Profile

Dr. Richard Middleton is CEO & Founder of Carbon Solutions LLC ("Carbon Solutions"), a mission-driven, fast-growing business focusing on low-carbon energy Research & Development (R&D), Software Development, and Services. Energy applications include CO_2 capture and storage (CCS), hydrogen, energy storage, and renewable energy (geothermal, wind, and solar). Previously, he was a manager and senior scientist at Los Alamo National Laboratory (LANL) for more than a decade. Dr. Middleton's research has focused on two major areas: (1) energy & infrastructure modeling, including CCS, unconventional fossil fuels (such as shale gas and CO_2-enhanced fracturing & hydrocarbon recovery), geothermal exploration, wind energy optimization, and bioenergy planning and landscape design; and (2) climate impacts on natural & engineered systems including climate extremes, hydrology, ecosystem dynamics, and the energy-water nexus. He has been ranked as the US' third-most productive CCS researcher (1997–2017) as well as LANL's most-published Earth science first-author from 2010–2018. He is the lead developer of *SimCCS*, a research- and industry-leading decision support framework for understanding how, where, and when CCS infrastructure could and should be deployed.

Contact

Phone:
+1-505-709-5346

Email:
richard.middleton@carbonsolutionsllc.com

LinkedIn:
linkedin.com/in/richardmiddleton

Website:
carbonsolutionsllc.com

Blog:
chartedterritory.us

Richard Middleton

CEO & Founder | **Carbon Solutions**

Education & Training

Ph.D. | **Geography/Operations Research** | **University of California Santa Barbara**
2001–2006 | GPA: 4.0

M.Sc. | **Geographical Information Science (GIScience)** | **University of Leicester**
1998–1999 | *Distinction*

B.Sc. | **Geography** | **Lancaster University**
1993–1996 | *2:1*

Professional Experience

Chief Executive Officer & Founder | **Carbon Solutions** | **2021–Present**
Develop & manage multi-million-dollar annual portfolio | Principal analyst | Strategic development | Long-term operational management

Manager | **Los Alamos National Laboratory** | **2016–2020**
Manage, guide, & mentor 50 researchers, postdoctoral fellows, & students | Mange $15M/yr group budget | Oversee multi-million-dollar projects

Senior Scientist | **Los Alamos National Laboratory** | **2016–2021**
Major project development | Strategic planning | Energy-water nexus lab lead

Research Scientist | **Los Alamos National Laboratory** | **2009–2016**
CO_2 capture & storage | Climate/disturbances | Energy-water nexus | Geothermal exploration | Shale gas/fracturing | Water resource management

Senior Infrastructure Modeler | **Oak Ridge National Laboratory** | **2007–2009**
Biofuels | Geospatial modeling | Transportation | Supply chain

Postdoctoral Researcher | **Los Alamos National Laboratory** | **2006–2007**
CO_2 capture & storage | Water resources management | Geospatial optimization

Awards

- Double R&D 100 Award winner | *Quic-Fire* | **2020**
- Highest-impact Earth science pub., Los Alamos (2017–2020) | **2020**
- POWER Magazine Award, Finalist | *SimCCS* | **2020**
- Double R&D 100 Award winner | *SimCCS* | **2019**
- World "Top 10 most-cited" CCS researcher (1997–2017) | **2019**
- #1 First-author for Earth Science, Los Alamos (2011–2018) | **2018**
- Distinguished Mentor Award, Los Alamos | **2017**

Media & Interviews

Scientific American | Carbon Capture: Solved by Software? | **2020**
Albuquerque Journal | AI pinpoints renewable energy resources | **2020**
Reuters | Startups strive to recycle emissions for 'new carbon economy | **2019**
Le Monde | Au Texas, on exploite le gaz de schiste en pleine ville | **2018**
Albuquerque Journal | New approach to extracting fossil fuels | **2018**
Physics Today | Refracturing may not be all it's cracked up to be | **2017**

