning. *Journal of Hydrometeorology*, https://doi.org/10.1175/jhm-d-21-0114.1
7. Prigent C, Jimenez C, Dinh LA, Frappart F, **Gentine P**, Wigneron J-P, & Munchak J (2022). Diurnal and Seasonal Variations of Passive and Active Microwave Satellite Observations Over Tropical Forests. *Journal of Geophysical Research: Biogeosciences*, 127(2), https://doi.org/10.1029/2021jg006677
8. ***Wang R***, Li L, **Gentine P**, Zhang Y, Chen J, Chen X, Chen L, Ning L, Yuan L, & L G (2022). Recent increase in the observation-derived land evapotranspiration due to global warming. *Environmental Research Letters*, 17(2), 24020, https://doi.org/10.1088/1748-9326/ac4291

9. Fu Z, Ciais P, Prentice IC, **Gentine P**, Makowski D, Bastos A et al. (2022). Atmospheric dryness reduces photosynthesis along a large range of soil water deficits. *Nature Communications*, 13(1), https://doi.org/10.1038/s41467-022-28652-7
10. Dou X, Wang Y, Ciais P, Chevallier F, Davis SJ, Crippa M, …, **Gentine P**, Deng Z, & Liu Z (2022). Near-real-time global gridded daily CO2 emissions. *The Innovation*, 3(1), https://doi.org/10.1016/j.xinn.2021.100182
11. **Gentine P**, Eyring V, & Beucler T (2021). Deep Learning for the Parametrization of Subgrid Processes in Climate Models. *Deep Learning for the Earth Sciences*, 307-314, https://doi.org/10.1002/9781119646181.ch21
12. **Cheng Y**, Li Q, Li D, & **Gentine P** (2021). Logarithmic profile of temperature in sheared and unstably stratified atmospheric boundary layers. *Physical Review Fluids*, 6(3), https://doi.org/10.1103/physrevfluids.6.034606
13. Liu Y, Konings AG., Kennedy D, & **Gentine P** (2021). Global Coordination in Plant Physiological and Rooting Strategies in Response to Water Stress. *Global Biogeochemical Cycles*, 35(7), https://doi.org/10.1029/2020gb006758
14. Chen X, Su Z, Ma Y, Trigo I, & **Gentine P** (2021). Remote Sensing of Global Daily Evapotranspiration based on a Surface Energy Balance Method and Reanalysis Data. *Journal of Geophysical Research: Atmospheres,* 126(16), , https://doi.org/10.1029/2020jd032873
15. Frankenberg C, Yin Y, Byrne B, He L, & **Gentine P** (2021). Comment on "Recent global decline of CO 2 fertilization effects on vegetation photosynthesis". *Science*, 373(6562), https://doi.org/10.1126/science.abg2947
16. Beucler T, Ebert-Uphoff I, Rasp S, Pritchard M, & **Gentine P** (2021). *Machine Learning for Clouds and Climate (Invited Chapter for the AGU Geophysical Monograph Series "Clouds and Climate").,* https://doi.org/10.1002/essoar.10506925.1
17. Feldman AF, Gianotti DJ, Konings AG, **Gentine P**, & Entekhabi D (2021). Patterns of plant rehydration and growth following pulses of soil moisture availability. *Biogeosciences*, 18(3), 831-847, https://doi.org/10.5194/bg-18-831-2021
18. Peters-Lidard CD., Mocko DM, Su L, Lettenmaier DP, **Gentine P,** & Barlage M (2021). Advances in Land Surface Models and Indicators for Drought Monitoring and Prediction. *Bulletin of the American Meteorological Society*, 1-68, https://doi.org/10.1175/bams-d-20-0087.1
19. Liu Y, Chen D, Mouatadid S, Lu X, Chen M, Cheng Y, Xie Z, Jia B, Wu H, & **Gentine P** (2021). Development of a Daily Multilayer Cropland Soil Moisture Dataset for China Using Machine Learning and Application to Cropping Patterns. *Journal of Hydrometeorology,* 22(2), 445-461, https://doi.org/10.1175/jhm-d-19-0301.1
20. He W, Ju W, Jiang F, Parazoo N, **Gentine P**, et al (2021). Peak growing season patterns and climate extremes-driven responses of gross primary production estimated by satellite and process based models over North America. *Agricultural and Forest Meteorology*, 298, 108292, https://doi.org/10.1016/j.agrformet.2020.108292
21. Tran H, Leonarduzzi E, Fuente L, Hull RB, Bansal V, Chennault C, **Gentine P**, Melchior P, Condon LE & Maxwell RM. (2021). Development of a Deep Learning Emulator for a Distributed Groundwater–Surface Water Model: ParFlow-ML. *Water*, 13(23), 3393, https://doi.org/10.3390/w13233393
22. Zhou S, Williams AP, Lintner BR, Berg AM, Zhang Y, Keenan TF, Cook BI, Hagemann S, Seneviratne SI, & **Gentine P** (2021). Soil moisture–atmosphere feedbacks mitigate declining water availability in drylands. *Nature Climate Change*, 11(1), 38-44, https://doi.org/10.1038/s41558-020-00945-z
23. Yang X, Wu J, … **Gentine P**, & Wright SJ (2021). A comprehensive framework for seasonal controls of leaf abscission and productivity in evergreen broadleaved tropical and subtropical forests. *The Innovation*, 2(4), 100154, https://doi.org/10.1016/j.xinn.2021.100154
24. Chen X, Ciais P, Maignan, …, **Gentine P**, et al. (2021). Vapor Pressure Deficit and Sunlight Explain Seasonality of Leaf Phenology and Photosynthesis Across Amazonian Evergreen Broadleaved Forest. *Global Biogeochemical Cycles*, 35(6), https://doi.org/10.1029/2020gb006893

