

# DANIEL HARDESTY LEWIS

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## Education

- expected 2026 **M.S., Urban Planning**, *Columbia University*, New York City, NY
- 2017 **B.S., Pure Mathematics**, *University of Texas*, Austin, TX
- 2017 **Certificate, Scientific Computation**, *University of Texas*, Austin, TX

## Experience

### Professional

- Nov. 2024 – **Co-founder**, *Homecastr*, New York, NY
  - Present Consumer real-estate pricing and forecasting platform with interactive uncertainty fancharts and temporal leakage-safe expanding-window evaluation.
    - Architected and deployed a nationwide, tract-level score-based diffusion forecasting model, achieving an 8% one-year forecast error that outperforms Zillow's 8.4% benchmark, and maintaining a highly stable 25% MdAE at a 4-year horizon.
    - Engineered advanced architecture—including spatial inducing tokens, per-horizon loss normalization, and DDIM sampling—to balance high predictive accuracy with highly realistic, probabilistically calibrated price trajectories at scale.
    - Developed a rigorous probabilistic evaluation suite (optimizing for PIT uniformity, interval coverage, and sharpness) to strictly validate forecast reliability prior to web delivery.
    - Owned the end-to-end pipeline from source data ingestion to real-time serving via a production web UI ([homecastr.com](http://homecastr.com)), and refined product strategy through feedback from a16z and MetaProp.
- Nov. 2024 – **Co-founder**, *PoliBOM*, Seattle, WA
  - Present Top-5% YC entrant, KPMG rolled out their [Tariff Modeller](#) after we put [polibom.com](http://polibom.com) in front of them
    - Now targetting early stage investment
- Nov. 2023 – **Founder**, *Summit Geospatial*, New York, NY
  - Present Developed the highest quality seamless elevation data for Texas, [summitgeospatial.com](http://summitgeospatial.com)
    - Now targetting recent interest received to license to AI labs such as OpenAI & Cohere
- Aug. 2021 – Aug. 2023 **Senior Data Scientist & Technical Lead**, *Texas Advanced Computing Center (TACC)*, Austin, TX
  - Spun out Summit Geospatial alongside UT's VPs of IP
  - Led a principal project of the \$40M Texas Disaster Information System (TDIS) disaster resiliency initiative
  - Contributed research towards Paola Passalacqua's 2022 EGU Bagnold Medal, one of geomorphology's highest honors
  - Scaled climate and flood models on world-leading supercomputers, utilizing millions of dollars in computational resources and million-node jobs
  - Evaluated and accepted tens of millions of dollars in compute requests
  - Managed relationships and developed projects with federal, state agencies, and universities including NOAA, NSF, US Army Corps of Engineers, Texas General Land Office, USC, UT, A&M
- Feb. 2018 – Jul. 2021 **Data Scientist & Research Engineer**, *Texas Advanced Computing Center (TACC)*, Austin, TX
  - Competed in DARPA World Modelers program, focusing on disaster resiliency in East Africa
  - Research received a mention from President of AAAI Yolanda Gil during her farewell speech
  - Helped teach Petrobras deep learning on HPC

### Research

- May 2025 – **Research assistant to Dir. Electrical Engineering Zoran Kostic**, *Columbia University*, New York, NY
  - Present Targetting theory publications to DeepSeek's GRPO algorithm

Jan. 2025 – Present **Research assistant to Dir. Financial Engineering Ali Hirsa**, *Columbia University*, New York, NY

Achieved better than [commercial  \$R^2\$](#)  on backtested holdout prediction of daily mutual fund returns on a variety of asset classes

- Using a DL latent factor model to produce better factors than our benchmark: Fama-French's 5-factor model
- Now targetting SHAP explainability publication

July 2019 – Aug. 2019 **Summer research intern to Pres. AAI Yolanda Gil**, *University of Southern California*, Los Angeles, CA

Integrated hydrological models into team's DARPA-supported scientific model orchestration portal