PUBLICATIONS

1. Moore, E.A., Chua, A., Middleton, E.J., **Middleton, R.S.**, Sale, K., Mehdi, Q., Miranda, M., Grol, E., Azarijafari, H., Kirchain, R. (**2025**). How can the Cement Industry Enable Industrial Decarbonization at Scale? *Environmental Science & Technology*, *doi.org/10.1021/acs.est.5c02831*.
2. Duggan, J.E., Ogland-Hand, J.D., **Middleton, R.S.** (**2025**). Modeling CCS policy support: Implications for market performance, net emissions, and welfare, *Applied Energy*, *doi.org/10.1016/j.apenergy.2025.125613*.
3. Cairncross, E., Ogland-Hand, J.D., Adams, B.M., **Middleton, R.S.** (**2024**). Nationwide cost and capacity estimates for sedimentary basin geothermal power and implications for geologic CO_2 storage, *Frontiers in Energy Research*, *doi.org/10.3389/fenrg.2024.1422285*.
4. Brooks, B.J., Geissler, C.H., An, K., McCoy, S.T., **Middleton, R.S.**, Ogland-Hand, J.D. (**2024**). The performance of solvent-based direct air capture across geospatial and temporal climate regimes, *Frontiers in Climate*, *doi.org/10.3389/fclim.2024.1394728*.
5. Bennett, J.A., Ellett, K.M., **Middleton, R.S.**, Winter, S., Blumer, E. (**2023**). Preliminary life cycle assessment of a net-zero power plant co-fired with waste coal and biomass, *Procedia CIRP*, *doi.org/10.1016/ j.procir.2023.02.004*.
6. Bennett, J.A., Ogland-Hand, J.D., Middleton, E.J., Eidbo, J.B., Prorok, M., Ross, B., Yaw, S.P., **Middleton, R.S.** (**2023**). The transmission ramifications of social and environmental siting considerations on wind energy deployment, *Frontiers in Energy Research*, *doi.org/10.3389/fenrg.2022.1040957*.
7. Miranda, M.W., Ogland-Hand, J.D., Bielicki, J.M., Moghanloo, R.G., Danesh-Far, J., **Middleton, R.S.** (**2023**). Developing a roadmap for carbon capture, and storage in Oklahoma by assessing the viability of stacked storage, *Greenhouse Gases: Science and Technology*, *doi.org/0.1002/ghg.2244*.
8. Vesselinov, V.V., Ahmmed, B., Mudunuru, M.K., Pepin, J.D., Burns, E.R., Siler, D.J., Karra, S., **Middleton, R.S.** (**2022**). Discovering hidden geothermal signatures using unsupervised machine learning, *Geothermics*, *doi.org/10.1016/j.geothermics.2022.102576*.
9. Jones, E.C., Yaw, S.P., Bennett, J.A., Ogland-Hand, J.D., Strahan, C., **Middleton, R.S.** (**2022**). Designing Multi-Phased CO_2 Capture and Storage Infrastructure Deployments, *Renewable and Sustainable Energy Transition*, *doi.org/10.1016/j.rset.2022.100023*.
10. Moodie, N. Jia, W., **Middleton, R.S.**, Yaw, S., Lee, S., Xiao, T., Wheatly, D., Steele, P., Esser, R., McPherson, B. (**2022**). Geologic carbon storage of anthropogenic CO_2 under the Colorado Plateau in Emery County, Utah, *Minerals*, *doi.org/10.3390/min12040398*.
11. Ogland-Hand, J.D., Adams, B.M., Bennett, J.A., **Middleton, R.S.** (**2022**). A geospatial cost comparison of CO_2 plume geothermal (CPG) power and geologic CO_2 storage, *Frontiers in Energy Research*, *doi.org/ 10.3389/fenrg.2022.855120*.
12. Ogland-Hand, J.D., Cohen, S.M., Kammer, R.M., Ellett, K.M., Saar, M.O., Bennett, J.A., **Middleton, R.S.** (**2022**). The importance of modeling carbon dioxide transportation and geologic storage in energy system planning tools, *Frontiers in Energy Research*, *doi.org/10.3389/ fenrg.2022.855105*.