25. Yazbeck ZT, Bohrer G, **Gentine P**, et al. (2021). Site Characteristics Mediate the Relationship Between Forest Productivity and Satellite Measured Solar Induced Fluorescence. *Frontiers in Forests and Global Change*, 4, https://doi.org/10.3389/ffgc.2021.695269
26. Liu L, Ciais P, …, **Gentine P,** et al. (2021). Tropical tall forests are more sensitive and vulnerable to drought than short forests. *Global Change Biology*, 28(4), 1583-1595, https://doi.org/10.1111/gcb.16017
27. Konings AG, Saatchi SS, Frankenberg C, …, **Gentine P**, et al (2021). Detecting forest response to droughts with global observations of vegetation water content. *Global Change Biology*, 27(23), 6005-6024
28. Bastos A., Ciais P., Reichstein M, **Gentine P**. , (2021). Increased vulnerability of European ecosystems to consecutive hot and dry summers in 2018/19, *Earth System Dynamics*, *12*(4), 1015-1035, ISSN 2190-4987
29. **Wang R**., Zhang Y., Zhou S., **Gentine P**, (2021). Long-term relative decline in evapotranspiration despite increased runoff, *Hydrology and Earth System Sciences*, *25*(7), 3805-3818,
30. **Massmann, A**., **Gentine, P.,** & Runge, J. (2021). Causal inference for process understanding in Earth sciences. *arXiv e-prints*, arXiv-2105.
31. Braghiere B., Wang; Y., Doughty R., Souza D., Magney T., Widlowski, J-L., Longo M., Bloom A., Worden J., **Gentine P.,** Frankenberg C., (2021), Accounting for canopy structure improves hyperspectral radiative transfer and sun-induced chlorophyll fluorescence representations in a new generation Earth System model, *Remote Sens Env.* 261 (2021): 112497.
32. Chen X. Ciais P., et al., **Gentine P.,** (2021), Vapor pressure deficits and sunlight explain seasonality of leaf phenology and photosynthesis across Amazonian evergreen broadleaved forest, *Global Biochemical Cycles*
33. Fang Y., Leung L.-Y., et al., **Gentine P.,** (2021), Disentangling the effects of vapor pressure deficit and soil water availability on canopy conductance in a seasonal tropical forest during the 2015 El Niño drought, *JGR Atmosphere*
34. Mooers G., Pritchard M., Beucler T., Ott J., Yacalis G., Baldi P., Gentine P., (2021), Assessing the Potential of Deep Learning for Emulating Cloud Superparameterization in Climate Models with Real-Geography Boundary Conditions, *JAMES,13*(5),
35. Li Q., **Cheng Y.,** **Gentine P.,** (2021), Connection between mass flux transport and eddy diffusivity in convective atmospheric boundary layers, *Geo Res Letters*, doi: 10.1029/2020GL092073
36. ***Wang C***., Tang G., **Gentine P.**, and Hong Y., (2021), PrecipGAN: Merging Microwave and Infrared Data for Satellite Precipitation Estimation using Generative Adversarial Network, *Geo Res Letters*, doi: 10.1029/2020GL092032
37. Beucler T., Pritchard M., Rasp S., **Gentine P.**, (2021), Enforcing analytic constraints in neural-networks emulating physical systems, *Phys Rev Letters,* doi: 10.1103/PhysRevLett.126.098302 Editor's highlight
38. ***Yin J.,*** Sullivan S., **Gentine P.**, (2021), Does the Hook Structure Constrain Future Flood Intensification under Anthropogenic Climate Warming?, *Water Resources Res*, 57(2), doi: 10.1029/2020WR028491
39. Worden J., et al., **Gentine P**, et al., (2021), Satellite Observations of the Tropical Terrestrial Carbon Balance and Interactions with the Water Cycle During the 21st Century, *Review of Geophysics,* 59(1), doi: 10.1029/2020RG000711
40. He W., Parazoo N.C., **Gentine P**, et al., (2021), Peak growing-season patterns and climate extremes-driven responses of gross primary production estimated by satellite and process-based models over North America, *Ag Forest Meteor*, doi: 10.1016/j.agrformet.2020.108292
41. Humphrey V., Ciais P., **Gentine P**., Reichstein M., Seneviratne S., (2021), Soil moisture–atmosphere feedback dominates land carbon uptake variability, *Nature,* doi: 10.1038/s41586-021-03325-5
42. Sun, S., Che, T., **Gentine, P.**, Chen, A., Wang, L., Yan, Z., Chen, B., Song, Z., (2021), Shallow groundwater inhibits soil respiration and favors carbon uptake in a wet alpine meadow ecosystem, *Ag Forest Meteor, 297,* doi: 10.1016/j.agrformet.2020.108254

43. Scott R., J.F., Knowles, J., Nelson J., **Gentine P.**, ***Li X.***, Barron-Gafford G., Bryant R., Biederman J., (2021), Water Availability Impacts on Evapotranspiration Partitioning, *Ag Forest Meteor*, doi: 10.1016/j.agrformet.2020.108251
44. ***Schlund M.***, Lauer A., **Gentine P.**, Sherwood S.C, Eyring V., (2020), Emergent constraints on Equilibrium Climate Sensitivity in CMIP5: do they hold for CMIP6?, *Geo Mod Dev*, doi: 10.5194/esd-11-1233-2020
45. Schiro K., Sullivan S., **Gentine P.**, …, Neelin D., (2020), Environmental controls on tropical mesoscale convective system precipitation intensity, *J Atmos Sci*, doi:10.1175/JAS-D-20-0111.1
46. Chen C., Li D., Li Y., Piao S., Wang X., Huang M., **Gentine P.**, Brokvin V., Nemani R.R., Myneni R.B., (2020), Biophysical impacts of Earth greening largely controlled by aerodynamic resistance, *Science Adv*, doi: 10.1126/sciadv.abb1981
47. Schlund M., Eyring V., Camps-Valls G., Friedlingstein P., **Gentine P.**, (2020), Reichstein M., Constraining uncertainty in projected gross primary production with machine learning, *JGR Biogeosciences*, doi: 10.1029/2019JG005619.
48. Zhou W., Guan K., Peng B., Shi J., Jiang C., Wardlow B., Pan M., Kimball JS., **Gentine P.**, (2020), Connections between the hydrological cycle and crop yield in the rainfed US Corn Belt, *Journal of Hydrology* 590, 125398
49. **Green J.**, Berry J., Ciais P., Zhang Y., **Gentine P.**, (2020), Amazon rainforest photosynthesis increases in response to atmospheric dryness*, Science Adv*, doi: 10.1126/sciadv.abb7232
50. Von Schukmann, K., et al**. Gentine P.**, (2020), Heat stored in the Earth system: Where does the energy go?, *Earth Sys Sci Data,* doi: 10.5194/essd-12-2013-2020
51. Maes W., Pagán B., Martens B., **Gentine P.,** Miralles D., (2020), Sun-induced fluorescence closely linked to ecosystem transpiration as evidenced by satellite data and radiative transfer models, *Remote Sensing of Environment,* 249*,* 112030
52. **Cheng Y**, Li Q, Grachev A, Argentini S, Fernando HJS, **Gentine P**, (2020), On the Power-law Scaling of Turbulence Cospectra in the Stably Stratified Atmospheric Boundary Layer, *Boundary Layer Meteor,* **177**, 1-18. doi:10.1007/s10546-020-00545-6
53. Zhu W., Jia S., Lall U., **Cheng Y.**, **Gentine P.**, (2020), An observation-driven optimization method for continuous estimation of evaporative fraction over large heterogeneous areas, *Remote Sensing of Environment* , 247, 111887, doi: 10.1016/j.rse.2020.111887
54. Jonard F., Brüggemann N., **Gentine P.**, De Cannière S., Lobet G., Miralles D., Montzka C., Rascher U., Vereecke H., (2020), Value of chlorophyll fluorescence for quantifying hydrological states and fluxes: current status and challenges, *Ag Forest Meteor*, doi: 10.1016/j.agrformet.2020.108088
55. Sullivan S., Schiro K., ***Yin J.,*** **Gentine P,** (2020), Changes in tropical precipitation intensity with El Niño warming, *Geo Res Letters*, doi: 10.1029/2020GL087663
56. Lai C.Y., Kingslake J., Wearing M., Chen P.C., **Gentine P.,** Li H., Spergel J., (2020), Vulnerability of Antarctica's ice shelves to meltwater-driven fracture, *Nature*, doi: 10.1038/s41586-020-2627-8
57. ***Zhao W.***, Qiu G., Xiong Y., Tha Paw U K., **Gentine P**., Chen B. (2020), Uncertainty caused by resistances in evapotranspiration estimation, *HESS,* doi: 10.5194/hess-2019-160
58. Zhang Y., Commane R., Williams A.P, Zhou S., **Gentine P.**, (2020), Light limits northern latitude end-of-season carbon uptake, *Nature Climate Change*, doi: 10.1038/s41558-020-0806-0
59. Vila-Guerau de Arellano J., Wang X., Pedruzo-Bagazgoitia X., Sikma M., Panareda A.-A., Boussetta S., Balsamo G., Machado L. A. T., **Gentine P.,** Martin S. T., Fuentes J. D and Gerken T., (2020), Interactions between the Amazonian rainforest and cumuli clouds: A large-eddy simulation, high-resolution ECMWF and observational intercomparison study, *JAMES,* doi: 10.1029/2019MS001828
60. Zhang Y., Williams A.P, Pao S., Zhou S., **Gentine P.**, (2020), Large and potentially strengthening moisture limitation on end-of-season photosynthesis, *PNAS,* doi: 10.1073/pnas.1914436117
61. **Cheng Y**, Li Q, Argentini S, Sayde C, **Gentine P**, (2020), A model for Turbulence Spectra in the Equilibrium Range of the Stable Atmospheric Boundary Layer, *J Geo Res- Atmos*, doi: 10.1029/2019JD032191

