

Infinitem, LLC

Scientific Consulting Services

Patricia M. Parker (née Lawston), PhD, CCM

Co-owner, Infinitem, LLC Scientific Consulting Services

Certified Consulting Meteorologist

EDUCATION

- 2017 **Ph.D. Climatology**, University of Delaware, Newark, DE
Dissertation: Impacts of irrigation on land-atmosphere interactions in high-resolution model simulations
- 2013 **M.S. Geography**, University of Delaware, Newark, DE
Thesis: Simulating the effects of the St. Louis urban center on mesoscale convective systems using WRF
- 2010 **B.S. Meteorology**, Math minor, Millersville University, Millersville, PA

RELEVANT PROFESSIONAL EXPERIENCE

- 2020 – Present **Assistant Research Scientist**, University of Maryland Earth System Science Interdisciplinary Center (ESSIC) and NASA Goddard Space Flight Center (GSFC)
Conducted case study analysis of past weather events using observations and the Weather Research and Forecasting (WRF) model. Led and collaborated on research studies using NASA remote sensing data and models to better understand weather, climate, and the Earth system. Presented scientific information to diverse audiences, including briefing congressional staffers on NASA data for monitoring water resources and appearing on national television as subject matter expert to discuss NASA's 2022 global temperature update. Selected to serve on an international panel associated with the Global Water and Energy Cycle Exchanges (GEWEX) project, an activity of the World Meteorological Organization. Led an international working group of more than 100 participants focused on irrigation in Earth system modeling.
- 2017 – 2020 **Postdoctoral Associate**, University of Maryland ESSIC and NASA GSFC

Provided scientific and technical support to NASA GSFC's Hydrological Science Laboratory. Led and collaborated on projects related to urban impacts on weather, vegetation's role in flash drought, irrigation effects on weather and heat stress, land surface model calibration, and the impacts of wet soils on landfalling tropical cyclones. Conducted analysis of satellite remote sensing data (e.g., surface soil moisture, land surface temperature). Completed and analyzed model simulations using land surface and atmospheric models (e.g., NoahMP, WRF, NASA's Land Information System, NASA's Unified WRF).

PROFESSIONAL CERTIFICATIONS

- 2021 – Present **Certified Consulting Meteorologist (CCM) #766**, American Meteorological Society (AMS)
 The CCM designation is granted by AMS only to those who demonstrate a broad background in meteorology together with a detailed knowledge in a particular field of specialization. CCMs must demonstrate exemplary knowledge, skills, and character and are considered experts in the application of weather information to practical challenges. The CCM designation allows clients to select consultants with a greater confidence in the quality and reliability of the services they will receive.

PEER-REVIEWED JOURNAL PUBLICATIONS

- 2025 Yoo, J., J. A. Santanello, **P. Lawston-Parker**, J. M. Shepherd, S. V. Kumar, and R. Wakefield, 2025: The Roles of Antecedent Soil Moisture and Land–Atmosphere Interactions in the Inland Intensification of Tropical Storm Bill (2015). *J. Hydrometeor.*, 26, 365–384, <https://doi.org/10.1175/JHM-D-24-0036.1>.
- 2024 Makhasana, P., J. Santanello, **P. Lawston-Parker**, J. Roundy, 2024: Deducing Land-Atmosphere Coupling Regimes from SMAP Soil Moisture, *Hydrol. Earth Syst. Sci.*, <https://doi.org/10.5194/hess-2024-125>.
- 2023 Lachenmeier, E., R. Mahmood, C. Phillips, U. Nair, E. Rappin, R. A. Pielke, Sr., W. Brown, S. Oncley, J. Wurman, K. Koshiba, A. Kaulfus, J. A. Santanello, **P. Lawston-Parker**, M. Hayes, T. E. Franz, 2023: Irrigated Agriculture Significantly Modifies Seasonal Boundary Layer Atmosphere and Lower Tropospheric Convective Environment.

Journal of Applied Meteorology and Climatology, 63, 245-262,
<https://doi.org/10.1175/JAMC-D-23-0020.1>.