13. Ogland-Hand, J.D., Kammer, R.M., Bennett, J.A., Ellett, K.M., **Middleton, R.S.** (**2022**). Screening for geologic sequestration of CO_2: A comparison between SCO_2T^{PRO} and the FE/NETL CO_2 saline storage cost model, *International Journal of Greenhouse Gas Control* 114, 103557, *doi.org/10.1016/j.ijggc.2021.103557*.
14. Atchley, A.L., Linn, R.R., Jonko, A., Hoffman, C., Hyman, J.D., Pimont, F., Sieg, C., **Middleton, R.S.** (**2021**). Spatial fuel distribution effect on wind profiles and resulting wildland fire behavior, *International Journal of Wildland Fire* 30, 179–189, *doi.org/10.1071/ WF20096*.
15. Lyu, Q., Tan, J., Li, L., Ju, Y., Busch, A., Wood, D.A., Ranjith, P.G., **Middleton, R.S.**, Shu, B., Hu, C. Wang, Z., Hu, R. (**2021**). The role of supercritical carbon dioxide for recovery of shale gas and sequestration in gas shale reservoirs, *Energy & Environmental Science* 14, 4203–4227, *doi.org/10.1039/D0EE03648J*.
16. Mehana, M., Guiltinan, E., Vesselinov, V.V., **Middleton, R.S.**, Hyman, J., Kang, Q., Viswanathan, H.S. (**2021**). Machine-learning predictions of the shale wells' performance, *Journal of Natural Gas Science and Engineering* 88, 103819, *doi.org/10.1016/j.jngse.2021.103819*.
17. Wei, N. Jiao, J., Ellett, K.M., Ku, A.Y., Liu, S., **Middleton, R.S.**, Li, X. (**2021**). Decarbonizing the Coal-Fired Power Sector in China via Carbon Capture, Geological Utilization, and Storage Technology, *Environmental Science & Technology*, *doi.org/10.1021/acs.est. 1c01144*.
18. Wei, N., Li, X., Jiao, J., Stauffer, P.H., Ellett, K.M., **Middleton, R.S.** (**2021**). A hierarchical framework for CO_2 storage capacity in deep saline aquifer formations, *Frontiers*, *doi.org/10.3389/feart.2021.777323*.
19. Whitman, C., Yaw, S.P., Hoover, B.A., **Middleton, R.S.** (**2021**). Scalable solutions to the carbon capture infrastructure design problem, *Optimization and Engineering*, *doi.org/10.1007/s11081-021-09621-3*.
20. **Middleton, R.S.**, Ogland-Hand, J.D., Chen, B., Bielicki, J.M., Ellett, K.M., Harp, D.R., Kammer, R.M. (**2020**). Identifying geologic characteristics and operational decisions to meet global carbon sequestration goals, *Energy & Environmental Science* 13, 5000–5016, *doi.org/10.1039/D0EE02488K*.
21. **Middleton, R.S.**, Bielicki, J.M., Chen, B., Clarens, A.F., Currier, R., Ellett, K.M., Harp, D.R., Hoover, B.A., Kammer, R.M., McFarlane, D., Ogland-Hand, J., Pawar, R.J., Stauffer, P.H., Viswanathan, H.S., Yaw, S.P. (**2020**). Great *SCO₂T*! Rapid carbon sequestration science and screening, *Applied Computing and Geosciences* 7, 100035 *doi.org/10.1016/j.acags.2020.100035*.
22. **Middleton, R.S.**, Yaw, S., Hoover, B.A., Ellett, K.M. (**2020**). An open-source tool for optimizing CO_2 capture, transport, and storage infrastructure, *Environmental Modelling and Software* 124, 1045–1060, *doi.org/10.1016/j.envsoft.2019.104560*.
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Hydrology: Regional Studies 28, 100678. doi.org/10.1016/j.ejrh.2020. 100678.
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26. Linn, R.R., Goodrick, S., Brambilla, S., Brown, M.J., **Middleton, R.S.**, O'Brien, J.J., Hiers, J.K. (**2020**). QUIC-Fire: A fast-running simulation tool for prescribed fire planning, *Environmental Modelling and Software* 125, 104616, doi.org/10.1016/j.envsoft.2019.104616.