62. Kimm H., Guan K., **Gentine P.,** Wu J., Lin C., Bernacchi C.J., and Sulman B.J., (2020), Redefining droughts for the U.S. Corn Belt: the dominant role of VPD over soil moisture in regulating stomatal behavior of Maize and Soybean, *Ag Forest Meteorology,* doi: 10.1016/j.agrformet.2020.107930
63. Clifton O.E., Fiore A.M., et al., **Gentine P**., (2020), Dry deposition of ozone over land: processes, measurement, and modeling, *Reviews of geophysics,* doi:10.1029/2019RG000670
64. **Guérin M**., Benito-Martin D., Griffin K., Hamdam R., Andreu-Hayles L., McDowell N., Pockman W., Von Arx G., **Gentine P**., (2020), Distinct xylem responses to acute vs. prolonged drought in pine trees, *Tree Physiology*, doi: 10.1093/treephys/tpz144
65. Tajfar E., Bateni, S.M., Margulis S.A., **Gentine P.,** Auligne T., (2020), Estimation of Turbulent Heat Fluxes via Assimilation of Air Temperature and Specific Humidity into a Coupled Land Surface-Atmospheric Boundary Layer Model, *J Hydrometorology,* doi: 10.1175/JHM-D-19-0104.1
66. ***Zhao W.***, **Gentine P**., Reichstein M., Zhang Y., Zhou S., Wen Y., Lin C., Li X., Qiu, G.Y., (2019), Physics-constrained machine learning of evapotranspiration, *Geo Res Letters,* doi:10.1029/2019GL085291
67. Lawrence D., …, **Gentine P**. et al., (2019), The Community Land Model version 5: Description of new features, benchmarking, and impact of forcing uncertainty, *JAMES,* doi: 10.1029/2018MS001583
68. ***Yang T.,*** Sun F., **Gentine P**., Liu We., Wang H., Yin J., Du M., Liu C., (2019), Evaluation and machine learning improvement of global hydrological model-based flood simulations, *Env. Res. Letters*, doi: 10.1088/1748-9326/ab4d5e
69. Zhang Y., Zhou S, **Gentine P**., Xiao X., Basara J., (2019), Can vegetation optical depth reflect changes in leaf water potential during drought?, *Rem Sens Env,* doi: 10.1016/j.rse.2019.111451
70. **Massmann A.**, Lin C., **Gentine P.,** (2019), When does vapor pressure deficit drive or reduce evapotranspiration?, *JAMES*, doi: 10.1029/2019MS001790
71. **Gentine P.,** Massmann A., Fu. R, Kennedy D., Green J., Lintner. B., Villa-Guerau J., (2019), Land-atmosphere interactions in the tropics, *HESS, doi:* 10.5194/hess-23-4171-2019
72. Stoy, P., El-Madany, T., Fisher, J., **Gentine, P**., et al., (2019), Reviews and syntheses: Turning the challenges of partitioning ecosystem evaporation and transpiration into opportunities, *Biogeoscience, doi:* 10.5194/bg-16-3747-2019
73. Zhou S., Wiliams A.P, Seneviratne S.I., Berg A.M., Findell K.L., Hagemann S., Lawrence D.M., **Gentine P.**, (2019), Land-atmosphere feedbacks exacerbate compound drought and atmospheric aridity events, *PNAS,* doi: 10.1073/pnas.1904955116
74. Sullivan S., Schiro K., **Gentine P,** (2019), The response of tropical organized convection to El Niño warming, *JGR-Atmosphere,* doi:10.1029/2019JD031026
75. ***Lin C.,*** **Gentine P**., Frankenberg C., Zhou S., **Kennedy D**., (2019), Evaluation of ecosystem diurnal hysteresis and mechanism exploration, *Ag Forest Meteor,* doi:10.1016/j.agrformet.2019.107642
76. Anber U., Wang S., **Gentine P**., and Jensen M.P., (2019), Probing the response of tropical deep convection to aerosol perturbations using idealized cloud-resolving simulations with parameterized large-scale dynamics, *J Atmos Sci*., doi:10.1175/JAS-D-18-0351.1
77. McColl, K.G., Salvucci G.D., and **Gentine P.**, (2019), Surface flux equilibrium theory explains an empirical estimate of daily evapotranspiration, *JAMES,* doi: 10.1029/2019MS001685
78. Yu V., Shang S., Zhu W., **Gentine P**, Cheng Y., (2019), Mapping daily evapotranspiration over a large irrigation district from MODIS data using a novel hybrid dual-source coupling model, *Agr Forest Meteor,* doi: 10.1016/j.agrformet.2019.06.011
79. **Gentine P,** Green J.K., Guérin M., Humphrey V., Seneviratne S.I., Zhang Y., Zhou S., (2019), Coupling between the continental carbon and water cycles, *Env. Res. Letters*, doi: 10.1088/1748-9326/ab22d6
80. Barros F., Bittencourt P., Monteiro-Junior M., Restrepo-Coupe N., Pereira L., Teodoro G., Borma L., Saleska S., Christoffersen B., Penha D., Alves L., Lima A., Carneiro V., **Gentine P**., Lee J., Cruz de A., Luiz E., Ivanov V., Leal L., Araujo A., Oliveira R., (2019), Differential responses of Amazonian forests to El Nino-induced drought are explained by hydraulic traits, *New Phytologist, doi:* 10.1111/nph.15909

