

Malena Orduña Alegría

Postdoctoral Researcher - Kansas Geological Survey, University of Kansas

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🔗 ResearchGate

📖 Education

Technische Universität Dresden | **PhD in Socio-Hydrology** | Germany

- » Thesis: Robust design optimization of complex irrigation networks under water scarcity conditions. Development of inter- and trans-disciplinary approaches for sustainable water resources management.
- » Grade: *magna cum laude*

Universität Stuttgart | **M.Sc. in Water Resources Eng. and Management** | Germany

- » Thesis: Application and assessment of a spatially lumped model for dynamic analysis of stream flow and water chemistry.

Universidad Autónoma de San Luis Potosí | **B.S. in Environmental Engineering** | México

- » Thesis: Prefeasibility study of electro-dialysis water treatment for fluoride removal of drinking water sources.

West Virginia University | **B.S. in Environmental Engineering - Study Abroad** | USA

- » Elements of environmental protection and resource economy. Foundations of applied GIS in natural sciences.

📁 Work Experience

Feb 2023 Present	<i>Kansas Geological Survey</i> Postdoctoral Researcher USA <ul style="list-style-type: none">» Lead the development of an open-source platform that couples groundwater, crop, and agent-based models to analyze interactions among humans and water systems in irrigated agricultural landscapes.
Jun 2021 Sep 2016	<i>Technische Universität Dresden</i> Research Associate Germany <ul style="list-style-type: none">» Design of resilient complex water networks in agriculture using agent-based models.» Design of effective learning and data collection through collaborative science approaches.
Aug 2017 Mar 2017	<i>Purdue University</i> PhD Research Stay USA <ul style="list-style-type: none">» Evaluation of evapotranspiration rates and water productivity by diverse irrigation strategies in the Corn Belt.
Jul 2015 Apr 2015	<i>Lincoln Agritech</i> Water Resources Research Intern New Zealand <ul style="list-style-type: none">» Testing of StreamGEM model for chemical analysis of groundwater in New Zealand.» Support of field work for research projects.
Jul 2013 Jan 2013	<i>3M Mexico</i> Research and Development Engineer México <ul style="list-style-type: none">» Risk and environmental analysis for products of 3M Health Care Business.» Development and research of new product ideas.
Dec 2012 Aug 2012	<i>UASLP Metallurgy Institute</i> Water Treatment Engineer México <ul style="list-style-type: none">» Estimation of arsenic and fluoride concentrations in drinking water quality.» Design electro-dialysis water treatment to remove pollutants from drinking water reservoirs.

