

Peiyu Cao

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Education

Iowa State University, United States

PhD program with Dr. Chaoqun Lu, Aug. 2016 – Present
Major: Environmental Science
Minor: Statistics
GPA: 3.67/4

Institute of Geographic Sciences and Natural Resources Research, China

Master Program with Dr. Leiming Zhang, Sept. 2013 - July 2016
M.S. Major: Ecology

China Agricultural University, China

Undergraduate study, Sept. 2009 - July 2013
B.S. Major: Resource and Environmental Science

Teaching Experience

EnSci/Agron 270X: Geospatial Technologies

Teaching Assistant

ISU

Fall 2017, 2018

EnSci/Biol 370: GIS for Ecology and Environmental Science

Teaching Assistant

ISU

Spring 2020, Summer 2020, Fall 2019, 2020

EnSci/Biol 381: Introduction to Environmental Systems

Teaching Assistant

ISU

Fall 2019, 2020

Mentoring undergraduate researcher

Student: Alina Lu

Fall 2017 - Fall 2018

Student: Luke Sloterdijk

Fall 2019 - Fall 2020

Service

Facilities Chair - Department of Ecology, Evolution, and Organismal Biology GSO

Facilities committee representative

Fall 2020 - Present

Project Experience

Delivery-scale evaluation and modeling of nutrient reduction practices, INRC 2017-06

Project assistant

July 2017 - June 2019

- Developed model input data for four catchments
- Modified model structure to improve snow process, soil moisture dynamics, subsurface flows, and include tile drainage, prairie potholes
- Validated model performance and compared the simulations with observations
- Drafted quarter reports

Before the streams: Modeling the effectiveness of in-field and edge-of-field practices in reducing nitrogen loads, INRC 2018-13

Project assistant

July 2018 - June 2020

- Developed model driving data for model simulation
- Modified model structure to incorporate tile drainage network and saturated riparian buffer

Sustainable field-to-market supplychains enabled by blockchain networks, NSF CNH2-S

- Developed county-level nitrogen fertilizer data set

Honor & Awards

“F. Wendell Miller scholarship” by Iowa State University in 2016

Manuscripts Under Review & In Preparation

1. Lu C, et al., Revisit soil N₂O emission across the contiguous United States: Magnitude, variations, and reason attribution. *In preparation*.
2. **Cao, P.** et al., Spatiotemporal patterns of fertilizer N/P inputs in major crops across the United States. *In preparation*.
3. Jien Zhang, **Peiyu Cao**, Chaoqun Lu. Half-century history of crop nitrogen budget in the conterminous United States: Variations over time, space and crop types. *Global Biogeochemical Cycles*, under review.

Publications (Citations: 114, h-index: 4)

1. **Peiyu Cao**, Chaoqun Lu, Jien Zhang, Avani Khadilkar. Northwestward cropland expansion and growing urea-based fertilizer use enhanced NH₃ emission loss in the contiguous United States. *Atmospheric Chemistry and Physics*, 2020, 20: 11907-11922. (IF: 5.4)
2. Chaoqun Lu, Jien Zhang, **Peiyu Cao**, Jerry Hatfield. Are we getting better in using nitrogen? – Variations in nitrogen use efficiency of two cereal crops across the United States. *Earth's future*, 2019, 7: 939-952. (IF: 6.1)
3. **Peiyu Cao**, Chaoqun Lu, Zhen Yu. Historical Nitrogen Fertilizer Use in Agricultural Ecosystems of the Contiguous United States during 1850-2015: Application rate, Timing, and Fertilizer Types. *Earth System Science Data*, 2018, 10: 969-984. (IF: 9.2, Citations: 74)
4. Zhen Yu, Chaoqun Lu, **Peiyu Cao**, Hanqin Tian. Long-term terrestrial carbon dynamics in the Midwestern United States during 1850 - 2015: Roles of land use and cover change and agricultural management. *Global Change Biology*, 2018, 24(6): 2673-2690. (IF: 8.5, Citations: 19)
5. Zhen Yu, Chaoqun Lu, **Peiyu Cao**, Hanqin Tian, Amy hessl, Neil Pederson. Earlier leaf-flushing suppressed ecosystem productivity by draining soil water in the Mongolian Plateau, *Agricultural and Forest Meteorology*. 2017. 250-251: 1-8. (IF: 4.6)
6. **Peiyu Cao**, Leiming Zhang, Shenggong Li, Junhui Zhang. Review on vegetation phenology observation and phenological index extraction. *Advances in Earth Science*. 2016. 31(4): 365-376.
7. Leiming Zhang, **Peiyu Cao**, Yaping Zhu, Qingkang Li, Junhui Zhang, Xiaoling Wang, Guanhua Dai, Jingong Li. Dynamics and regulations of ecosystem light use efficiency in a broad-leaved Korean pine mixed forest, Changbai Mountain. *Chinese Journal of Plant Ecology*. 2015. 39(12): 1156-1165.