## Teaching

Jan. 2018 – Dec. 2020 **Co-instructor**, *The University of Texas at Austin*, Austin, TX

Helped teach graduate-level courses: *Machine Learning for the Geosciences*, *Intelligent Systems for the Geosciences*, and *Scientific Computation*, including C++, CUDA, HPC, & optimization

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## Key Projects

oppsAlert Developed the first property- and owner-level ML model of NIMBYism, using 15+ years of 15000+ points of individual homeowner protest data provided by the City of Austin

Stealth, RegTech *Seeking PE investment*: Teaming up with a top-propotech operator for a very large opportunity to aid cities achieve permitting compliance via simple pipeline collating publicly available imagery against permitting data

Flood Hazard Assessment Partnered with the US Army Corps of Engineers to statistically model compound flood hazards in coastal Texas, integrating high-resolution topographic data with hydrological models.

Texas Disaster Information System (TDIS) Led development of the core elevation data layer for a web-based spatial data system that supports resilient decision-making at the state and local levels.

Real-Time Inundation Mapping Developed computationally efficient methods to produce high-resolution (1m) flood inundation maps from National Water Model outputs for emergency response personnel.

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## Technology Skills

Programming Languages Python, Bash, PL/pgSQL, Fortran, Perl, C++

Operating Systems GNU/Linux, macOS, Windows

Libraries & Frameworks GDAL, CUDA, GeoPandas, RasterIO, NumPy, Plotly, Dash

Database Systems PostgreSQL, Redis, Supabase, PostGIS

Scientific Software MODFLOW, HAND, HEC-RAS, MESA

Cloud & Virtualization AWS, Azure, Docker, Singularity

AI tooling ChatGPT, Claude, Gemini, VSCode, v0.dev

ML VAE, Tree-based models

Clustering techniques & metrics DBSCAN, Hierarchical, Silhouette score, Calinski-Harabasz, Davies-Bouldin

Statistical & ML metrics  $R^2$ , MAPE, RMSE, KL-div, Reconstruction loss

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## Peer-reviewed articles

2021 July Gil, Y., D. Garijo, D. Khider, C. A. Knoblock, M. Osorio, H. Vargas, M. Pham, J. Pujara, B. Shbita, B. Vu, Y. Chiang, D. Feldman, Y. Lin, H. Song, V. Kumar, A. Khandelwal, M. Steinbach, K. Tayal, S. Xu, S. A. Pierce, L. Pearson, *D. Hardesty Lewis*, E. Deelman, R. F. da Silva, R. Mayani, A. R. Kemanian, Y. Shi, L. Leonard, S. D. Peckham, M. Stoica, K. M. Cobourn, Z. Zhang, C. Duffy, L. Shu. "Artificial Intelligence for Modeling Complex Systems: Taming the Complexity of Expert Models to Improve Decision Making". *The ACM Transactions on Interactive Intelligent Systems* 11(2):11.

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## Conference papers

155 CLAREMONT AVE – NEW YORK, NY 10027 – UNITED STATES

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[researchgate.net/profile/Daniel-Hardesty-Lewis](https://researchgate.net/profile/Daniel-Hardesty-Lewis)

- 2019 Mar. Garijo, D., J. Pujara, B. Vu, D. Feldman, R. Mayani, K. Cobourn, C. Duffy, A. R. Kemanian, L. Shu, V. Kumar, A. Khandelwal, D. Khider, K. Tayal, S. D. Peckham, M. Stoica, A. Dabrowski, *D. Hardesty Lewis*, S. A. Pierce, V. Ratnakar, Y. Gil, E. Deelman, R. F. da Silva, C. Knoblock, Y. Chiang, M. Pham. "An intelligent interface for integrating climate, hydrology, agriculture, and socioeconomic models". ACM 24th International Conference on Intelligent User Interfaces (IUI'19).
- 2018 June Garijo, D., D. Khider, Y. Gil, L. A. M. C. Carvalho, B. T. Essawy, S. A. Pierce, *D. Hardesty Lewis*, V. Ratnakar, S. D. Peckham, C. Duffy, J. L. Goodall. "A Semantic Model Catalog to Support Comparison and Reuse". 9th International Congress on Environmental Modelling and Software.