81. Maes W., **Gentine P.**, Verhoest N., Miralles D., (2019), Potential evaporation at eddy-covariance sites across the globe, *HESS,* 23, 925-948
82. Pagán B., Maes W., **Gentine P.,** Martens B., Miralles D., (2019), Exploring the potential of satellite solar-induced fluorescence to constrain global transpiration estimates, *Remote Sensing*, doi: 10.3390/CHyCle-2017-04874
83. **Kennedy D.**, Fisher R., Bonan G., Lawrence D., **Gentine P.**, (2019), Implementation of a plant hydraulics scheme in the Community Land Model (CLM), *JAMES*, doi: 10.1029/2018MS001500
84. Novick K., Konings A., **Gentine P.**, (2019), Beyond soil water potential: An expanded view on isohydricity including land-atmosphere interactions and phenology, *Plant Cell and Env,* doi: 10.1111/pce.13517
85. **Li X., Gentine P.,** et al. (2019), A simple and objective method to partition evapotranspiration into transpiration and evaporation at eddy-covariance sites, *Ag Forest Meteor,* doi: 10.1016/j.agrformet.2018.11.017
86. **Green J.K,** Seneviratne S.I., Berg A.M., Findell K.L., Hagemann S., Lawrence D.M., **Gentine P.**, (2019), Large influence of soil moisture on terrestrial carbon cycle, *Nature,* **565**, 476-479
87. Zhou S., Zhang Y., A. P. Williams, **Gentine P.**, (2019), Large decline in carbon uptake due to compound drought and aridity events, *Science Advances,* doi: 10.1126/sciadv.aau5740
88. Dirmeyer P.A., **Gentine P.**, Ek M.B., Balsamo G., (2019), Land Surface Processes Relevant to Sub-seasonal to Seasonal (S2S) Prediction, *Sub-Seasonal to Seasonal Prediction*, 165-181
89. Balsamo G., …, **Gentine P.**, et al., (2018), Satellite and in situ observations for advancing global Earth surface modelling: a review, *Remote Sensing,* doi:10.3390/rs10122038
90. **Lemordant L**. and Gentine P., (2018), Vegetation response to rising CO_2 impacts extreme temperatures, *Geo. Res. Letters,46*(3), 1383-1392.
91. van Emmerik T., Steele-Dunne S., **Gentine P.**, Oliveira R.S., Bittencourt P., Barros F., and van de Giesen N., (2018), Ideas and perspectives: Tree-atmosphere interaction responds to water-related stem variations, *Biogeoscience, 15*(21), 6439-6449.
92. Alemohammad S.H., Kolassa J., Prigent C., Aires F. and **Gentine P**. (2018), Global Downscaling of Remotely-Sensed Soil Moisture using Neural Networks, *HESS,* doi: 10.5194/hess-2017-680
93. Zhang Y., Joiner J., Alemohammad S.H., Zhou S., **Gentine P.**, (2018), A global spatially Contiguous Solar Induced Fluorescence (CSIF) dataset using neural networks. *Biogeosciences*. doi: 10.5194/bg-2018-255
94. ***Yin J.***, **Gentine P.**, Zhou S., Sullivan S.C., **Wang R.**, Zhang Y., Guo S. (2018), Anthropogenic changes intensify storm runoff more than precipitation extremes, *Nat Communications,* doi: 10.1038/s41467-018-06765-2
95. Lehmann, P., Merlin O., **Gentine P.**, Or D., (2018), Soil texture effects on surface resistance to bare soil evaporation, *Geo Res Letters,* doi: 10.1029/2018GL078803
96. Rasp S., Pritchard M., **Gentine P.**, (2018), Deep learning to represent sub-grid processes in climate models, *PNAS,* doi*:* 10.1073/pnas.1810286115
97. Li Q., **Gentine P.**, Mellado JP., McColl K., (2018), Implications of non-local transport and coherent structures on Monin-Obukhov Similarity Theory and Townsend's attached eddy hypothesis, *J Atm Sci,* doi*:* 10.1175/JAS-D-17-0301.1
98. Miralles D.G., **Gentine P.**, Seneviratne S. I., Teuling A. J., Land–climate feedbacks during droughts and heatwaves: state of the science and current challenges, *Proc of NY Academy of Science,* doi: 10.1111/nyas.13912
99. **Gentine P.**, Pritchard M., Rasp S., Reinaudi G., (2018), Could machine learning break the convection deadlock?, *Geo Res Letters,* doi: 10.1029/2018GL078202
100. Williams A.P, **Gentine P.**, Moritz M.A., Roberts D.A., (2018), Effect of urban cloud cover reduction on aridity and fire danger in coastal California, *Geo. Res. Letters*, doi: 10.1029/2018GL077319
101. **Gentine P.**, Steeneveld G.-J., Heusinkveld B., Holtslag A.A.M., (2018), Coupling between radiation divergence and turbulence near the surface, *Quarterly Journal of the Royal Meteorological Society,* doi: 10.1002/qj.3333
102. Merlin O., et al. **Gentine P.**, (2018), A phenomenological model of soil evaporative efficiency using

readily available data, *Agr Forest Meteor,* doi: 10.1016/j.agrformet.2018.04.010

103. Zhang Y., Xiao X., et al., **Gentine P**., Steinbrecher R., Ardö J., (2018), Spatio-temporal convergence of maximum daily light use efficiency based on radiation absorption by canopy chlorophyll, *Geo Res Letters*, doi: 10.1029/2017GL076354

104. **Giardina F**., Konings A., Uriarte M., Oliveira R., **Gentine P**., (2018), Tall Amazonian forests are more resistant to precipitation variability, *Nature Geo,* doi:10.1038/s41561-018-0133-5

105. Liu Y.Y., et al. **Gentine P**., (2018), Enhanced canopy growth precedes senescence during Amazonia droughts, *Rem Sens Env.,* doi: 10.1016/j.rse.2018.03.035

106. Zhang Y., Joiner J., **Gentine P.,** (2018), Reduced solar-induced chlorophyll fluorescence from GOME-2 during Amazon drought caused by dataset artifacts, *Global Change Bio,* doi: 10.1111/gcb.14134

107. **Gentine P.** and Alemohammad S.H, (2018), Reconstructed solar-induced fluorescence, *Geo Res. Letters,* doi: 10.1002/2017GL076294

108. **Lemordant L**., **Gentine P**., Cook. B., Swann A., Scheff J., (2018), Critical impact of vegetation physiology on the continental hydrologic cycle in response to increasing CO_2, *PNAS,* doi: 10.1073/pnas.1720712115

109. ***Lin, C***., **Gentine P**., Huang, Y., Guan, K., Kimm, H., Zhou, S., (2018), Dial ecosystem conductance responses to vapor pressure deficit between optimality and Leuning's models and independent of soil moisture, *Ag. Forest Metor.,* doi*:* 10.1016/j.agrformet.2017.12.078

110. Santanello, J.A.., Dirmeyer P.A., Ferguson C., Findell K., Tawfik A., Berg A., Ek M., **Gentine P.,** Guillod B., van Heerwaarden C., Roundy J., Wulfmeyer V., (2017), Land-Atmosphere Interactions: The LoCo Perspective, *BAMS, doi: 10.1175/BAMS-D-17-0001.1*

111. **Guérin M**., Benito-Martin D., Griffin K., Hamdam R., Andreu-Hayles L., McDowell N., Muscharella B., Pockman W., Von Arx G., **Gentine P.,** (2017), Drought-induced adaptation in evaporative anatomy impacts drought resilience, *Ecology and Evolution.* doi: 10.1002/ece3.3743

112. Kolassa J., Reichle R.H., Liu Q., Alemohammad S.H, **Gentine P**., (2017), Estimating surface soil moisture from SMAP observations using a Neural Network, *Remote Sens Env*,, doi: 10.1016/j.rse.2017.10.045

113. Park S., Böing S., **Gentine P,** (2017), Role of surface friction on shallow convection, *Journal of the Atmospheric Sciences,* doi: 10.1175/JAS-D-17-0106.1