Conference Presentations

- **Peiyu Cao**, Chaoqun Lu. Building Model Capability in Simulating Spatiotemporal Variations of Hydrology and Nitrogen Loading across Scales. *AGU Fall Meeting*, USA. Dec. 1-17, 2020.
- **Peiyu Cao**, Chaoqun Lu, William Crumpton, Matthew Helmers. Building Model Capability in Simulating Catchment Hydrology and Nitrogen Loads. *Sustainable Urban Systems - Redesigning Urban Rural Interface*. Ames, IA, USA, August 12-13, 2019.
- Chaoqun Lu, Jien Zhang, **Peiyu Cao**, Jerry Hatfield. Half-century history of crop nitrogen budget and nitrogen use efficiency in the conterminous United States: Variations over time, space and crop types. *AGU Fall Meeting*, San Francisco, USA. Dec. 9-13, 2019.
- Jien Zhang, Chaoqun Lu, **Peiyu Cao**. Spatiotemporal Patterns of Nitrogen Fertilizer Use Efficiency in Two Cereal Crops in the United States. *AGU Fall Meeting*, Washington DC, USA. Dec. 10-14, 2018.
- **Peiyu Cao**, Chaoqun Lu, Avani Khadilkar. Spatiotemporal Pattern of NH₃ Volatilization Loss From Synthetic Fertilizer Uses In The U.S. During 1850-2015. *AGU Fall Meeting*, Washington DC, USA. Dec. 10-14, 2018.
- **Peiyu Cao**, Chaoqun Lu, Zhen Yu, Avani Khadilkar, Alina Lu. Spatiotemporal Pattern of NH₃ Volatilization Loss from Sythetic Fertilizer Uses in the U.S. from 1850-2015. *Environmental Science Graduate Research Symposium*. Iowa State University, Ames, IA, USA. April 4, 2018.

- **Peiyu Cao**, Chaoqun Lu, Zhen Yu. Historical Agricultural Nitrogen Fertilizer Management in the Contiguous United States during 1850-2015. *AGU Fall Meeting*, New Orleans, LA, USA. Dec. 11-15, 2017.
- Chaoqun Lu, Zhen Yu, **Peiyu Cao**, Hanqin Tian. The overwhelming role of soil N₂O emissions in net greenhouse gas balance of the U.S. Corn Belt: Modeling estimate of nitrogen fertilizer impacts. *AGU Fall Meeting*, New Orleans, LA, USA. Dec. 11-15, 2017.
- **Peiyu Cao**, Chaoqun Lu, Zhen Yu. Spatiotemporal changes of Synthetic Nitrogen Fertilizer Uses across agricultural land of the Continental United States: Historical data reconstruction during 1850-2015. *Environmental Science Graduate Research Symposium*. Iowa State University, Ames, IA, USA. April 7, 2017.
- Leiming Zhang, **Peiyu Cao**, Shenggong Li, Guirui Yu, Junhui Zhang, Yingnian Li. Phenological indicators derived with CO₂ flux, MODIS image and ground monitor at a temperate mixed forest and an alpine shrub. *European Geosciences Union General Assembly 2016*. Vienna, Austria, April 17-22, 2016.