

Curriculum Vitae

Yao Zhang

PERSONAL DETAILS

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EDUCATION

Ph.D. in Soil and Crop Sciences, Colorado State University, USA	2016
M.S. in Horticulture, Colorado State University, USA	2012
B.S. in Grass Science, Shandong Agricultural University, China	2009

RESEARCH INTERESTS

Primary research interests are to develop and apply models to understanding and quantify human and natural controls over ecosystem patterns and processes. Specifically, they include carbon/nitrogen cycling, plant/soil interaction, best management practices, climate change, using satellite imagery and geospatial datasets, and using machine learning in ecosystem data. Current research focuses on:

- Developing the MEMS 2.0 ecosystem model. The MEMS 2.0 simulates measurable soil carbon pools in both top and deep soils and can be used to assess the impact of climate change, land-use change, and management on the stable fraction in grassland, forest, and crop systems;
- Improving the DayCent (daily Century) ecosystem model. Regional predictions of soil carbon and crop yield under climate change using the DayCent model.

APOINTMENTS

Research Scientist I, Natural Resource Ecology Lab, Colorado State University	2018 – present
Postdoc Researcher, Soil and Crop Sciences, Colorado State University	2016 – 2018

RESEARCH PROJECT PARTICIPATION

- NSF & USDA “Ag-Forestry-AI (AgFoAI): AI Institute for Agriculture and Forest Mitigation and Adaptation to Climate Change”. Project period: 2023 – 2027 (Participate as **Co-PI**)
- “Hawaii Climate Smart Commodities: A portfolio approach to equitably scaling the agriculture sector”. Project period: 2023 – 2028 (Participate as **CSU PI**)
- USDA “Gevo_USDA Farm to Flight Project”. Project period: 2023 – 2026 (Participate as **Co-PI**)
- CalRecycle “Proposal to Update Compost Amendments in DayCent for GHG Modeling”. Project period: 2023 – 2024 (Participate as **Co-PI**)
- DOE subcontract “Soil Organic Carbon Modeling to Support Crop-Related GHG Emission Analysis at Argonne National Laboratory” Project period: 2023 – 2024 (Participate as **CSU PI**)
- USDA Agricultural Greenhouse Gas Inventory Improvements. Project period: 2022 – 2024 (Participate as **Co-PI**)
- California Air Resources Board “Assessment of Climate Change Impacts on soil C and GHG emissions from California Agriculture Land”. Project period: 2022 – 2023 (Participate as **Co-PI**)
- Lawrence Livermore National Laboratory “National Getting to Neutral Carbon”. Project period: 2022 – 2023 (Participate as **Co-PI**).

- Gates Foundation Ag One “Modeling the impact of increased crop production on soil carbon for African countries”. Project period: 2022 (Participate as **PI**).
- Indigo Ag, Inc. “Support for development of model-based quantification on soil carbon and GHGs”. Project period: 2021 – 2022 (Participate as **PI**)
- Shell Oil Company “Developing the mems ecosystem model to represent soil c and n stocks in grasslands and croplands under common conventional and regenerative management”. Project period: 2021 – 2029 (Participate as **Co-PI**)
- NASA “Integrating Field Measurements and Models to Evaluate Solar Induced Fluorescence as a Predictor of Dryland Crop Productivity”. Project period: 2021 – 2024. (Participate as **Co-PI**)
- USDA “Inferring the Supply of Greenhouse Gas Abatement from US Commodity Producers in The Corn Belt Using Observed Practice Choices: Implications for Carbon Offset Programs”. Project period: 2021 – 2024. (Participate as **Co-PI**)
- NSF “A Novel Theoretical and Quantitative Framework to Understand and Predict Soil Carbon Storage and Nitrogen Recycling”. Project period: 2020 – 2023. (Participate as **Co-PI**)
- USDA “Improving the US Greenhouse Gas Emission Inventory for Agricultural lands”. Project period: 2020 – 2021. (Participate as **Co-PI**)
- US Golf Association “Turfgrass under effluent water irrigation: Long-term data collection and model simulation to predict management effectiveness for minimizing salinization and sodification risks”. Project period: 2020 – 2020 (Participate as **Co-PI**)