</> Software Skills

Water and GIS modelling

ArcGIS/QGIS ● ● ● ● ○
MODFLOW ● ● ● ● ○
CaSiMiR ● ● ● ○ ○

Agent-Based modelling

GAMA (JS) ● ● ● ● ○
Mesa ● ● ● ● ○
Netlogo ● ● ○ ○ ○
Cormas ● ● ○ ○ ○

Programming and visualization

Excel ● ● ● ● ●
Python ● ● ● ● ○
Matlab ● ● ● ○ ○
R ● ● ● ○ ○
Tableau ● ● ● ○ ○

Text Editing

Office Suite ● ● ● ● ●
Latex ● ● ● ● ●

Image Editing

Board Game Design ● ● ● ● ●
Adobe Suite ● ● ● ○ ○

Peer-Reviewed Publications

Published



- 2021 **Orduña Alegría, M. E.** *Optimization of Agro-Socio-Hydrological Networks under Water Scarcity Conditions*. Dissertation. url: <https://tinyurl.com/Qucosa>
- 2020 **Orduña Alegría, M. E.**; Schütze, N.; Zipper, S. *A Serious Board Game to Analyze Socio-Ecological Dynamics towards Collaboration in Agriculture*. Sustainability, 12(13), 5301. doi: 10.3390/su12135301
- 2020 **Orduña Alegría, M. E.**; Schütze, N.; Al Khatri, A.; Mialyk O.; Grundmann J. *Assessing Impacts of Decision-Making Theories on Agrohydrological Networks Using Agent-Based Modelling*. Earth and Space Science Open Archive, 2019. Pre-print doi: 10.1002/essoar.10501893.1
- 2019 **Orduña Alegría, M. E.**; Schütze, N.; Niyogi, D. *Evaluation of Hydroclimatic Variability and Prospective Irrigation Strategies in the U.S. Corn Belt*. Water, 11(2447):1-18. doi: 10.3390/w11122447
- 2015 Woodward, S.; **Orduña Alegría, M. E.**; Wöhling, T.; Stenger R. *Uncertainty of catchment nitrate flux estimates calculated using the "StreamGEM" approach with monthly monitoring data*. The New Zealand Hydrological Society Conference Proceedings. Hamilton, New Zealand. url: <https://tinyurl.com/NZHydro>

In Preparation

- 2024 **Orduña Alegría, M.E.**; Zipper, S.; Golden, B.; Wilson, B.B.; Griggs, B.W.; Lin, C.Y.; Yu, D.J.; Whittemore, D.O.; Bohling, G.C.; Shin, H.C.; Deines, J.M.; Allen, J.J.; Marston, L.T.; Sanderson, M.R.; Hendricks, N.P.; Yu, Q.C.; Lauer, S.; Smith, S.M.; Butler, J.J. *Unlocking Aquifer Sustainability Through Irrigator-Driven Groundwater Conservation*. Nature Sustainability - **in Revision**
- 2024 **Orduña Alegría, M. E.**; Motlagh, M.; Michalscheck, M.; Dekker, G.; Krásná, D.; Rosolowski, J.M.; Garcia, M. *Collaborative Approaches to Learn Sustainability: Insights from Game-Based Learning Case Studies*. Special issue: Education for the Future: Learning and Teaching for Sustainable Development in Education - Frontiers in Education - **in Writing**

- 2024 Lin, C.Y.; **Orduña Alegría, M.E.**; Zipper, S.; Marston, L.T. *PyCHAMP: A Crop-Hydrological-Agent Modeling Platform for groundwater management studies*. Environmental Modelling & Software - **in Writing**
- 2024 Yu, Q.C; Qi, L.; **Orduña Alegría, M. E.**; Zipper, S.; Marston, L.T. *Examining the Interplay of Climate, Market Uncertainty, and Crop Insurance on Irrigator Profitability and Irrigation Strategies*. Journal of Water Resources Planning and Management - **in Development**
- 2024 **Orduña Alegría, M. E.**; Lin, C.Y.; Yu, Q.C; Zipper, S.; Marston, L.T. *Assessment of Socio-economic and Behavioral Responses to Groundwater Conservation Policies*. Special Issue: Focus on Next Generation of Water Economics in Environmental Research Letters - **in Development**
- 2024 Ndlovu, W.; Foster, T.; **Orduña Alegría, M. E.**; Zipper, S. *Strategies towards successful calibration of AquaCrop models*. Agricultural Water Management - **in Development**

Developed Serious Games for Research and Education

- » **OGALLALA** - Card game for middle-school children to learn about the Ogallala Aquifer in Kansas and the impact farming and irrigation have on groundwater sustainability.
- » **MAHIZ v2** - Role-playing activity for conferences/ big groups designed to analyze climate change, gender inequality, policy implementations, and technological adaptations in agriculture.
- » **MAHIZ** - Role-playing board game designed to analyze climate change, policy implementations, and technological adaptations in agriculture.  [Link](#)
- » **MoRe WATER** - Monitoring and Remediation of Waters: Role-playing and deception game about water quality monitoring in a trans-boundary river.  [Link](#)