114. Li Y., Guan K., **Gentine P.,** Konings A.G., Meinzer F.C., Kimball J.S., Xu X., Anderegg W.R.L., McDowell N.G, Martínez-Vilalta J., Long D.G., Good S.P., (2017), Estimating global ecosystem iso/anisohydry using active and passive microwave satellite data, *J Geo Res – Bio, doi:* 10.1002/2017JG003958

115. Davini P., **Gentine P**., Park S., D'Andrea F., (2017), Coherent structures in large-eddy simulations of a non-precipitating stratocumulus-topped boundary layer, *J Atmos Sci,* doi: 10.1175/JAS-D-17-0050.1

116. Boland M.R. et al., **Gentine P**., Tatonetti N.P., (2017), Uncovering exposures responsible for birth season–disease effects: a global study, *Journal of the American Medical Informatics Association*, doi: 10.1093/jamia/ocx105

117. Alemohammad S.H. et al., and **Gentine P**., (2017), Water, Energy, and Carbon with Artificial Neural Networks (WECANN): A statistically-based estimate of global surface turbulent fluxes using solar-induced fluorescence, *Biogeosciences,* 14, 4101-4124, https://doi.org/10.5194/bg-14-4101-2017

118. Mastrotheodoros T., Pappas C., Molnar P., Burlando P., Keenan T., **Gentine P.,** Fatichi S., (2017), Linking plant functional trait plasticity and the large increase in forest water use efficiency, *J Geo Res-Biogeosciences, doi:* 10.1002/2017JG003890

119. Findell K.L., Berg A., **Gentine P.,** Krasting J.P., Lintner B.R., Malyshev S., Santanello J.A., Shevliakova E., (2017), The impact of historical land use/land cover change on regional climate extremes, *Nature Communications,* doi:10.1038/s41467-017-01038-w

120. Boland M. R., Gelman A., Parhi P., **Gentine P**., (2017), Climate Classification is an Important Factor in Assessing Quality-of-Care Across Hospitals, *Scientific Reports,* doi: 10.1038/s41598-017-04708-3

121. Cavusoglu A., Chen X., Sahin O., **Gentine P**., (2017), Natural evaporation is a water-saving low-intermittency renewable energy source, *Nature Communications*, doi:10.1038/s41467-017-00581-w

122. Park S., **Gentine P**. and Heus T., Role of convective mixing and evaporative cooling in shallow convection, (2017), *J Geo Res-Atmosphere*, doi: 10.1002/2017JD026466
123. Van Emmerik T., Steele-Dunne S., Hut R., **Gentine P**., Guerin M., Oliveira R., Wagner J., Selker J., Van De Giesen N., (2017), Measuring Tree Properties and Responses Using Low-Cost Accelerometers, *Sensors,* doi: 10.3390/s17051098
124. ***McColl K.,*** Katul G., van Heerwaarden C., **Gentine P**., Entekhabi D., (2017), Role of large eddies in the breakdown of the Reynolds analogy in an idealized unstable atmospheric surface layer, *Quarterly Journal of the Royal Meteorological Society,* doi: 10.1002/qj.3077
125. **Green J.,** Konings A., Kolassa J., Alemohammad H., Entekhabi D., **Gentine** P., Hotspots of biosphere-atmosphere feedbacks, (2017), *Nature Geo,* doi:10.1038/ngeo2957
126. Kolassa J., **Gentine P**., Prigent C., Aires F., (2017), Soil moisture retrieval from AMSR-E and ASCAT microwave observation synergy: Product presentation and synergy, *Remote Sens Env,* **195**, 202-217
127. **Cheng Y.,** Sayde C., Selker J., **Gentine P.,** (2017), Failure of Taylor's hypothesis in the atmospheric surface layer and its correction, *Geo Res Letters,* doi: 10.1002/2017GL073499
128. Klinger C., Mayer B., Jakub F., Zinner T., Park S., **Gentine P**., (2017), Effects of 3D thermal radiation on cloud development, *Atmos. Chem. and Phys.,* doi:10.5194/acp-2016-896
129. Konings A., Williams P., **Gentine P**., (2017), Sensitivity of grassland productivity to aridity controlled by stomatal and xylem regulation, *Nature Geo*, doi:10.1038/ngeo2903
130. **Gentine P., Chhang A.,** Rigden A., Salvucci G., (2016), Evaporative fraction estimates using weather station data and boundary layer theory, *Geo Res Letters*, 43(22), 651-661
131. Krakauer N.Y, Puma M.J., Cook B.I., **Gentine P**., Nazarenko L. and Kelly M., (2016), Ocean-Atmosphere interactions modulate irrigation's climate impact, *Earth Sys Dyn,* doi:10.5194/esd-7-863-2016
132. **Lemordant L.,** Drobinksy P., Stefanon M., Fatichi S., **Gentine P.,** CO_2 fertilization could mitigate heat waves and exacerbate summer dryness in future climate, *Geo Res Letters*, doi: 10.1002/2016GL069896
133. Merlin O., et al. **Gentine P**., (2016), Modeling soil evaporation efficiency in a range of soil and atmospheric conditions: A downward approach based on multi-site data, *Water Resources research,* doi: 10.1002/2015WR018233
134. Konings A., **Gentine P**., Global variations in Ecosystem-scale Isohydricity, (2016), *Global Change Biology,* doi: 10.1111/gcb.13389
135. ***McColl K.,*** Katul G., **Gentine P**., Entekhabi D., (2016), Mean velocity profile of smooth channel flow explained by a cospectral budget model with wall-blockage, *Physics of Fluids letter,* 28 (3), 035107
136. Park S., **Gentine P**., Farge M., Schneider K., (2016), Coherent Structures in the Boundary and cloud layers: role of updrafts, subsiding shells and environmental subsidence, *Journal of the Atmospheric Sciences,* 73 (4), 1789-1814
137. **Gentine P**., **Garelli A.,** Park S., Nie J. ,Torri G., Kuang Z., (2016), Role of surface heat fluxes underneath cold pools, *Geophysical Research Letters,* 43 (2), 874-883
138. Kolassa J., **Gentine P**., Prigent C., Aires F., (2015) Soil moisture retrieval from active/passive microwave synergy: a methodology analysis, *Remote Sens Env,* 173, 1-14
139. ***Parhi P.,*** Ginannini A., **Gentine P**., Lall U., (2015) Resolving contrasting regional rainfall response of an ENSO teleconnection over tropical Africa, *J Climate,* 29 (4), 1461-1476
140. Li D., Katul G., **Gentine P.,** (2015) The K-1 scaling of temperature spectra in atmospheric surface layer flows, *Quarterly Journal of the Royal Meteorological Society,* 142 (694), 496-505
141. ***Anber U.,*** **Gentine P**, Wang S., Sobel A.H., (2015) Fog and rain in the Amazon, *Proceedings of the National Academy of Science,* 112 (37), 11473-11477
142. Findell K.L, **P. Gentine**, B.R. Lintner, B.P. Guillod, (2015) Data length requirements for observational estimates of land-atmosphere coupling strength, *J Hydrometorology,* 16 (4), 1615-1635
143. **Gentine P**., **M. Guérin,** M. Uriarte, N. McDowell, W. Pockman, (2015) An allometry-based ecohydrological model of survival strategies to drought, *Ecohydrology, doi:* 10.1002/eco.1654
144. Lintner B.R., **P. Gentine**, K.L. Findell, G. Salvucci, (2015) The Budyko and complementary relationship: a large-scale land-atmosphere perspective, Hydrology and Earth System Sciences, 19 (5),