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28. An, J., **Middleton, R.S.**, Li, Y. (**2019**). Environmental Performance analysis of cement production with CO_2 capture and storage technology in a life-cycle perspective, *Sustainability* 11, 2626–2628, doi.org/ 10.3390/su11092626.
29. Atchley, A.S., Birdsell, K.H., Crowell, K., **Middleton, R.S.**, Stauffer, P.H. (**2019**). Simulating 10,000 years of erosion to assess nuclear waste repository performance, *Geosciences* 9, 120–140, doi.org/10.3390/geosciences9030120.
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31. Kwicklis, E.M., Lu, Z., **Middleton, R.S.**, Miller, T.A., Bourret, S.M., Birdsell, K.H. (**2019**). Numerical evaluation of unsaturated-zone flow and transport pathways at Rainier Mesa, Nevada, *Vadose Zone Journal* 18, 1–22, doi.org/10.2136/vzj2019.01.0005.
32. Solander, K.C., Bennett, K.E., Fleming, S.W., **Middleton, R.S.** (**2019**). Estimating hydrologic vulnerabilities to climate change using historical simulated data: A proof-of-concept for a rapid assessment algorithm, *Journal of Hydrology: Regional Studies* 26, 100642, doi.org/10.1016/j.ejrh.2019.100642.
33. Wei, L., Xu, C., Jansen, S., Zhou, H., Christoffersen, B.O., Pockman, W.T., **Middleton, R.S.**, Marshall, J.D., McDowell, N.G. (**2019**). A heuristic classification of woody plants based on contrasting shade and drought strategies, *Tree Physiology* 39, 767–781, doi.org/10.1093/treephys/tpy146.
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35. Yaw, S.P., **Middleton, R.S.**, Hoover, B.A. (**2019**). Graph simplification for infrastructure network design, *COCOA 2019: Conference on Combinatorial Optimization and Applications*, 576–589, doi.org/10.1007/978-3-030-36412-0_47.
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37. An, J., Li, Y., **Middleton, R.S.** (**2018**). Reducing energy consumption and carbon emissions of magnesia refractory products: A life-cycle perspective, *Journal of Cleaner Production* 182, 363–371, doi.org/10.1016/ j.jclepro.2018.01.266.
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43. Goodsman, D.W., Aukema, B.H., McDowell, N.G., **Middleton, R.S.**, Xu, C. (**2018**). Incorporating variability in simulations of seasonally forced phenology using integral projection models, *Ecology and Evolution* 8, 162–175, doi.org/10.1002/ece3.3590.
44. Goodsman, D.W., Grosklos, G., Aukema, B.H., Whitehouse, C., Bleiker, K.P., McDowell, N.G., **Middleton, R.S.**, Xu, C. (**2018**). The effect of warmer winters on the demography of an outbreak insect is hidden by intraspecific competition, *Global Change Biology* 24, 3620–3628, doi.org/10.1111/gcb.14284.
45. McDowell, N.G., Michaletz, S., Bennett, K.E., Solander, K.C., Xu, C., Maxwell, R., Allen, C., **Middleton, R.S.** (**2018**). Predicting chronic climate-driven disturbances and their mitigation, *Trends in Ecology and Evolution* 33, 15–27, doi.org/10.1016/j.tree.2017. 10.002.
46. Solander, K.C., Bennett, K.E., Fleming, S.W., Gutzler, D.S., Hopkins, E.M., **Middleton, R.S.** (**2018**). Interactions between climate change and complex topography drive observed streamflow changes in the Colorado River Basin, *Journal of*