## Technical reports

- 2021 Mar. Sun, A., M. H. Young, S. A. Pierce, J. Thompson, *D. Hardesty Lewis*, B. R. Scanlon. "Development of a Framework of Data Interpolation, Scaling, and Homogenization (DISH) for Mapping Natural Resources and Socioeconomic Data in Texas".
- 2019 Oct. Khider, D., Y. Gil, D. Garijo, K. M. Cobourn, C. Duffy, A. R. Kemanian, S. D. Peckham, B. Watkins, A. Champion, C. Preager, S. A. Pierce, *D. Hardesty Lewis*, A. Dabrowski, C. H. Porter, M. Landsfeld, M. Puma, B. Schauburger, A. Sliva, C. T. Morrison. "Towards a Shared Modeling Terminology and Problem Specification Framework".

## Presentations

- 2021 May Passalacqua, P., F. R. Salas, R. Schomp, A. Carruthers, *D. Hardesty Lewis*. "Estimating Inundation Extent and Depth from National Water Model Outputs and High Resolution Topographic Data". Presented to the National Oceanographic and Atmospheric Administration.
- 2020 Dec. Sun, A., J. Thompson, *D. Hardesty Lewis*, J. Powell, M. H. Young, B. R. Scanlon, S. A. Pierce. "Development of a Framework of Data Interpolation, Scaling, and Homogenization (DISH) for Mapping Natural Resources in Texas". Presented at the 2020 annual Fall Research Showcase of Planet Texas 2050.
- 2020 Sep. Passalacqua, P., D. R. Maidment, D. Arctur, H. Evans, C. Thies, A. Carruthers, R. Schomp, *D. Hardesty Lewis*, S. A. Pierce. "From Rain Forecasts to Stream Flow to Flood Modelling". Presented at the 2020 annual Fall Research Showcase of Planet Texas 2050.
- 2020 Aug. *Hardesty Lewis, D.*. "Vector and Raster GIS Processing with Python in Jupyter Notebooks". Presented at the 2020 annual TACC Institute of Planet Texas 2050.
- 2019 Sep. *Hardesty Lewis, D.*, A. Dabrowski, J. Powell, S. A. Pierce. "DataX and MINT Overview". Presented at the 2019 annual Fall Research Showcase of Planet Texas 2050.

## Posters

- 2019 Dec. Khider, D., Y. Gil, K. M. Cobourn, E. Deelman, C. Duffy, R. F. da Silva, A. R. Kemanian, C. A. Knoblock, V. Kumar, S. D. Peckham, Y. Chiang, D. Feldman, D. Garijo, *D. Hardesty Lewis*, A. Khandelwal, R. Mayani, M. Osorio, M. Pham, S. A. Pierce, J. Pujara, V. Ratnakar, L. Shu, H. J. Song, B. Shbita, M. Stoica, B. Vu, L. Pearson. "MINT: An intelligent interface for understanding the impacts of climate change on hydrological, agricultural and economic systems". Poster presented at the 2019 annual fall meeting of the American Geophysical Union.
- 2019 June *Hardesty Lewis, D.*, J. C. Thompson, E. Pease, Q. Yang, M. H. Young, S. A. Pierce. "A unified data representation of Texas water resources". Poster presented at the 2019 annual meeting of the Earthcube community.
- 2019 June Pierce, S. A., J. Powell, A. Karpatne, D. Garijo, J. Martin, *D. Hardesty Lewis*, P. Marchetto, S. Cleveland, M. Daniels, I. Athanasiadis, P. Keys, I. Demir, D. Fuka, S. Peckham, M. Hill, I. Ebert-Uphoff, D. Pennington, G. Jacobs, Y. Gil. "Intelligent Systems and Geosciences". Poster presented at the 2019 annual meeting of the Earthcube community.