- 2023 **Lawston-Parker, P.**, J. Santanello, N. Chaney, 2023: Investigating the Response of Land-Atmosphere Interactions and Feedbacks to Spatial Representation of Irrigation in a Coupled Modeling Framework, *Hydrology and Earth System Sciences*, 27: 2787-2805, <https://doi.org/10.5194/hess-27-2787-2023>.
- 2023 McDermid, S., Nocco M., **Lawston-Parker, P.M.**, J. Keune, Y. Pokhrel, S. Rabin, Y. Wada, A. Bell, L. Brocca, F. Chen, B. Cook, W. Dorigo, N. Hanasaki, J. Jagermeyr, S. Jasechko, A. Jones, H. Kim, M. Lo, D. Lombardozi, R. Mahmood, C. Massari, V. Mishra, N. Mueller, D. Niyogi, J. Polcher, D. Ryu, J. Santanello, Y. Satoh, S. Schrotter, S. Seneviratne, D. Singh, L. Sloat, M. Smilovic, W. Theiry, O. Tuinenburg, P. Vahmani, J. Winter, Y. Yao, T. Yokohata, L. Zappa, 2023: Recent Advances and Needs for Understanding the Role of Irrigation in the Earth System. *Nature Reviews Earth and Environment*. 4, 435-453, <https://doi.org/10.1038/s43017-023-00438-5>.
- 2021 **Lawston-Parker, P.M.**, J. Santanello, S. Kumar, 2021: "Understanding the impacts of land surface and PBL observations on the terrestrial and atmospheric legs of land-atmosphere coupling," *J. Hydrometeor.*, 22(9), 2241-2258.
<https://doi.org/10.1175/JHM-D-20-0263.1>.
- 2021 Rappin, E., R. Mahmood, U. Nair, R. Pielke Sr., W. Brown, S. Oncley, J. Wurman, K. Kosiba, A. Kaulfus, C. Phillips, E. Lachenmeier, J. Santanello Jr., E. Kim, **P. Lawston-Parker**, 2021: "The Great Plains Irrigation Experiment (GRAINEX)," *Bull. Amer. Meteor. Soc.*, <https://doi.org/10.1175/BAMS-D-20-0041.1>.
- 2021 Shepherd, J.M., A.M. Thomas, J.A. Santanello, **P.M. Lawston-Parker**, J. Basara, 2021: "Evidence of warm core structure maintenance over land: A case study analysis of Tropical Cyclone Kelvin," *Environ. Res. Comm.*, <https://doi.org/10.1088/2515-7620/abf39a>
- 2020 Shellito, P. J., Kumar, S. V., Santanello, J. A., Jr., **Lawston-Parker, P.**, Bolten, J.D., Cosh, M. H., Bosch, D. D., Holifield Collins, C. D., Livingston, S., Prueger, J., Seyfried, M., & Starks, P. J., 2020: Assessing the Impact of Soil Layer Depth Specification on the Observability of

- Modeled Soil Moisture and Brightness Temperature, *Journal of Hydrometeorology*, 21(9), 2041-2060.
<https://doi.org/10.1175/JHM-D-19-0280.1>
- 2020 **Lawston, P.M.**, J.A. Santanello, B. Hanson, K. Arsenault, 2020: Impact of Irrigation on Summertime Temperatures in the Pacific Northwest, *Earth Interactions*, **24** (1), 1-26, <https://doi.org/10.1175/EI-D-19-0015.1>.
- 2020 Yoo, J., J. A. Santanello, M. Shepherd, S. Kumar, **P. Lawston**, and A. M. Thomas, 2020: Quantification of the Land Surface and Brown Ocean Influence on Tropical Cyclone Intensification over Land. *J. Hydrometeor.*, 21, 1171–1192, <https://doi.org/10.1175/JHM-D-19-0214.1>.
- 2019 Santanello, J.A., **Lawston, P.M.**, Kumar, S.V., Dennis, E., 2018: Understanding the Impacts of Soil Moisture Initial Conditions on NWP in the Context of Land-Atmosphere Coupling. *J. Hydromet.*, 20 (5): 793-819, <https://doi.org/10.1175/JHM-D-18-0186.1>
- 2017 **Lawston, P.M.**, J.A. Santanello, Jr., S.V. Kumar, 2017: Irrigation Signals Detected from SMAP Soil Moisture Retrievals. *Geophysical Research Letters*, 44, <https://doi.org/10.1002/2017GL075733>.
- 2017 **Lawston, P.M.**, J.A. Santanello, Jr., T.E. Franz, M. Rodell, 2017: Assessment of Irrigation Physics in a Land Surface Modeling Framework using Non-Traditional and Human-Practice Datasets. *Hydrology and Earth System Sciences*, 21, 2953-2966, <https://doi.org/10.5194/hess-21-2953-2017>.
- 2016 Rauscher, S.A., T.A. O'Brien, C. Piani, E. Coppola, F. Giorgi, W.D. Collins, **P.M. Lawston**, 2016: A Multimodel Intercomparison of Resolution Effects on Precipitation: Simulations and Theory. *Climate Dynamics*, <https://doi.org/10.1007/s00382-015-2959-5>.
- 2016 Santanello, J.A., S.V. Kumar, C.D. Peters-Lidard, **P.M. Lawston**: Impact of Soil Moisture Assimilation on Land Surface Model Spinup and Coupled Land-Atmosphere Prediction. *J. Hydrometeorology*, 17, 517-540. <https://doi.org/10.1175/JHM-D-15-0072.1>.
- 2015 **Lawston, P.M.**, J.A. Santanello, B.F. Zaitchik, M. Rodell, 2015: Impact of Irrigation Methods on Land Surface Model Spinup and Initialization of WRF Forecasts. *J. Hydrometeorology*, 16, 3, 1135-1154, <https://doi.org/10.1175/JHM-D-14-0203.1>