PEER-REVIEWED PUBLICATIONS

- [1] Santos RS, Zhang Y, Cotrufo MF, Hong M, Oliveira DMS, Damian JM, Cerri CEP (2023) Simulating soil C dynamics under intensive agricultural systems and climate change scenarios in the Matopiba region, Brazil. *Journal of Environmental Management*, 347:119149.
- [2] Mathers C, Black CK, Segal BD, Gurung RB, **Zhang Y**, Easter MJ, Williams S, Motew M, Campbell EE, Brummitt CD, Paustian K, Kumar AA (2023) Validating DayCent-CR for cropland soil carbon offset reporting at a national scale. *Geoderma*, 438:116647.
- [3] Hong M, **Zhang Y**, Braun RC, Bremer DJ (2023) Simulations of nitrous oxide emissions and global warming potential in a C4 turfgrass system using process-based models. *European Journal of Agronomy*, 142:126668.
- [4] Field JL, **Zhang Y**, Marx E, Boote KJ, Easter M, George S, Hoghooghi N, Johnston G, Masum FH, Mulvaney MJ, Paustian K, Seepaul R, Swan A, Williams S, Wright D, Dwivedi P (2022) Modeling Yield, Biogenic Emissions, and Carbon Sequestration in Southeastern Cropping Systems With Winter Carinata. *Frontiers in Energy Research*, 10
- [5] **Zhang Y**, Lavalley JM, Robertson AD, Even R, Ogle SM, Paustian K, Cotrufo MF (2021) Simulating measurable ecosystem carbon and nitrogen dynamics with the mechanistically defined MEMS 2.0 model. *Biogeosciences*, 18(10):3147–3171.
- [6] Gurung R, Ogle SM, Breidt FJ, Parton WJ, Del Grosso SJ, **Zhang Y**, Hartman Melannie, Williams S, Venterea Rodney (2021) Modeling Nitrous Oxide Mitigation Potential of Enhanced Efficiency Nitrogen Fertilizers from Agricultural Systems. *Science of the Total Environment*, 801: 149342.
- [7] Cotrufo F, Lavalley J, **Zhang Y**, Hansen P, Paustian K, Schipanski M, Wallenstein M (2021) In-N-Out: A Hierarchical Framework to Understand and Predict Soil Carbon Storage and Nitrogen Recycling. *Global Change Biolog*, 27(19):4465–4468.

- [8] Deng C, **Zhang Y**, Bailey RT (2021) Evaluating Crop-Soil-Water Dynamics in Waterlogged Areas using a Coupled Groundwater-Agronomic Model. **Environmental Modelling & Software**, 143: 105130.
- [9] Zhang G, Song K, Miao X, Qiong Q, Ma J, Gong H, **Zhang Y**, Pausitan K, Yan X, Xu H (2021) Nitrous oxide emissions, ammonia volatilization, and grain-heavy metal levels during the wheat season: Effect of partial organic substitution for chemical fertilizer. **Agriculture, Ecosystems & Environment**, 311:107340.
- [10] Gurung RB, Ogle SM, Breidt FJ, Williams S, **Zhang Y**, Del Grosso SJ, Parton WJ, Paustian K (2021) Modeling ammonia volatilization from urea application to agricultural soils in the DayCent model. **Nutrient Cycling in Agroecosystems**.
- [11] Garcia-Chevesich P, Wei X, Ticona J, Martínez G, Zea J, García V, Alejo F, **Zhang Y**, Flamme H, Graber A, Santi P, McCray J, Gonzáles E, Krahenbuhl R (2021) The Impact of Agricultural Irrigation on Landslide Triggering: A Review from Chinese, English, and Spanish Literature. **Water**, 13(1):10.
- [12] **Zhang Y**, Gurung R, Marx E, Williams S, Ogle SM, Paustian K (2020) DayCent Model Predictions of NPP and Grain Yields for Agricultural Lands in the Contiguous U.S. **Journal of Geophysical Research: Biogeosciences**, 125(7):e2020JG005750.
- [13] **Zhang Y**, Marx E, Williams S, Gurung R, Ogle S, Horton R, Bader D, Paustian K (2020) Adaptation in U.S. Corn Belt increases resistance to soil carbon loss with climate change. **Scientific Reports**, 10(1):13799.
- [14] **Zhang Y**, Arabi M, Paustian K (2020) Analysis of parameter uncertainty in model simulations of irrigated and rainfed agroecosystems. **Environmental Modelling & Software**, 126:104642.
- [15] Gautam S, Mishra U, Scown CD, **Zhang Y** (2020) Sorghum biomass production in the continental United States and its potential impacts on soil organic carbon and nitrous oxide emissions. **GCB Bioenergy**, 12(10):878–890.
- [16] Zimnicki T, Boring T, Evenson G, Kalcic M, Karlen DL, Wilson RS, **Zhang Y**, Blesh J (2020) On Quantifying Water Quality Benefits of Healthy Soils. **BioScience**, 70(4):343–352.
- [17] **Zhang Y**, Paustian K (2019) Sensitivity of Predicted Agro-Ecosystem Variables to Errors in Weather Input Data. **Transactions of the ASABE**, 62(3):627–640.
- [18] Robertson AD, **Zhang Y**, Sherrod LA, Rosenzweig ST, Ma L, Ahuja L, Schipanski ME (2018) Climate Change Impacts on Yields and Soil Carbon in Row Crop Dryland Agriculture. **Journal of Environmental Quality**, 47(4):684–694.
- [19] **Zhang Y**, Suyker A, Paustian K (2018) Improved Crop Canopy and Water Balance Dynamics for Agroecosystem Modeling Using DayCent. **Agronomy Journal**, 110(2):511–524.
- [20] **Zhang Y**, Hansen N, Trout T, Nielsen D, Paustian K (2018) Modeling Deficit Irrigation of Maize with the DayCent Model. **Agronomy Journal**, 110(5):1754–1764.
- [21] Dozier AQ, Arabi M, Wostoupal BC, Goemans CG, **Zhang Y**, Paustian K (2017) Declining agricultural production in rapidly urbanizing semi-arid regions: policy tradeoffs and sustainability indicators. **Environmental Research Letters**, 12(8):085005.
- [22] Dozier AQ, David O, Arabi M, Lloyd W, **Zhang Y** (2016) A minimally invasive model data passing interface for integrating legacy environmental system models. **Environmental Modelling & Software**, 80:265–280.
- [23] Dozier A, David O, **Zhang Y**, Arabi M (2014) MODPI: A parallel model data passing interface for integrating legacy environmental system models. **International Congress on Environmental**