- 2019 June Powell J., A. Karpatne, D. Garijo, J. Martin, *D. Hardesty Lewis*, P. Marchetto, S. Cleveland, M. Daniels, I. N. Athanasiadis, P. W. Keys, I. Demir, S. D. Peckham, M. Hill, I. Ebert-Uphoff, D. Pennington, G. Jacobs, Y. Gil, S. A. Pierce. "Creating Sustainable Knowledge Centric Communities with Artificial Intelligence Applications to Earth Science Problems". Poster presented at the 2019 annual meeting of the Earthcube community.
- 2019 June Pease, E., J. C. Thompson, *D. Hardesty Lewis*, Q. Yang, S. A. Pierce, M. H. Young. "Integrated Modeling of Texas Water Resources". Poster presented at the 2019 annual meeting of the MODFLOW and More conference series.
- 2018 Dec. Pease, E., A. Pfeil, V. Ibarra, S. Siddique, F. Apango, O. Ramirez, E. Collado, *D. Hardesty Lewis*, N. Freed, S. A. Pierce. "Groundwater Modeling with Informatics and Automated Workflows for Water Resource Management: A Case Study from the Northern Trinity Aquifer". Poster presented at the 2018 annual fall meeting of the American Geophysical Union.
- 2018 Sep. Martin, J., *D. Hardesty Lewis*, N. Freed, S. A. Pierce. "The IS-GEO Gateway: A community portal to facilitate AI and knowledge centered earth discoveries". Poster presented at the 13<sup>th</sup> annual conference of Gateway Computing Environments.
- 2018 June Martin, J., D. Garijo, N. Freed, S. A. Pierce, Y. Gil, D. R. Thompson, I. Demir, I. Ebert-Uphoff, D. Pennington, *D. Hardesty Lewis*, M. Hill, D. Fuka. "IS-GEO: A Research Coordination Network on Intelligent Systems Research to Support the Geosciences". Poster presented at the 2018 annual meeting of the EarthCube community.
- 2017 Dec. *D. Hardesty Lewis*, S. A. Pierce. "From MODFLOW-96 to MODFLOW-2005, PARFLOW, and Others". Poster presented at the 2017 annual fall meeting of the American Geophysical Union.
- 2017 Dec. Kejriwal, M., S. A. Pierce, P. I. Q. Houser, S. D. Peckham, Z. Stanko, *D. Hardesty Lewis*. "Semi-automatic Data Integration using Karma". Poster presented at the 2017 annual fall meeting of the American Geophysical Union.
- 2016 July Cantu, A., S. A. Pierce, O. Rivera, A. Ramirez, *D. Hardesty Lewis*, J. Gentle, G. Fuentes-Pineda. "Big Data Analysis for Determining Sustainable Yield and Negotiation Space for an Aquifer System". Poster presented at the 51<sup>st</sup> annual meeting of the South-Central Section of the Geological Society of America.
- 2016 Apr. *Hardesty Lewis, D.* "On smoothness and Poisson's Equation". Presented at the 2016 annual DRP Undergraduate Project Symposium at the University of Texas at Austin.

## Academic projects

- 2022 June – Advanced compound flood hazard assessment science
- 2023 Aug. Partner with US Army Corps of Engineers to statistically model flood hazards in Texas's coastal region
- 2021 Oct. – Texas Disaster Information System (TDIS)
- 2023 Aug. Provide analytical web-based spatial data system to support more resilient decision-making at the state level
- 2020 Dec. – Museum of South Texas History Sunday Speaker Series
- 2023 Aug. Provide Dash-enabled website to facilitate geolocation of archival imagery by museum visitors
- 2020 Nov. – Networks for Hazard Preparedness and Response
- 2023 Aug. Overlay new, finely tuned flood maps over specially designed building and social vulnerability maps
- 2020 Sep. – Real-time flood inundation mapping to improve community resilience
- 2023 Aug. Provide simple, computationally efficient, high-resolution flood inundation maps to emergency response personnel
- 2020 Jan. – Estimating Inundation Extent and Depth from National Water Model Outputs and High Resolution Topographic Data
- 2023 Aug. Improving the accuracy of flood inundation estimation products from 10m to 1m resolution
- 2017 Dec. – MINT: Model INTEgration Through Knowledge-Rich Data and Process Composition
- 2023 Aug. Integrate geoscience models MODFLOW, HAND, & SWAT with models from widely separate disciplines including agriculture, economics, and social sciences
- 2016 Aug. – Intelligent Systems for Geosciences
- 2023 Aug. Used natural language processing and ETL pipelines to capture geoscientific variables' metadata to integrate with intelligent systems