2119-2131
145. Couvreux F. et al., **P. Gentine**, (2015) Daytime moist convection over the semi-arid Tropics: impact of parametrizations in CMIP5 and other models, *Quarterly Journal of the Royal Meteorological Society,* 141 (691), 2220-2236
146. ***Rieck M***., C. Hohenegger , **Gentine** P., (2015) The effect of moist convection on thermally induced mesoscale circulations, *Quarterly Journal of the Royal Meteorological Society,* 141 (691), 2418-2428
147. Berg A., H.K. Findell, B.R. Lintner, S. Malyshev, S.I. Seneviratne, P. **Gentine** (2014) Interannual coupling between summertime surface temperature and precipitation: processes and implication for climate change, *J Climate* **28**, 1308–1328
148. **Gentine P.**, Bellon G., van Heerwaarden C. (2014) A closer look at boundary-layer inversion in large-eddy simulations and bulk models: buoyancy driven case *Journal of the Atmospheric Sciences* **72**, 728–749
149. ***Guillod B.P***., Gentine. P., Lintner B.R., Scott R.L. van den Hurk B., Seneviratne S.I., Land surface controls on afternoon precipitation diagnosed from observational data: Uncertainties, confounding factors and the possible role of vegetation interception, *Atmos Chem and Physics* **14**, 8343-8367
150. Rochetin N., B.R. Lintner, H.K. Findell, A.H. Sobel, P. **Gentine**, (2014) Radiative convective equilibrium over a land surface *J Climate* **27**, 8611–8629
151. Berg A., B.R. Lintner, H.K. Findell, S. Malyshev, P. Loikith, P. **Gentine**, (2014) Impact of soil moisture-atmosphere interactions on surface temperature distribution *J Climate* **27**, 7976–7993
152. D'Andrea F., P. **Gentine**, B.R. Lintner, A.K. Betts (2014) Triggering deep convection with a probabilistic plume model *Journal of the Atmospheric Sciences* **71**, 3881–3901
153. Aires F., P. **Gentine**, K. Findell, B.R. Lintner, C. Kerr (2014), Neural-network based sensitivity analysis of summertime convection over the continental US, *J Climate*, 131126143958004. doi:10.1175/JCLI-D-13-00161.1.
154. **Gentine**, P., A. A. M. Holtslag, F. D'Andrea, and M. Ek (2013), Surface and atmospheric controls on the onset of moist convection over land, *J Hydrometeorol*, 130211131121003, doi:10.1175/JHM-D- 12-0137.1.
155. **Gentine**, P., A. K. Betts, B. R. Lintner, K. L. Findell, C. C. van Heerwaarden, A. Tzella, and F. D'Andrea (2013), A probabilistic-bulk model of coupled boundary layer and convection: 1) Clear-sky case, *Journal of the Atmospheric Sciences*, *70*, 1543–1556, doi:10.1175/JAS-D-12-0145.1.
156. **Gentine**, P., A. K. Betts, B. R. Lintner, K. L. Findell, C. C. van Heerwaarden, and F. D'Andrea (2013), A probabilistic-bulk model of coupled boundary layer and convection: 2) Shallow convection case, *Journal of the Atmospheric Sciences*, *70*, 1557–1576, doi:10.1175/JAS-D-12-0146.1.
157. **Gentine**, P., C. R. Ferguson, and A. A. M. Holtslag (2013), Diagnosing evaporative fraction over land from boundary-layer clouds, *J Geophys Res-Atmos*, *118*(15), 8185–8196, doi:10.1002/jgrd.50416.
158. Berg, A., K. Findell, B. R. Lintner, P. **Gentine**, and C. Kerr (2013), Precipitation sensitivity to surface heat fluxes over North America in reanalysis and model data, *J Hydrometeorol*, 130122134735005, doi:10.1175/JHM-D-12-0111.1.
159. Lintner, B. R., P. **Gentine**, K. L. Findell, F. D'Andrea, A. H. Sobel, and G. D. Salvucci (2013), An idealized prototype for large-scale land-atmosphere coupling, *J Climate*, *26*(7), 2379–2389, doi:10.1175/JCLI-D-11-00561.1.
160. Salvucci, G. D., and P. **Gentine** (2013), Emergent relation between surface vapor conductance and relative humidity profiles yields evaporation rates from weather data, *Proceedings of the National Academy of Sciences*, doi:10.1073/pnas.1215844110.
161. Beziat, P., Rivalland, V., Tallec, T., Jarosz, N., Boulet, G., & **Gentine**, P. (2013). Evaluation of a simple approach for crop evapotranspiration partitioning and analysis of the water budget distribution for several crop species. *Agricultural And Forest Meteorology*, *177*, 48–56.
162. **Gentine**, P., B. Heusinkveld, and D. Entekhabi (2012), Systematic Errors in Ground Heat Flux Estimation and Their Correction, *Water Resour Res*, *48*(9), W09541, doi:10.1029/2010WR010203.

163. **Gentine**, P., P. D'Odorico, B. R. Lintner, G. Sivandran, and G. Salvucci (2012), Interdependence of climate, soil, and vegetation as constrained by the Budyko curve, *Geophys Res Lett*, *39*(19), L19404–, doi:10.1029/2012GL053492.
164. **Gentine**, P., T. J. Troy, B. R. Lintner, and K. L. Findell (2012), Scaling in surface hydrology: progress and challenges, *Journal of Contemporary Water Research & Education*, *147*(1), 28–40, doi:10.1111/j.1936-704X.2012.03105.x.
165. Lee, J.-E., Lintner, B. R., Neelin, J. D., Jiang, X., **Gentine**, P., Boyce, C. K., et al. (2012). Reduction of tropical land region precipitation variability via transpiration. *Geophysical Research Letters*, *39*(19), L19704. doi:10.1029/2012GL053417
166. **Gentine**, P., D. Entekhabi, and J. Polcher (2011a), The Diurnal Behavior of Evaporative Fraction in the Soil-Vegetation-Atmospheric Boundary Layer Continuum, *J Hydrometeorol*, *12*(6), 1530–1546, doi:10.1175/2011JHM1261.1.
167. **Gentine**, P., J. Polcher, and D. Entekhabi (2011b), Harmonic propagation of variability in surface energy balance within a coupled soil-vegetation-atmosphere system, *Water resources Research*, *47*, 1– 21, doi:10.1029/2010WR009268.
168. Findell, K., P. **Gentine**, and B. Lintner (2011), Probability of afternoon precipitation in eastern United States and Mexico enhanced by high evaporation, *Nat Geosci*, *4*(7), 434–439,doi:10.1038/NGEO1174.
169. **Gentine**, P., D. Entekhabi, and J. Polcher (2010), Spectral Behaviour of a Coupled Land-Surface and Boundary-Layer System, *Bound-Lay Meteorol*, *134*(1), 157–180, doi:10.1007/s10546-009-9433-z.
170. Boulet, G., A. Chehbouni, P. **Gentine**, B. Duchemin, J. Ezzahar, and R. Hadria (2007), Monitoring water stress using time series of observed to unstressed surface temperature difference, *Agr Forest Meteorol*, *146*, 159–172, doi:10.1016/j.agrformet.2007.05.012.
171. **Gentine**, P., D. Entekhabi, A. Chehbouni, G. Boulet, and B. Duchemin (2007), Analysis of evaporative fraction diurnal behaviour, *Agr Forest Meteorol*, *143*, 13–29, doi:10.1016/j.agrformet.2006.11.002.