AWARDS & HONORS

- 2019 NASA Hydrosphere, Biosphere, and Geophysics (HBG) Award for Scientific and Technical Support, for “*excellent scientific support of numerous soil moisture, irrigation, and modeling projects across the Lab and in serving as a role model for new interns and postdocs*”
- 2013 Teaching Assistant of the Year, University of Delaware, Department of Geography
- 2013 First Place – Student Paper Competition, International Agro-Geoinformatics Conference, George Mason University, Fairfax, VA

PRESENTATIONS

Invited Seminars and Invited Panels

- 2023 NASA Goddard Space Flight Center Science and Exploration Directorate Seminar Series. *Importance of Irrigation in Earth System Modeling*. 9 Sept 2023. Greenbelt, MD.
- 2023 American Meteorological Society Annual Meeting. *Monitoring and Modeling of Irrigation for Improved Weather Prediction*. 9 Jan. Virtual. Oral presentation.
- 2022 Ray Falconer Public Lecture Series, State University of New York at Albany. *Monitoring and Modeling of Irrigation for Improved Weather Prediction*. 23 Aug 2022. [20220823-Falconer Lecture: Monitoring & Modeling of Irrigation for Improved Weather Prediction](#).
- 2022 U.S. Climate Modeling Summit, 2 Aug 2022. *Progress and Challenges in the Monitoring and Modeling of Irrigation*, virtual oral presentation. College Park, MD.
- 2020 American Geophysical Union Annual Meeting. *Understanding Land-Atmosphere Interactions in Agricultural Areas through Improved Modeling and Monitoring of Irrigation*. 8 Dec 2020. Virtual. Oral presentation.

- 2019 University of Maryland, ESSIC seminar series, 30 September. *Modeling and Monitoring of Irrigation for Better Understanding of Land-Atmosphere Interactions in Agricultural Areas*, College Park, MD. [Dr. Patricia Lawston Parker | Modeling and Monitoring of Irrigation for Land-Atmosphere Interactions](#)
- 2019 Invited Panelist - *Career Paths in Climatology and Geography* panel, hosted by Climate Specialty Group, Association of American Geographers Annual Meeting. 3 April, Washington, D.C.
- 2014 University of Nebraska-Lincoln, Dept of Earth and Atmospheric Science, Stout Lecture Series, 19 Sept. *Impact of Irrigation on LSM Spinup and Initialization of WRF Forecasts*. Lincoln, NE.
- 2012 Women in Math and Science Conference, Millersville University, 26 Mar 2012. *No Catwalk Necessary: Numerical Modeling and Other Opportunities in Graduate School*, Millersville, PA.