Awards, Grants, and Scholarships

- 2019 Outstanding Student Presentation Award (**AGU Fall Meeting**)
- 2019 Outstanding Student Presentation Award (**EGU Fall Meeting**)
- 2016-2021 International Research Training Group Grant: Resilient Complex Water Networks (**Technische Universität Dresden**)
- 2013-2015 CONACYT-DAAD Cooperation Programme Scholarship (**Universität Stuttgart**)
- 2010-2011 PROMESAN Scholarship for Student Exchange Program for Higher Education in North America (**West Virginia University**)

Conferences & Talks

- June 2024 **Water Science Conference**, St. Paul, United States
- » **Orduña Alegría, M.E.**; Zipper, S.; Butler, J.J.; Golden, B.; Wilson, B.B.; Griggs, B.W.; Lin, C.Y.; Yu, D.J.; Whittemore, D.O.; Bohling, G.C.; Shin, H.C.; Deines, J.M.; Allen, J.J.; Marston, L.T.; Sanderson, M.R.; Hendricks, N.P.; Yu, Q.; Lauer, S.; Smith, S.M. *Socio-Hydrological Tenets for Effective Groundwater Governance*.
- Apr 2024 **European Geoscience Union General Assembly**, Vienna, Austria
- » **Orduña Alegría, M.E.**; Zipper, S.; Butler, J.J.; Golden, B.; Wilson, B.B.; Griggs, B.W.; Lin, C.Y.; Yu, D.J.; Whittemore, D.O.; Bohling, G.C.; Shin, H.C.; Deines, J.M.; Allen, J.J.; Marston, L.T.; Sanderson, M.R.; Hendricks, N.P.; Yu, Q.; Lauer, S.; Smith, S.M. *From Local Success to Global Solutions: Tenets for Effective Groundwater Governance*.

- » Schneider, B.; **Orduña Alegría, M. E.**; Popp, A. *How to become an active bystander to improve workplace climate* - Short Course.
- Apr 2024 **Geological Society of America - Joint North-Central and South-Central Section Meeting**, Springfield, United States
 - » Siomades, S.; Connolly, A.; **Orduña Alegría, M.E.**; Schneider, B. *Ogallala: A New Educational Geoscience Game Designed to Teach Middle School Students about the Role of Aquifers in Agriculture*.
- Dec 2023 **American Geoscience Union General Assembly**, San Francisco, United States
 - » **Orduña Alegría, M. E.**; Zipper, S.; Butler, J. *Managing Groundwater Depletion: Insights from the Irrigator-Driven SD-6 LEMA in Kansas*.
 - » **Orduña Alegría, M. E.**; Lin, C.Y.; Zipper, S.; Marston, L. *Bridging the Gap between Climate Change, Agriculture, and Policy with CHAMP: An Integrated Modeling Framework*.
- Nov 2023 **Governor's Conference on the Future of Water in Kansas**, Kansas, United States
 - » **Orduña Alegría, M. E.**; Lin, C.Y.; Zipper, S.; Marston, L. *PyCHAMP: Unraveling Human-Water Dynamics in Groundwater Governance Systems*.
 - » **Orduña Alegría, M. E.**; Zipper, S.; Butler, J. *Policy, Hydrological, and Economic Factors and Outcomes Underlying the SD-6 LEMA's First Decade*.
- Oct 2023 **Red Hot Research**, Kansas, United States
 - » **Orduña Alegría, M. E.** *Unlocking Aquifer Sustainability*.
- Sep 2023 **KGS Rocks N Rolls**, Kansas, United States
 - » **Orduña Alegría, M. E.**; Connolly, A. *Serious Games for Geoscience Education and Research*.
- Dec 2019 **American Geoscience Union General Assembly**, San Francisco, United States
 - » **Orduña Alegría, M. E.**; Schütze, N.; Al Khatri, A.; Mialyk O.; Grundmann J. *Assessing Impacts of Decision-Making Theories on Agrohydrological Networks Using Agent-Based Modelling*.
 - » **Orduña Alegría, M. E.**; Schütze, N. *Understanding the socio-hydrological dynamics in agriculture using a serious board game*.
- Oct 2019 **Water Security and Climate Change Conference**, San Luis Potosí, México
 - » **Orduña Alegría, M. E.**; Monji, F.; Mozzi, G.; Schütze. *Towards understanding the socio-hydrological dynamics of irrigation in agriculture*.
 - » **Orduña Alegría, M. E.**; Mialyk, O.; Schütze. *Optimization of crop water productivity and food security under limited water resources: interdisciplinary assessment of the prospective implementation of deficit irrigation strategies*.
- Sep 2019 **IAH Groundwater Management and Governance Congress**, Malaga, Spain
 - » **Orduña Alegría, M. E.**; Monji, F.; Mozzi, G.; Schütze. *An Agent Based Modelling approach to assess the impact of water demand in irrigation networks*.
- Aug 2019 **Scientific Area Network "Dynamics of Complex Networks"**, Dresden, Germany
 - » **Orduña Alegría, M. E.**; Schütze, N. *Towards understanding the socio-hydrological dynamics of irrigation in agriculture*.
- Apr 2019 **European Geoscience Union General Assembly**, Vienna, Austria
 - » **Orduña Alegría, M. E.**; Schütze, N.; Niyogi, D. *Hydroclimatic impacts in agriculture in the U.S.: an integrated assessment of the prospective implementation of deficit irrigation strategies*.