GRANTS AND CONTRACTS AWARDED

Total project funding received amounts to ~ $33,250,000

- **NSF STC** 2021-2026 ($25,000,000 – Lead): "Learning the Earth with Artifical intelligence and Physics – LEAP"
- **NASA ROSES MAP** 2021-2024 ($849,495 – Lead Dr. Ensheng Wang, share ~$350,000): "Modeling forest physiological and structural responses to climate extremes and feedbacks in GISSModelE"
- **NASA ROSES Hydrology** 2020-2023 ($692,000 – Lead Dr. Elizabeth Tellman, share ~$50,000): "Mapping flood impacts using multi sensor satellite data fusion in urban areas"
- **NASA ROSES SMAP** 2020-2023 ($500,000): "Understanding memory effects and respiration with SMAP vegetation optical depth"
- **European Research Council Synergy Award** 2019-2025 ($2.1M euros): "Understanding and Modelling the Earth System with Machine Learning"
- **NSF Cyberinfrastructure for Sustained Scientific Innovation (CSSI) - Data and Software: Elements and Frameworks** 2018-2021 ($300,000): "Software for a new machine learning based parameterization of moist convection for improved climate and weather prediction using deep learning methods"
- **NASA ROSES Hydrology** 2018-2021 ($500,000): "Partitioning evapotranspiration towards transpiration"
- **NASA ROSES** 2017-2019 ($100,000): "Quantum computing with applications to the carbon cycle"
- **NOAA MAPP** 2017-2020 ($450,000): "Biosphere-atmosphere regulations of droughts assessed using microwave and solar-induced fluorescence observations and improved plant water stress representation"
- **National Science Foundation - Climate and large-scale dynamics** 2017-2020 ($450,000):

"Cloud albedo feedback on tropical continents"

- **National Science Foundation - Climate and large-scale dynamics** 2017-2020 ($200,000): "Transition between shallow and deep convection"
- **National Science Foundation CAREER** 2016-2021 ($500,000): "Departure from Monin-Obukhov Similarity Theory (MOST) using high-resolution models
- **Department of Energy early career** 2015-2020 ($750,000): "Cross-Scale Land-Atmosphere Interactions (CSLAEX)"
- **NASA ROSES** 2014-2017 ($450,748): "Neural network retrieval of soil moisture from SMAP for use in NWP centers"
- **NASA New Investigator Program** 2014-2017 ($258,011): "A unified parameterization of dry and moist convection"
- **Department of Energy /GoAmazon** grant 2014-2017 (share as co-PI $316,817, total >$2M) with Jung-Eun Lee (Brown University-PI): "Ecophysiological control on Amazonian precipitation seasonality and variability"
- **NASA ROSES** grant 2013-2015 ($265,000): "Downscaling of flooded fraction derived from low-resolution microwave measurements"
- **Department of Energy /Atmospheric Science Research** grant 2012-2015 (share as co-PI $96,000, total $500,000) with Zhiming Kuang (Harvard-PI): "Probing the transition from shallow to deep convection using ASR data and large-eddy simulations"
- **National Science Foundation/Climate and Large-scale dynamics** grant 2011-2014 (share as co-PI $259,000, total $500,000): "Quantifying the impacts of atmospheric and land-surface heterogeneity and scale on soil moisture-precipitation feedbacks"

INVITED TALKS

2021: Carnegie, IBM, University of Minnesota, LSCE-Paris, UCLA, National academies
2020: AGU, NYU, NASA JPL, DOE, GFDL, MIT, Oxford University, CEA LSCE, Duke University
2019: Urbana Champaign (UIUC), Climate Informatics keynote, U Wisconsin – Madison, Harvard, ETH keynote on machine learning
2018: Princeton, Luxembourg Institute of Science and Technology, EPFL, CalTech, UC Irvine, Max Planck Institute Hamburg, ETH Zurich, UC Berkeley, Ghent University
2017: Max Planck Institute Jena, AGU meeting, ETH Zurich, EGU, Ghent University, Lamont Doherty, university of Washington, NASA GSFC
2016: Brown University, NASA, European Centre for Medium Weather Forecast, Colorado State University, AMS
2015: AGU, MIT
2014: DOE ASR meeting, DOE tropical meeting, University of Virginia
2013: Stony Brook, DOE ASR meeting, TU Delft, Wageningen University
2012: Ecole Normale Superieure, Boston University
2011: ETH Zurich, UC Berkeley, UC Irvine, Princeton University, Georgia Tech, Massachusetts Institute of Technology

SERVICE AND MEMBERSHIPS

Professional service:

- AGU Global Environmental Change section canvassing committee member (to identify, encourage or lead nominations of scientists in underrepresented groups) (2019-now)

- World Climate Research Program (WCRP) - US CLIVAR Data Science group co-lead and co-founder (2019-now)
- Climate Data Guide Board of Advisors (2021-now)
- WCRP Working Group on Seasonal to Interannual Prediction - member
- Global Land/Atmosphere System Study (GLASS) Global Energy and Water Cycle Experiment (GEWEX) - member
- LoCo (Local Coupling) Global Energy and Water Cycle Experiment (GEWEX) - member
- CUAHSI (Consortium of Universities for the Advancement of Hydrologic Science, Inc.) Columbia University representative
- NOAA drought task force co-lead (2017-2020)
- Organizer of the Alpine summer school on land-atmosphere interactions (2015) – bringing 45 students from various fields (ecology to climate) to collaborate on and learn about biosphere-atmosphere interactions.
- NSF white paper panelist on the future of funding in hydrometeorology and hydroclimatology

Memberships:

- American Geophysical Union (AGU) member
- American Meteorological Society (AMS) member

Columbia University service:

- School
- Committee on instruction (COI) - 2013-2019
- Eagleston scholar supervision - current
- BRIDGE under-represented student mentoring 2019-current

- Department
- Head of graduate committee and program 2017-current
- Department Diversity, Equity and Inclusion group member (2020-now)
- Department undergraduate committee 2010-2017
- Department undergraduate orientation 2010-current
- Department seminar organization 2010-2015

- Institute
- Earth Institute postdoctoral selection committee

EDITOR/REVIEWER

Associate Editor:

Remote Sensing
Frontiers in Artificial Intelligence - AI in Food, Agriculture and Water
Hydrology and Earth System Sciences
Journal of Hydrometeorology
Frontiers in hydrology (up to 2017)
Frontiers in atmospheric sciences (up to 2017)

Reviewer:

- **Journals:**

  Nature, Nature climate change,Water resources research, Advances in water resources, Journal of hydrology, Boundary-layer meteorology, Journal of hydrometeorology, Journal of climate, Journal of the atmospheric sciences, Atmospheric Chemistry and Physics, Hydrology and Earth system sciences, Biogeosciences.

- **Proposals:**
  National Science Foundation, National Science Foundation CAREER, Department of Energy, NASA, NERC, Dutch space agency, Swiss Foundation, Department of Energy Laboratory review.