Conference Presentations (as Lead Author and Presenter)

- 2024 American Geophysical Union Annual Conference. 10 Dec. *Assessing the Potential Role of Irrigation on Extreme Heat Mitigation in the Southeast U.S.* Washington, D.C. Oral presentation.
- 2023 American Meteorological Society Meeting. 8 Jan. *Investigating the response of land-atmosphere interactions and feedbacks to spatial representation of irrigation*. Virtual. Oral presentation.
- 2021 American Geophysical Union Annual Conference. 14 Dec., *Investigating the response of land-atmosphere interactions and feedbacks to heterogeneity imposed by irrigation*. Virtual. Poster presentation.
- 2021 American Meteorological Society Meeting, virtual. 12 Jan, *Quantifying the LoCo process chain connections in coupled modeling using land-atmosphere coupling approaches*. Oral Presentation.
- 2019 American Geophysical Union Annual Conference, 10 Dec, *Utilizing NASA Satellite Data for Improved Monitoring and Modeling of Irrigation*, San Francisco, California. Oral Presentation.

- 2019 NASA GSFC Early Career Scientist Forum, 25 Oct., *Impact of Irrigation on Summertime Temperatures in the Pacific Northwest*, Greenbelt, MD. Poster Presentation.
- 2019 GEWEX Global Land Atmosphere System Study (GLASS) panel meeting, 7 Aug, *Progress and Challenges in the Monitoring and Modeling of Irrigation from Ground and Satellite*, Boulder, Colorado. Oral presentation.
- 2018 American Geophysical Union Annual Conference, 10 Dec, *The Great Plains Irrigation Experiment (GRAINEX) – Investigating the Impacts of Irrigation on Regional Weather*, Washington, D.C. Oral Presentation.
- 2018 American Geophysical Union Annual Conference, 10 Dec, *Impact of Irrigation on Summertime Temperatures in the Pacific Northwest*, Washington, D.C. Poster Presentation.
- 2018 The 2018 MOISST Workshop, 6 June, *SMAP: For Modeling and Analysis*, Lincoln, Nebraska. Oral Presentation.
- 2018 GEWEX Open Science Meeting, 9 May, *Irrigation Signals Detected from SMAP Soil Moisture Retrievals*, Canmore, Alberta, Canada. Oral Presentation.
- 2017 American Geophysical Union Annual Conference, 11 Dec, *Infusion of SMAP Data into Offline and Coupled Models: Evaluation, Calibration, and Assimilation*, New Orleans, Louisiana. Oral Presentation.
- 2016 Including Water Management in Large Scale Models, 29 Sep, Gif-Sur-Yvette, France. *Progress and Challenges in Irrigation Modeling*. Oral Presentation.
- 2016 The 2016 Workshop at MOISST: The Growing Science of Soil Moisture Sensing, 18 May, Stillwater, Oklahoma. *Assessment of Irrigation Physics in a Land Surface Modeling Framework and Evaluation with High-Resolution Soil Moisture Observations*. Oral Presentation.
- 2016 Annual Meeting of the American Meteorological Society, 13 Jan, New Orleans, LA. *Assessment of Irrigation and Wind Turbine Wake*

Effects on Land-Atmosphere Interactions in a Desert Regime using High-Resolution Model Simulations. Poster Presentation.

- 2015 American Geophysical Union Annual Conference, 16 Dec, San Francisco, CA. *Evaluation of Irrigation Physics in a Land Surface Modeling Framework and Impacts on Coupled Prediction.* Oral Presentation.
- 2014 Annual Meeting of the American Meteorological Society, 2-6 Feb, Atlanta, GA. *Impact of Irrigation Methods on LSM Spinup and Initialization of WRF Forecasts.* Oral Presentation.
- 2013 The Second International Agro-Geoinformatics Conference, 12-16 Aug, Fairfax, VA. *Impact of Irrigation Methods on LSM Spinup and Initialization of WRF Forecasts.* Oral Presentation.
- 2012 Annual Meeting of the Association of American Geographers, 24-28 Feb, New York, NY. *Simulating the Effects of the Urban Center of St. Louis on Mesoscale Convective Systems using WRF.* Oral Presentation.