- 2019 Sep. – Improving the Estimation of Inundation Extent and Depth with High Resolution Terrain Data Over the State of Texas  
 2020 Aug. Provided utilities to scale up the flood modelling toolset, GeoFlood, to statewide applicability across Texas
- 2018 July – Optimal Averaging of Water Resources in Texas  
 2019 Dec. Identified Texas water data sources, described their spatio-temporal scales and locations, estimated volume of all water in Texas its uncertainty, determined best methods to up-/down-scale all data to a common resolution and grid and minimise error
- 2017 May – From MODFLOW-96 to MODFLOW-2005, PARFLOW, and Others  
 2017 Aug. Brought a common groundwater flow model to scale on a supercomputer by updating its own Fortran code, using Perl natural language processing to extract and transform useful metadata from its user manual, and helping to get that metadata incorporated into a widely used scientific ontology
- 2016 July Big Data Analysis for Determining Sustainable Yield and Negotiation Space for an Aquifer System  
 Developed some Perl transformation routines between input file formats of groundwater models, MODFLOW-96 and PARFLOW
- 2014 Oct. – Stochastic Differential Equations and Monte Carlo Simulation  
 2014 Dec. Drafted Fortran routine that could run arbitrary equations of this type with arbitrary parameters
- 2013 May – Region of Calculated Existence for O/Ne-Core Stars with H/He Envelopes  
 2013 Dec. Verified known observations, discovering that MESA accurately models this type of star under its default parameters

## Professional projects

- 2019 Nov. – **Board member**, *Austin Community Reinvestment Cooperative (ACRC)*, Austin, United States  
 2024 Dec. Helped establish cooperative real estate investment firm  
 Detailed accomplishments:
- Shaped bylaws and business plan, having consulted with advisors who've had 40+ years in cooperative development experience
  - Provide GIS maps of specific properties to follow for a potential purchase, having selected them from criteria applied across parcel-level data
  - Provide heat maps to help determine the best neighborhoods for investment based on parcel-level zoning, existing building characteristics, and simple Python pro formas
  - Develop fully detailed real estate development pro formas for specific properties
  - Develop and maintain relationships with Central Austin property owners interested in a collaboration
  - Develop and submit options-to-purchase to interested property owners
- 2019 May – **Member-owner**, *Hardy Cooperative*, Austin, United States  
 Present Helped establish Central Austin affordable housing cooperative  
 Detailed accomplishments:
- Helped establish affordable housing cooperative of 7+ households in Central Austin, generating \$60,000+ in annual revenue while providing rents 35% more affordable than nearby alternatives
  - Collaborated with Dave Sullivan, former long-time chair of Austin planning commission, to determine that we met all zoning requirements for our use
  - Secured 3 guarantors willing to front \$40,000-\$80,000 in liability for our commercial lease and new venture
  - Drafted and implemented business prospectus, operational pro forma, resident lease applications, resident lease agreements, guarantor agreements, loan agreements, etc
  - Maintained good relationships with 2 separate pro bono attorneys who have extensively reviewed, provided feedback, and largely rubber-stamped the contracts I have written
  - Secured \$30,000+ in lending, as well as conditional approval for another \$40,000
  - Received 150+ applicants for only 7 spaces in just 2 years of operation
  - Established and maintained relationships with a 20+-year old housing coop and the ACRC in order to secure the long-term future of this venture