- Modelling and Software**, <https://scholarsarchive.byu.edu/iemssconference/2014/Stream-A/28>
- [24] **Zhang Y**, Qian Y, Mecham B, Parton WJ (2013) Development of Best Turfgrass Management Practices Using the DAYCENT Model. **Agronomy Journal**, 105(4):1151–1159.
- [25] **Zhang Y**, Qian Y, Bremer DJ, Kaye JP (2013) Simulation of Nitrous Oxide Emissions and Estimation of Global Warming Potential in Turfgrass Systems Using the DAYCENT Model. **Journal of Environmental Quality**, 42(4):1100–1108.
- [26] Zhang G, Huang Q, Song K, Ma J, **Zhang Y**, Paustian K, Yan X, Xu H. Gaseous emissions and grain-heavy metal contents in rice paddies: a 3-year partial organic substitution experiment. **Science of the Total Environment**, 826:154106

SELECTED ABSTRACTS OR PRESENTATIONS

- [1] **Zhang Y**, King A., Falvo, G., Hamilton, E., Yang H., Ogle S., Pausitan K., Robertson G., Cotrufo M. Developing the MEMS Model for Regenerative Agriculture. ASA-CSSA-SSSA Annual Meetings 2023. *Oral presentation*
- [2] **Zhang Y**, Lavallee J, Robertson A, Rebecca E, Ogle S, Paustian K, Cotrufo F. Modeling grassland and forest biogeochemistry with MEMS 2.0. American Geophysical Union, Fall Meeting 2021. *Poster*
- [3] Hong M, Zhang Y, Braun R, Bremmer D. Simulating Nitrous Oxide Emissions in Turfgrass Using Daycent and DNDC. ASA-CSSA-SSSA Annual Meetings 2021. *Oral presentation*
- [4] Paustian K, **Zhang Y**, Easter M, Swan A. Cutting the Gordian Knot - Reliable, low-cost quantification of CO₂ removal and GHG mitigation in agricultural soils. American Geophysical Union, Fall Meeting 2020. *Oral presentation*
- [5] Cotrufo F, Lavallee, **Zhang Y**, Robertson A, Ogle S, Wallenstein M, Paustian K. Modelling biophysically-defined measurable soil organic matter pools and fluxes: the MEMS model. The Soil Ecology Society Biennial Meeting 2019. *Oral presentation*
- [6] Gautam S, Mishra U, Scown C, Zhang Y. Suitability Analysis for Biomass Sorghum Production in the Continental United States. American Geophysical Union, Fall Meeting 2019. *Poster*
- [7] **Zhang Y**, Easter M, Brown K, Layer M, Velayudhan S, Williams S, Paustian K. The integrated COMET-WQ tool for crop field water quality assessment. 9th International Congress on Environmental Modelling and Software. 2018. *Oral presentation*
- [8] **Zhang Y**, Marx E, Williams S, Gurung R, Ogle S, Horton R, Bader D, Paustian K. Management Adaptation and Practice Changes Using Current Available Technology Mitigate CO₂ Emissions from Agricultural Soil in US Corn Belt Under Climate Change. ASA-CSSA-SSSA Annual Meetings 2017. *Poster*
- [9] **Zhang Y**, Dozier A, Arabi M, Paustian K. Enhanced DayCent Modeling Tool for Characterizing Deficit Irrigation in the SPRB. UCOWR/NIWR Conference 2017. *Oral presentation*
- [10] Dozier A, Arabi M, Goemans C, Wostoupal B, **Zhang Y**, Paustian K. Hydroeconomic modeling framework for assessing vulnerability to water demands in arid regions. UCOWR/NIWR Conference 2017. *Oral presentation*
- [11] Fujisaki K, Martin M, **Zhang Y**, Bernoux M, Chapuis-Lardy L. Evaluation of the DayCent model to predict carbon fluxes in French crop sites. European Geosciences Union General Assembly 2017. *Oral presentation*
- [12] Ogle S, Paustian K, **Zhang Y**, Kent J, Gurung R, Klotz R. Current and Projected Carbon Dynamics in US Agricultural Systems. AGU Fall Meeting 2016. *Oral presentation*