- Mar 2019 **Biopolis PhD Symposium**, Dresden, Germany
- » **Orduña Alegría, M. E.**; Monji, F.; Mozzi, G.; Schütze, N. *n Agent Based Modelling approach to assess the impact of water demand in irrigation networks.*

Teaching Experience

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| Mar 2024 | University of Kansas 2 Guest Lecture Lawrence, USA <ul style="list-style-type: none"> » Environmental solutions: Understanding the tragedy of commons in the Ogallala Aquifer using serious games. » Ethics, ideas and nature: Governance and Game Theory. |
| Nov 2023 | University of Kansas - CUAHSI Virtual University Guest Lecture Lawrence, USA <ul style="list-style-type: none"> » Modeling Human-Water Systems: Theories and Frameworks. |
| Oct 2023 | University of Kansas - CUAHSI Virtual University Guest Lecture Lawrence, USA <ul style="list-style-type: none"> » Knowledge Visualization for Hydrologic Data Visualization. |
| Apr 2022 | Technische Universität Dresden Guest Lecture Dresden, Germany <ul style="list-style-type: none"> » The Potential of Serious Games to Solve International Water Issues. |
| Feb 2020 | Goethe Universität Guest Lecture Frankfurt, Germany <ul style="list-style-type: none"> » Integrated Water Resources Management: Monitoring strategies and trans-boundary conflicts in practice. |
| Oct 2019 | Technische Universität München 2 Guest Lectures Munich, Germany <ul style="list-style-type: none"> » Integrated Water Resource Management in Agriculture. » Socio-Hydrology Dynamics and Game theory. |
| May 2019 | Technische Universität Dresden Guest Lecture Dresden, Germany <ul style="list-style-type: none"> » Introduction to Social Dynamics in Integrated Water Resources Management. |
| 2018 - 2019 | Technische Universität Dresden Project supervisor Dresden, Germany <ul style="list-style-type: none"> » Study Project Integrated Water Resources Management. |

Additional Professional Development

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| May 2023 | ADVANCEGeo Partnership Train the Trainers Workshop Madison, USA <ul style="list-style-type: none"> » Bystander intervention strategies with discussion of STEM-related scenarios. » Tools and strategies for improving workplace climate. » Workshop facilitation training. |
| Apr 2022 | Udemy - ZtM Complete Python Developer in 2022 Online <ul style="list-style-type: none"> » Python 3 developer: function and object-oriented programming, machine learning, data science, automation using PyCharm, Git, and Jupyter Notebooks. |
| Mar 2022 | Udemy - 365 Careers The Data Visualization Course Online <ul style="list-style-type: none"> » Data visualization with Excel, Python, R and Tableau. |
| Sep 2019 | AGROPOLIS International MISS-ABMS Summer school Montpellier, France <ul style="list-style-type: none"> » Multi-platform agent-based modelling and simulation for renewable resources management. |