SERVICE TO PROFESSION

- 2024 - Present Session convener, AMS annual meeting, Land-Atmosphere Interactions in a Changing Climate
- 2023 – Present Topic Editor, Geoscientific Model Development
- 2022 – Present Member, GEWEX Global Land-Atmosphere System Study (GLASS) panel
- 2021 – Present Lead for GEWEX GLASS/GHP Irrigation cross-cut project
- 2016 – Present Member, Local Land-Atmosphere Coupling “LoCo” Working Group, an activity led by the Global Land Atmosphere System Study (GLASS) panel of the World Meteorological Organization (WMO)’s Global Energy and Water Exchanges (GEWEX) project
- 2023 – 2024 Steering Committee Member, NSF-sponsored workshop on Coordinated Cosmic-Ray Observation System, Lincoln, NE, Fall 2023

- 2023 Guest Editor, Agricultural Water Management Special Issue on "Irrigation monitoring through Earth Observation data"
- 2023 Delivered NASA Hyperwall talk at GSFC to congressional staff for Rep. Doris Matsui (D-CA).
- 2021 Aspen Global Change Institute (AGCI) workshop convener, on Irrigation in the Earth System (June 4-9, 2023).
<https://www.agci.org/workshops/7014x0000002IxWAAU/irrigation-in-the-earth-system-priorities-for-data-modeling-and-cross-disciplinary-research>
- 2020 Session convener and Chair, AGU annual meeting, Irrigation Interactions with the Earth System: Observations, Modeling, and Multi-scale Impacts
- 2018 Session convener and Chair, AGU Annual Meeting, Quantifying Water Use through Observation and Simulation
- 2018 Session convener, GEWEX Open Science Meeting, Advances in Irrigation Hydrology and Irrigation Impacts on the Water Cycle: Measurements, Modeling, and Multi-scale Impacts on Water Resources
- 2018 Proposal Reviewer, Flanders (FWO) – Belgium research agency
- 2017 Proposal Reviewer, NASA Earth and Space Science Fellowship Proposal Panel
- 2016 Session chair, AGU Annual Meeting, Remote Sensing Applications for Water Resources Management, including Irrigation, Droughts, Floods, and Associated Water Cycle Extremes V
- 2015 – Present Peer reviewer for the following journals:
Nature Food
Geophysical Research Letters (GRL)
Journal of Hydrometeorology (JHM)
Journal of Applied Meteorology and Climatology (JAMC)
Earth Interactions (EI)
Journal of Advances in Modeling Earth Systems (JAMES)
Public Library of Science ONE (PLOS ONE)
Atmospheric Science Letters (ASL)

Hydrology and Earth System Sciences (HESS)
Journal of Geophysical Research – Atmospheres (JGR-Atmos)
Agricultural and Forest Meteorology (AGFORMET)
Agricultural Water Management (AGWAT)
Remote Sensing (RS)
Journal of Climate (JCLIM)

2015 NASA intern representative, Women in STEM Fair, Cannon House Building, Capitol Hill, Washington, DC.

2011-2013 AMS Committee on Applied Climatology student member

MEDIA COVERAGE

2023 Interviewed as Subject Matter Expert by six TV stations about NASA's global temperature update, including, Fox Weather (national), KTBC (Austin, Texas), KWQC (Davenport, Iowa), WWLTV (New Orleans, LA), WEWS (Cleveland, OH), WDIV (Detroit, MI).

[NOAA climate report finds 2022 was Earth's 6th warmest on record | Fox Weather](#)

[NASA and NOAA: 2022 was tied for Earth's 5th warmest on record](#)

2018 Agriculture Impacts Weather: The Case for Connected Ecosystems
<http://www.precisionag.com/systems-management/data/agriculture-impacts-weather-the-case-for-connected-ecosystems>

RELATED PROFESSIONAL SKILLS

Programming Languages & Software tools

15 years Linux/Unix environment
 15 years NCAR Command Language (NCL)
 4 years FORTRAN
 4 years Python
 1 year Matlab

Modeling Systems

15 years Weather Research and Forecasting (WRF-ARW) model
 13 years NASA Unified WRF (NU-WRF)
 13 years NASA's Land Information System (LIS)

13 years	Noah and NoahMP Land Surface Models
< 1 year	Community Earth System Model (CESM)

PROFESSIONAL MEMBERSHIPS

2021 – Present	Association of Certified Meteorologists
2012 – Present	American Geophysical Union
2009 – Present	American Meteorological Society

Expert Not Retained