- [13] **Zhang Y**, Dozier A, Arabi M, Paustian K. Decision Support Tools to Adapt Semi-Arid Irrigated Cropping Systems to Drought. ASA-CSSA-SSSA Annual Meetings 2016. *Oral presentation*
- [14] **Zhang Y**, Hansen N, Trout T, Nielson D, Paustian K. Modeling Deficit Irrigation of Maize Using the Daycent Model. ASA-CSSA-SSSA Annual Meetings 2015. *Oral presentation*
- [15] Qian Y, Gillette K, Zhang Y, Ronald F. C Sequestration and N₂O Emissions in Urban Soils. ASA-CSSA-SSSA Annual Meetings 2014. *Oral presentation*
- [16] **Zhang Y**, Suyker A, Paustian K. Testing and Improvement of Water Balance of the DAYCENT Ecosystem Model. ASA-CSSA-SSSA Annual Meetings 2014. *Poster*
- [17] **Zhang Y**, Qian Y. How Will Kentucky Bluegrass Turf Respond to Global Climate Change? - Results from Ecosystem Modeling. International Horticultural Congress 2014. *Poster*
- [18] **Zhang Y**, Qian Y, Bremer D, Kaye J. Simulation of N₂O Emissions From Two Cool Season Turfgrass Lawns Using the Daycent Model. ASA-CSSA-SSSA Annual Meetings 2012. *Poster*
- [19] **Zhang Y**, Qian Y, Mecham B, Parton W. Development of Best Turfgrass Management Practices Using Daycent Model. ASA-CSSA-SSSA Annual Meetings 2012. *Oral presentation*
- [20] **Zhang Y**, Qian Y. Development of Best Turfgrass Management Practices Using Daycent Model, ASHS Annual Meetings 2012. *Oral presentation*

SKILLS

Model development: leading developer of the MEMS 2.0 ecosystem model, developer of the DayCent ecosystem model, developer of the COMET-farm online carbon and greenhouse gas accounting platform, developer of the Agriculture Water Conservation Analysis tool on the online eRAMS (Environmental Resources Assessment and Management System) platform.

Models: DayCent (CENTURY), DSSAT, CropSyst, APEX, LINTUL, GECROS, MEMS, SWAT

Programming: Proficient in R, Fortran, C, Java, and Python.

Remote sensing and GIS: Proficient in ArcGIS, GIS packages in R, and other programs in processing and analyzing spatial data.

PROFESSIONAL SERVICE

- **Journal Editor**
Associate editor of the Agronomy Journal (the flagship journal of American Society of Agronomy)
- **Journal Reviewer**
Global Change Biology, Soil Biology and Biochemistry, Field Crops Research, Environmental Modelling & Software, Agriculture Water Management, Carbon Management, Agronomy Journal, Crop Science, Ecological Modeling, Journal of Environmental Quality, MDPI Agronomy, etc.
- **Member**
Soil Science Society of America (2012 to present)
American Geosciences Union (2021 to present)