Hydrometeorology 19, 1637–1650, *doi.org/10.1175/JHM-D-18-0012.1*.

47. **Middleton, R.S.**, Gupta, R., Hyman, J.D., Viswanathan, H.S. (**2017**). The shale gas revolution: Barriers, sustainability, and emerging opportunities, *Applied Energy* 199, 88–95, *doi.org/10.1016/j.apenergy. 2017.04.034*.
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53. Langenfeld, J.K., Bielicki, J.M., Tao, Z., **Middleton, R.S.**, Menefee, A.H., Clarens, A.F. (**2017**). Response of integrated CO_2 capture and storage systems in saline aquifers and fractured shale formations to changes in CO_2 capture costs, *Energy Procedia* 114, 4099–4105, *doi.org/10.1016/j.egypro.2017.03.1550*.
54. Solander, K.C., Bennett, K.E., **Middleton, R.S.** (**2017**). Shifts in historical streamflow extremes in the Colorado River Basin, *Journal of Hydrology: Regional Studies* 12, 363–377, *doi.org/10.1016/j.ejrh.2017.05.004*.
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58. **Middleton, R.S.**, Carey, J.W., Currier, R.P., Hyman, J.D., Kang, Q., Karra, S., Jiménez-Martínez, J., Porter, M.L., Viswanathan, H.S. (**2015**). Shale gas and non-aqueous fracturing fluids: Opportunities and challenges for supercritical CO_2, *Applied Energy* 147, 500–509, *doi.org/10.1016/j.apenergy.2015.03.023*.
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Invited Talks & Panels

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2. **Middleton, R.S.** (**2025**). Regional Carbon Management & CO_2 Transport in the United States, *China International Pipeline Conference*, Beijing, China.
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11. **Middleton, R.S.** (**2016**). Critical watersheds: multiscale impacts of drought and fire, DOE *Office of Science (Environmental System Science PI Meeting)*, Washington, DC.
12. **Middleton, R.S.** (**2015**). Secure and sustainable energy infrastructure: CO_2 capture, utilization, and storage (CCUS), National Energy Technology Laboratory, Pittsburgh, PA.
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Media & Interviews