Aug 2018	<i>ETH Zürich</i> Modeling and Simulating Social Systems with MATLAB Online » Introduction to dynamical systems, networks and game theory and agent-based modeling.
Oct 2017	<i>Technische Universität Dresden</i> Scientific Writing and Communication Dresden, Germany » Basics of planning and writing different academic texts.
Aug 2017	<i>Technische Universität Dresden</i> International Synthesis Summer school Dresden, Germany » Basics of methods and tools for analysis of network functional dynamics.
Feb 2017	<i>Technische Universität Dresden</i> R Statistical Workshop Dresden, Germany » Introduction to the statistics software R: Basic techniques, fundamental statistical methods, and selected topics.
Jun 2012	<i>Universität Kassel</i> Hessen International Summer University Kassel, Germany » Integrative Environmental Management and Engineering. » Artistic Adaptation Strategies to Climate Change.

Society and Network Memberships

2023-present	International Association of Hydrological Sciences (IAHS)
2023-present	Soil for Society Network
2019-present	American Geophysical Union (AGU)
2019-present	European Geophysical Union (EGU)
2019-2021	Water Youth Network (WYN)
2013-2015	International Association for Hydro-Environment Engineering and Research (IAHR)

Outreach and Service

2023 - present	<i>Soil for Society</i> Emerging Professional Leadership Team Member USA » Co-create a diverse and inclusive soil systems community of scientists, practitioners, and society toward climate-adaptive, sustainable, food and water systems. » Organization of webinar series and other workforce development workshops.
2023 - present	<i>IAHS</i> Working Group Leader USA » Working group "Effective Aquifer Governance for Agriculture" is part of the new science for water solutions decade: HELPING (Hydrology Engaging Local People IN one Global world) with the goal of understanding hydrological diversity and integrating knowledge across scales and regions.
2023 - present	<i>ADVANCEGeo</i> Workshop Facilitator USA Workshops: » Improving workplace climate: empowering individuals to become active bystanders. » Tackling implicit bias and microaggressions in the workplace. » Implicit Biases: Why we have them and how they impact STEM.
2023 - present	<i>KGS</i> Diversity, Equity, Inclusion, and Belonging Committee Member USA » Coordinate activities that increase representation and support of groups that have been historically under-represented in the geosciences. » Support the development of the code of conduct for KGS staff. » Support the development of a resources guide to improve diversity in recruiting and hiring.

2019 - present	EGU Organizer of Games for Geoscience Austria <ul style="list-style-type: none"> » Organized the annual Games for Geoscience scientific session that is attended by scientists who want to learn the latest research and experiences on how to use games to effectively communicate about (geo)science. » Organized the annual Geoscience Game Night which is a social event in which AGU and EGU attendees gather to play geoscience related games.
2022	World Water Week Water and Climate Coalition Sweden <ul style="list-style-type: none"> » Organized "Collaborative action for informed climate smart water management" session where MAHIZ was played by international and national organizations, NGOs, private sector, academia members to discuss their actions towards an integrated water and climate agenda. 🌐 Link to video of the session and interactive Game.
2014 - 2015	IAHR Activities Coordinator Germany <ul style="list-style-type: none"> » Organized social events and activities for the IAHR Young Professionals Network in Baden-Württemberg, Germany.
2011 - 2012	UASLP Environmental Agenda Mexico <ul style="list-style-type: none"> » Development of the interactive environmental information system platform for the dissemination of biodiversity, climate change and air quality knowledge in San Luis Potosí.

Languages

Spanish ● ● ● ● ●
 English ● ● ● ● ●
 German ● ● ● ○ ○

Skills

» Open-mindedness
 » Teamwork
 » Problem-solving
 » Time management
 » Financial analysis
 » Effective Communication
 » Attention to detail
 » Project management
 » Adaptability
 » Creativity