TEACHING EXPERIENCE

University Courses

Sole Lecturer

- Linear algebra Fall 2009, Fall 2011, Columbia University
- Principle of Applied Mathematics Spring 2011, Columbia University
- Hydrology Fall 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 21
- Hydrosystems Spring 2013, 2014, 2015, 2016, 2017, 2019, 2020, 2021
- Management and development of water systems Spring 2014, 2015, 2017, 2019
- Machine Learning for Environmental Science and Engineering 2019, 2020

Evaluations and number of students:

Course number	Name	Number of students
CIEEE3250_001_2021_1	HYDROSYSTEMS ENGINEERING	34
Course mean 3.75 Instructor mean 3.83		
EAEEE4000_001_2020_1	Machine learning for environmental engin	10
Course mean 3.83 Instructor mean 4.17		
CIEEE3250_001_2020_1	HYDROSYSTEMS ENGINEERING	34
Course mean 4.20 Instructor mean 4.00		
CIEEE3250_001_2019_1	Physical hydrology	19
Course mean 3.63 Instructor mean 3.88		
CIEEE3250_001_2019_1	HYDROSYSTEMS ENGINEERING	19
Course mean 3.27 Instructor mean 3.18		

ECIAW4100_001_2019_1	MGMT & DEVPT OF WATER SYSTEMS	39

Course mean 3.50
Instructor mean 3.63

EAEE6240_001_2018_3	PHYSICAL HYDROLOGY	24

Course mean 3.95
Instructor mean 4.30

EAEE6240_001_2017_3	PHYSICAL HYDROLOGY	28

Course mean 4.50
Instructor mean 4.50

CIEEE3250_001_2017_1	HYDROSYSTEMS ENGINEERING	18

Course mean 3.83
Instructor mean 3.7

ECIAW4100_001_2017_1	MGMT & DEVPT OF WATER SYSTEMS	28

Course mean 4.10
Instructor mean 4.00

EAEE6240_001_2016_3	PHYSICAL HYDROLOGY	19

Course mean 4.50
Instructor mean 4.50

EAEE6240_001_2015_3	PHYSICAL HYDROLOGY	29

Course mean 4.43
Instructor mean 4.52

CIEEE3250_001_2015_1	(shared) HYDROSYSTEMS ENGINEERING	19

Course mean 3.00
Instructor mean 3.33

ECIAW4100_001_2015_1	(shared) MGMT & DEVPT OF WATER SYSTEMS	39

Course mean 3.57
Instructor mean 3.62

EAEEE6240_001_2014_3	PHYSICAL HYDROLOGY	14

Course mean 4.7
Instructor mean 4.88

ECIAW4100_001_2014_1	(shared) MGMT & DEVPT OF WATER SYSTEMS	29

Course mean 4.09
Instructor mean 4.27

CIEEE3250_001_2014_1	(shared) HYDROSYSTEMS ENGINEERING	24

Course mean 3
Instructor mean 3.22

EAEEE6240_001_2013_3	PHYSICAL HYDROLOGY	8

Course mean 4.75
Instructor mean 4.5

ECIAW4100_001_2013_1	(shared) MGMT & DEVPT OF WATER SYSTEMS	52

Course mean NA
Instructor mean NA

CIEEE3250_001_2013_1	(shared) HYDROSYSTEMS ENGINEERING	20

Course mean NA
Instructor mean NA

EAEEE6240_001_2012_3	PHYSICAL HYDROLOGY	8

Course mean NA
Instructor mean NA

Guest Lecturer

- Woods Hole Geophysical Fluid Dynamics summer school – Summer 2014

RESEARCH SUPERVISED AS SPONSOR

Research scientist

- Dr. Kara Lamb (2020 –) – Microphysics
- Dr. Yaling Liu (2018 –) – Vegetation Optical Depth for stress monitoring

Post-doctoral

- Dr. Wenli Zhao (2018 –) – Machine learning for land-atmosphere feedback
- Dr. Sha Zhou (2018 –) – Biosphere-atmosphere feedbacks and compound events
- Dr. Sylvia Sullivan (2018 –2019) now Postdoctoral scholar at KIT – Organized convection
- Dr. Yao Zhang (2018 –2019) now Postdoctoral scholar at UC Berkeley – Solar-induced fluorescence
- Dr. Qi Li (2016 – 2018) now Assistant Professor at Cornell - Departure from Monin Obukhov
- Dr. Seyed Hamed Alemohammad (2016 – 2018) now Research Scientist at Radiant – Soil moisture retrieval using machine learning techniques
- Dr. Alexandra Konings (2015 – 2016) now Assistant Professor at Stanford – Retrieving vegetation water stress from remote sensing
- Dr. Bin Fang (2015 – 2016) now working in the private sector – Soil moisture retrieval using machine learning techniques
- Dr. Seung-Bu Park (2014 – 2017) now Research Scientist in South Korea – Large-eddy simulations and implementation of unified convection parameterization in the NASA GISS climate model
- Dr. Jana Kolassa (2014–2015) now Research Scientist at NASA – Soil moisture retrieval from multiple satellite product
- Dr. Alexis Berg (2012 –2013) now Research Scientist at Princeton University – Soil moisture and precipitation feedbacks
- Dr. Nicolas Rochetin (2012 –2013) now Research Scientist at Météo France – Radiative Convective Equilibrium over land

Doctor of Philosophy (Earth & Environmental Engineering)

- Jisu Huan (2019-) Turbulence in the canopy and surface layers
- Weiwei Zhan (2019-) Machine learning for terrestrial carbon cycle
- Olya Skulovich (2018 –) Machine learning of soil moisture
- Yu Huang (2017 –) Amazon cloud feedback on water and carbon cycles

- Adam Massmann (2016 –) Land-atmosphere feedback on mesoscale storms
- Yu Cheng (2014 – 2019) now Postdoctoral researcher at Harvard - Heterogeneity in turbulence
- Daniel Kennedy (2013 – 2019) now Postdoctoral researcher at NCAR - Vegetation water content and plant hydraulics
- Julia Green (2013 – 2019) now Postdoctoral researcher at LSCE - Ecophysiological control of plants on convection over the Amazon
- Léo Lemordant (2012 – 2017) now CEO Enerfip - Carbon feedbacks on the surface hydrologic cycle and land-atmosphere interactions
- Marceau Guérin (2011 – 2018) now Freelance Consultant - Survival strategies to droughts

Master Students

- Thomas de Gouville (Summer 2020) Machine learning for climate
- Kenza Amara (Summer 2019) Machine learning for fire prediction
- Francesco Giardina (Summer 2016) Amazon trait regulation of climate variability
- Anais Chhang (summer 2014) Estimating evaporation using weather station data
- Alix Garelli (summer 2015) Interaction between cold pools and surface fluxes
- Felix Camus (summer 2016) Drought in the Amazon and El Niño
- Brahim Khalid (summer 2016) Organization of Mesoscale Convective Systems globally

EXTERNAL EXAMINER FOR PHD DISSERATIONS

PhD examination committees in Columbia SEAS Departments:

Earth and Environmental Engineering

- John Feighery (2013)
- Mengquian Lu (2014)

Civil and Environmental Engineering

- Daniel Marasco (2014)
- Raha Hakimdavar (2016)

PhD examination committee – Oxford university

- Tom Bolton (2020)