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2. Sale, K., Bennett, J., Talsma, C., Rodriguez, D., Harrison, A., Gilhooley, C., Lubeck, V., Middleton, E., **Middleton, R.S.** (**2024**). Projecting the Energy Requirements of Implementing Carbon Capture at Hard-to-Abate Industrial Facilities in the United States, *17th Greenhouse Gas Control Technologies Conference*, Calgary, Canada, *tinyurl.com/ 2dw36vsm*.
3. Middleton, E., Bennett, J., Ogland-Hand, J., **Middleton, R.S.**, Mehdi, Q., Miranda, M., Sale, K. (**2024**). Industrial Decarbonization Pathways and Their Implications for Environmental Justice Communities, *17th Greenhouse Gas Control Technologies Conference*, Calgary, Canada, *tinyurl.com/ 6x4h7etj*.
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5. Ogland-Hand, J., Bailey, L., Adams, B., Gilhooley, C., Morgan, D., Cunha, L., **Middleton, R.S.** (**2024**). Unlocking the Nation's Subsurface to Reach Net-Zero: Addressing Uncertainty in Geologic CO_2 Storage Screening with SCO_2T^{PRO}, *17th Greenhouse Gas Control Technologies Conference*, Calgary, Canada, *tinyurl.com/47vwkm5v*.
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42. **Middleton, R.S.**, Keating, G.N., Brandt, A.R., Viswanathan, H.S., Stauffer, P.H., Pawar, R.J., Bielicki, J.M. (**2012**). CO_2 leakage risks and the impact on commercial-scale CO_2 capture, transport, and storage: Alberta oil sands case study, *Eleventh Annual Conference on Carbon Capture, Utilization & Sequestration*, Pittsburgh PA, tinyurl.com/esr7y2d4.
43. **Middleton, R.S.**, Keating, G.N. (**2012**). Geospatially optimizing CO_2 capture and storage infrastructure with geologic uncertainty, *Annual Meeting of the Association of American Geographers*, New York, NY, tinyurl.com/svxkbfpc.
44. **Middleton, R.S.**, Kuby, M.J., Wei, R., Keating, G.N., Pawar, R.J. (**2011**). Spatiotemporal and economic decision making for the evolution of CCS infrastructure, *Tenth Annual Conference on Carbon Capture & Sequestration*, Pittsburgh PA, tinyurl.com/y4j4wyy3.
45. **Middleton, R.S.**, Bielicki, J.M., Keating, G.N., Pawar, R.J. (**2010**). Jumpstarting CCS using refinery CO_2 for enhanced oil recovery, *10th International Conference on Greenhouse Gas Technologies*, Amsterdam, The Netherlands, tinyurl.com/f53ycp6k.
46. Keating, G.N., **Middleton, R.S.**, Stauffer, P.H., Viswanathan, H.S., Letellier, B.C., Pasqualini, D.M., Pawar, R.J., Wolfsberg, A.V. (**2010**). How storage uncertainty will drive CCS infrastructure, *10th International Conference on Greenhouse Gas Technologies*, Amsterdam, The Netherlands, tinyurl.com/v52c2vdp.
47. Kuby, M.J., **Middleton, R.S.**, Bielicki, J.M. (**2010**). Analysis of cost savings from networking pipelines in CCS infrastructure systems, *10th International Conference on Greenhouse Gas Technologies*, Amsterdam, The Netherlands, tinyurl.com/huvahxc5.
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49. **Middleton, R.S.**, Keating, G.N., Stauffer, P.H., Viswanathan, H.S., Pawar, R.J. (**2010**). The impact of geologic reservoir uncertainty on CCS infrastructure, *Ninth Annual Conference on Carbon Capture & Sequestration*, Pittsburgh PA, tinyurl.com/2nrjwte5.
50. **Middleton, R.S.**, Phillips, B., Bielicki, J.M. (**2009**). The optimal spatial deployment of wind-energy and electricity transmission infrastructure, *Annual Meeting of the American Geophysical Union*, San Francisco CA, tinyurl.com/3zwx5av4.
51. **Middleton, R.S.**, Bielicki, J.M., Kuby, M.J. (**2008**). The carbon capture and storage optimization problem, *International Symposium on Locational Decisions XI*, Santa Barbara, CA.
52. **Middleton, R.S.** Bielicki, J.M. (**2008**). A comprehensive carbon capture and storage infrastructure model, *9th International Conference on Greenhouse Gas Technologies*, Washington, DC.
53. **Middleton, R.S.** (**2008**). Geospatial optimization for bioenergy infrastructure, *Annual Meeting of the Association of American Geographers*, Boston, MA.
54. **Middleton, R.S.**, Bielicki, J.M., Herzog, H.J., Kuby, M.J. (**2007**). The carbon capture and storage optimization problem, *Annual North American Meetings of the Regional Science Association International*, Savannah, GA.
55. **Middleton, R.S.**, Herzog, H.J., Keating, G.N., Kuby, M.J., Liao, X. (**2007**). Optimization for geologic carbon sequestration and carbon credit pricing. *Sixth Annual Conference on Carbon Capture & Sequestration*, Pittsburgh, PA.
56. **Middleton, R.S.**, Bielicki, J.M., Herzog, H.J. and Kuby, M.J. (**2007**). Optimization for carbon capture and storage. *Annual Meeting of the Association of American Geographers*, San Francisco, CA.
57. **Middleton, R.S.** and Duque, J.C. (**2006**). Geography and gerrymandering: a location science approach, *Annual Meeting of the Association of American Geographers*, Chicago, IL.
58. **Middleton, R.S.** and Church, R.L. (**2006**). Beyond Swapping: heuristic concentration and the p-median problem, *Western Regional Science Association Conference*, Santa Fe, NM.
59. **Middleton, R.S.** and Church, R.L. (**2005**). Heuristic distillation, *International Symposium on Location Decisions*, Sevilla, Spain.
60. **Middleton, R.S.** (**2005**). The p-median planning problem and the first law of optimization geography, *Annual Meeting of the Association of American Geographers*, Denver CO.
61. **Middleton, R.S.**, Church, R.L. (**2004**). Heuristic distillation for the *p*-median problem, *Annual North American Meetings of the Regional Science Association International*, Seattle WA.
62. **Middleton, R.S.** (**2002**). Topological integrity for multi-resolution tins, *Annual Meeting of the Association of American Geographers*, Los Angeles, CA.