- 2019 May – 2020 **Member, housing committee**, *Austin Cooperative Business Association*, Austin, United States
- Apr. Austin Land Development Code (LDC) Revision  
Detailed accomplishments:
- Reviewed cumulative 3000+ pages of 6 different Austin LDCs (1972, 1984, current, and LDC drafts 1, 2, & 3)
  - Developed ACBA policy positions from understanding of these codes
  - Distributed GIS maps depicting impact of each proposed LDC draft and our proposed LDC amendments on current and future affordable housing cooperative development
  - Secured meeting with Mayor Steve Adler
  - Advocated ACBA’s position in direct meetings with Mayor Steve Adler, CM Greg Casar, CM Harper-Madison’s policy director, CM Leslie Pool’s chief of staff, and City Staff LDC drafters
  - Notified co-ops impacted by potential code changes and put them in touch with relevant City Council and City Staff members
  - Helped advance ACBA positions through different City Councilmember offices and conducted vote-counts of each position before and after each vote
  - Succeeded in getting amendments adopted into draft LDC

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## Review committees

- 2023 Mar. – Frontera Fellows applications  
2023 Apr. Helped TACC determine the most qualified doctoral fellows’ projects on one of the largest supercomputers in the world
- 2022 Aug. TACC’s Frontera Pathways & Large-Scale Community Partnerships applications  
Helped approved/deny millions of dollars in computing resources to multimillion-dollar projects

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## Students mentored

- 2021 Aug. – Khushboo Agarwal  
2023 Aug. MS Energy and Earth Resources, the University of Texas at Austin (expected 2023)
- 2020 Aug. – Mark Wang  
2023 Aug. PhD Civil Engineering, the University of Texas at Austin (expected 2025)  
MS Environmental and Water Resources Engineering, the University of Texas at Austin (2022)
- 2019 Aug. – Robert Schomp  
2021 May MS Environmental and Water Resources Engineering, the University of Texas at Austin (2021)
- 2019 Aug. – Alec Carruthers  
2020 May MS Environmental Engineering Technology / Environmental Technology, the University of Texas at Austin (2020)

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## Pertinent coursework

- *Mathematics* Advanced Calculus for Applications, Linear Algebra and Matrix Theory, Differential Equations, Real Analysis I, Probability I, Partial Differential Equations and Applications, Topology I, Algebraic Structures I, Complex Analysis, Vector Calculus
- *Scientific computing* Introduction to Scientific & Technical Computing, Artificial Intelligence (*audited*), Mathematical Modelling in Science and Engineering, Introduction to Stochastic Processes, Applied Statistics
- *Political and social sciences (2019 ICPSR Summer Program, University of Michigan)* Intro to Network Analysis, Machine Learning, Math for Social Sciences III

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## Professional affiliations

- *Mathematical Association of America* Member
- *North American Students of Cooperation* Member
- *American Geophysical Union* Member

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## Extracurricular activities

- *Austin Transportation Equity Analysis Zones Advisory Team* Member, one of 30 members selected from a pool of 177 applicants to advise Austin Transportation on equitable geographic allocation of Project Connect's anti-displacement bond
- *Austin Community Reinvestment Cooperative (ACRC)* Board member
- *Austin Cooperative Business Association (ACBA)* Member, Development committee
- *Evolve Austin* Member, affiliate organization
- *AURA* Member
- *Brentwood Neighborhood Association* Member, provided PIR of full set of Affordability Unlocked applications
- *Hardy Cooperative* Founder, member-owner
- *Austin Cooperative Business Association (ACBA)* Member, Housing committee
- *Mission Interuniversitaire de Coordination Échanges Franco-Américains* Foreign exchange
- *Directed Reading Program* Graduate mathematical readings under individual guidance of doctoral students
- *Mathematics Club* Attended student- and professor-led talks
- *Inter-Cooperative Council (ICC) Austin* Member
- *College Houses Cooperatives* Member
- *Emerging Scholars Program, Calculus* Explored calculus outside of course material

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## Languages

French Professional working

Spanish Native