Public Projects (PI/Key Roles)

1. Trail of the Chiefs (**2024–26**). $4.0M (c0PI).
2. *Project WyoTCH*: Developing a Roadmap for a Sustainable Carbon Hub (**2024–26**). $3.4M (PI).
3. Time's Ticking: Embarking on the Wyoming Trails Carbon Hub ("*WyoTCH*") (**2023–25**). $5.0M (PI).
4. Uinta Basin CarbonSAFE Phase II (**2023–25**). $ 11.8M (co-PI).
5. *SCO_2T^{PRO}*: Unlocking the Nation's Subsurface to Support the Energy Transition (**2022–24**). $1.1M (PI).
6. *SimWIND*: Software to Support Wind Siting and Environmental (**2021–22**). $200k (PI).
7. Development and Commercialization of *SCO_2T* to Maximize CO_2-based Subsurface Energy Potential (**2021**). $200k (PI).

8. Pumped-Storage Hydropower using Abandoned Underground Mines (PSH-AUM) as an Innovative Energy Storage Technology for Fossil-Integrated Systems (**2021**). $200k (co-PI).
9. Cloud-based High-Performance Computing Decision-Making Software for Carbon Sequestration (**2021–22**). $200k (co-PI).
10. Detection and Attribution of No-Analog Fire (**2020**). $150k (PI).
11. Spatiotemporal Social Data Analytics and Machine Learning for Pandemic Exploration and Forecasting (**2020**). $50k (PI).
12. *SimCCS*: Development and Applications (**2018–2021**). $200k/yr (PI).
13. Carbon Utilization and Storage Partnership (CUSP) of the Western United States (**2019–2024**). $5M/yr (co-PI/POC).
14. Southeast Regional Carbon Storage Partnership USA (SECARB-USA) (**2019–2024**). $5M (co-PI/POC).
15. Salts in Hot Water – Developing a Scientific Basis for Supercritical Desalination, Strategic Metal Recovery, and Industrial Water Treatment (**2018–2021**). $4.7M (co-I).
16. Pajarito Climate Impacts Study: Feasibility (**2018–2019**). $70k (PI).
17. Integrated Midcontinent Stacked Carbon Storage Hub (**2018–2019**). $13.3M (co-PI/POC).
18. CarbonSAFE Rocky Mountains Phase I: Ensuring Safe Subsurface Storage of CO_2 in the Intermountain West (**2016–2017**). $1.3M (co-PI/POC).
19. Establishing an Early CO_2 Storage Complex in Kemper County, Mississippi (**2017**). $11.2M (co-I/POC).
20. Nebraska Basin CarbonSAFE Integrated Pre-Feasibility Project (**2016–2017**). $1.2M (co-I/POC).
21. CAB-CS: Central Appalachian Basin CarbonSAFE (**2016–2017**). $1.2M (co-I/POC).
22. CarbonSAFE in the Northern Michigan Basin Integrated Pre-Feasibility (**2017**). $1.2M (co-I/POC).
23. US-China CERC—Clean Coal Technology, Phase II (**2015**). $25M (co-I/Theme Lead).
24. Critical Watersheds: Climate change, Tipping Points, and Energy-water Security Impacts (**2014–2017**). $3.0M (PI).
25. Hydrogeologic Windows: Regional Signature Detection for Blind and Traditional Geothermal Play Fairways (**2014–2015**). $405k (PI).
26. Regional assessment for CO_2 Capture and Storage for Southern Company (**2012**). $35k (PI).
27. Evolution and Optimization of the Biofuel Supply Chain (**2008–2010**) $800k (PI).

Awards & Honors

- R&D 100 Award (IT/Electrical) | *QUIC-Fire* | *tinyurl.com/yhhdbql3* | **2020**.
- R&D 100 Award (Special Recognition: Corporate Social Responsibility) | *QUIC-Fire* | *tinyurl.com/yhhdbql3s* | **2020**.
- Highest-impact Computational Earth Science publication, Los Alamos (2017–2020) | *tinyurl.com/ygpqthqy* | **2020**.
- POWER Magazine Award, Finalist (Creative Problem Solver), *SimCCS* **2020**.
- R&D 100 Award (Software & Services) | *SimCCS* | *tinyurl.com/yy6bhvt5* | **2019**.
- R&D 100 Award (Special Recognition: Corporate Social Responsibility) | *SimCCS* | *tinyurl.com/yy6bhvt5* | **2019**.
- World "Top 10 most-cited" author in CCS research (1997–2017) | *tinyurl.com/ydv76t8e* | **2019**.
- "Top 3 publisher" for EES Division (100+ scientists), Los Alamos, 2016–2018 | **2019**.
- "#1 First-author publisher" for EES Division (100+ scientists), Los Alamos, 2011–2018 | **2018**.
- Distinguished Mentor Award, Los Alamos | **2017**.
- Strongly Endorsed Leadership Focus (SELF) for Top 10% Management Training, Los Alamos | **2015**.
- "Top 3 publisher" for EES Division (100+ scientists), Los Alamos, 2012–2014 | **2014**.
- "Top 10" presentation (of 300+ presentations) at national CCUS conference, Pittsburgh | **2013**.

Mentorship

- **Daniel Restrepo Montoya**, Universidad EAFIT (PhD).
- **Erick Jones**, University of Texas, Austin (PhD).
- **Marcos Miranda**, The Ohio State University (PhD).
- **Brendan Hoover**, University of Texas, Austin (PhD).
- **Sean Yaw**, Montana State University (Postdoctoral Researcher).
- **Loy Lobo**, Arizona State University (MS).
- **Evan Gragg**, New Mexico Institute of Mining and Technology (PhD).
- **Ryan Kammer**, Indiana University (MS).
- **Kurt Solander**, Los Alamos National Laboratory (Postdoctoral Researcher).
- **Kelsey Hunter**, The Ohio State University (MS).
- **Minh Nguyen**, University of Wyoming (MS).
- **Katrina Bennett**, Los Alamos National Laboratory (Postdoctoral Researcher).
- **Isabelle Runde**, UC Santa Barbara (BS).
- **Melissa Teter**, Los Oregon State University (BS).
- **Elias Gonzales**, Los Alamos National Laboratory (High School).
- **Nicole Pendleton**, RelayHealth (MS).
- **Glenn Sutula**, TetraTech (MS).
- **Edgar Ronquillo**, Los Alamos National Laboratory (BS).
- **Alex Gorski**, USEIA (MS).
- **Min Chen**, Los Alamos National Laboratory (Postdoctoral Researcher).
- **Marc Mulkey**, Economist at Bureau of Labor Statistics (PhD).
- **Jeffrey Bielicki**, The Ohio State University (PhD).

Synergistic Activities

- **Developer of the spatial decision framework *SimCCS***
  Decision framework to support CO_2 capture and storage infrastructure and wind energy infrastructure. SimCCS has appeared in dozens of peer-reviewed publications, taught in multiple university optimization courses, and is regularly used by more than a dozen scientists for research, presentations,

and papers. SimCCS is a key part of dozens of past and ongoing federal, state, private, and non-profit CCS projects.

- **Author for the National Petroleum Council (NPC) report on CCUS ("Meeting the Dual Challenge: A Roadmap to At-Scale Deployment of Carbon Capture, Use, and Storage")**
  Author for the "CO_2 Geologic Storage" and "Integrative Economics" chapters including SimCCS simulations.
- **Steering committee for National Climate Assessment (NCA)**
  Lead author for the energy-water-land (EWL) technical input report for the 2013 NCA.
- **Los Alamos energy-water nexus representative**
  Los Alamos-wide representative for all energy-water issues including regular meetings, outreach, and proposal & program development.
- **Reviewer for leading scientific journals**
  Reviewer for 20+ journals across multiple disciplines including theoretical and applied energy, fuels, hydrology, environmental science, GIScience, operations research, computational science, and economics.