# COLLEEN GOLJA

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## EDUCATION

**Harvard University, Cambridge, MA** *May 2022*
***Ph.D. Environmental Science and Engineering***
*Dissertation: Solar Geoengineering: A Modeling Perspective*
*Dissertation Committee: David Keith, Frank Keutsch, Marianna Linz and Daniel Jacob*

**Tufts University, Medford, MA** *May 2015*
***B.S. Chemical Engineering***

## RESEARCH INTERESTS

- Investigating compensating errors in model representations of stratospheric mean state and variability to improve weather and climate prediction
- Leveraging complex statistical methods to increase the efficacy and efficiency of model based climate prediction (e.g. observational parameter constraint via ridge regression, neural network emulators etc.)

## RESEARCH EXPERIENCE

**Harvard University, Linz Research Group** *2022-present*
*Postdoctoral Fellow; Advisor: Marianna Linz*

**Exploring the impact of stratospheric mean state biases on response to perturbations**

- Leverage ISCA to isolate the contribution of stratospheric mean state conditions to the disparate stratospheric and surface responses of GCM's to an idealized aerosol forcing in the lower stratosphere

**Harvard University, Solar Geoengineering Research Group** *2016-2022*
*Doctoral Researcher; Advisor: David Keith*

**Impact of stratospheric warming in an inter-model comparative study**

- Use Python climate tools to quantify the surface effects of an imposed stratospheric heating rate associated stratospheric aerosol induced surface cooling in a multi-model intercomparison
- Generate policy framing for understanding risks posed by stratospheric aerosol injection

**A coupled advective-microphysical model of aerosol dynamics**

- Expanded the AER-2D condensation, coagulation and evaporation schemes into 3D and temporally coupled to an advective scheme to study the behavior of sulfate and solid aerosols injected from a high-altitude balloon payload into a turbulent stratospheric region
- Findings suggested the efficacy of a balloon platform to generate a high density aerosol plume without exceeding particle sizes relevant to studies of solar aerosol injection

**Tufts University, Smart Polymers, Membranes and Separations Laboratory** *2014*
*Undergraduate Research Assistant; Advisor: Ayse Asatekin*

**Development of self cleaning zwitterionic membranes**

- Characterized the ability of generated membranes with novel polarized surface features to contract and expand for self cleaning relevant for wastewater and petrochemical applications

**Proton OnSite, Wallingford, CT** *Summer 2013, 2014*
*Undergraduate Research Intern; Advisor: Julie Renner*

**Development of Novel Proton Exchange Membranes**

- Fabricated and assessed proton and anion exchange membrane electrode setups for performance and endurance

## PUBLICATIONS & PRESENTATIONS

### Journal Articles

Behrer, A. P., Park, R. J., Wagner, G., **Golja, C. M.**, & Keith, D. W. (2021). Heat has larger impacts on labor in poorer areas. *Environmental Research Communications*, *3*(9), 095001. https://doi.org/10.1088/2515-7620/abffa3

**Golja, C. M.**, Chew, L. W., Dykema, J. A., & Keith, D. W. (2021). Aerosol dynamics in the near field of the SCoPEx stratospheric balloon experiment. *Journal of Geophysical Research: Atmospheres*, *126*(4). https://doi.org/10.1029/2020JD033438

### Conference Presentations

**Golja, C. M.**, Keith, D. W., & Linz, M. (2022). Climate impacts of stratospheric heating from solar geoengineering scenarios. *Proc. of the American Meteorological Society session on Stratospheric Aerosol Climate Intervention and Natural Analogs*. https://ams.confex.com/ams/102ANNUAL/meetingapp.cgi/Paper/399493

**Golja, C. M.** & Keith, D. W. (2021). Increase the diversity of models to reduce policy-relevant uncertainty in solar geoengineering. *Proc. of the American Meteorological Society session on Aerosol-Cloud-Climate Interactions-Aerosol and Climate Geoengineering*. https://ams.confex.com/ams/101ANNUAL/meetingapp.cgi/Paper/381615

**Golja, C. M.** (2019). Solar geoengineering scientific briefing. *Invited talk at: Towards an interdisciplinary knowledge community on the critical understanding of emergent climate system intervention technologies in Southeast Asia*.

### Conference Posters

**Golja, C. M.**, Keith, D. W., & Chew, L. W. (2019, December). *The creation of a coupled advection-coagulation model to understand the behavior of aerosols injected from the SCoPEx payload*. Poster presented at American Geophysical Union, Fall Meeting, San Francisco, CA.

**Golja, C. M.**, Weisenstein, D., & Keith, D. W. (2019, November 7). *The microphysical constraints of in-situ solar geoengineering experimentation*. Poster presented at the Graduate Climate Conference, Woods Hole, MA.

**Golja, C. M.**, Keith, D. W., & Dai, Z. (2017, July 23). *Analysis of calcite particle uptake of hydrogen chloride and nozzle design for solid particle plume generation*. Poster presented at the Gordon Research Conference, Newry, ME.

## SKILLS

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| **Languages:** | Python, MATLAB, R, NCL, CDO, Fortran, Unix/Linux shell scripting |
| **Software & Tools:** | Jupyter Notebook, GitHub, Slurm, Aspen Plus, SuperPro, Simulink |
| **Computing Experience:** | Experience porting, validating and running CESM (1 & 2) on the Harvard Cannon super-computing cluster |

## TEACHING AND ADVISING EXPERIENCE

**Teaching Fellow,** Harvard University

- Energy within Environmental Constraints (Professor: David Keith) *2018*

- Climate and Climate Engineering (Professor: David Keith) *2019, 2020*
- Applied Environmental Policy Analysis: Air Pollution, Solar Geoengineering and Environmental Justice (Professor: David Keith) *2021*

**Women in STEM Mentor**, Harvard University *2019-present*

- Facilitate bi-weekly meetings with mentee to discuss professional development, laboratory skills and research targets
- Provide a space to discuss professional strategies to develop confidence and competency while working against sexism and bias in the workplace

**Geoscience Education and Mentorship Support: Mentor** *2022-present*

- Provide support to student applying to geoscience graduate programs in the U.S.
- Guide the creation and execution of deliverable timelines, providing feedback on key documents

**Undergraduate Research Advisor**, Harvard University *2021-2022*

- Managed student research project to model silica particle deposition to quantify impacts of arctic ice albedo modification
- Supported student in the generation of a conference presentation and authorship of a peer reviewed paper

## HONORS AND AWARDS

Commendation for Extraordinary Teaching *Harvard University, 2020*
Bok Center Certificate of Distinction in Teaching *Harvard University, 2019*
Smith Family Fellowship *Harvard University, 2017-2018*
Stonington Endowment Graduate Fellowship of Environmental Science and Engineering *Harvard University, 2016-2017*

## PROFESSIONAL EXPERIENCE

**Navigant Consulting, Burlington, MA** *August 2015 - August 2016*
*Engineering Consultant*

- Supported U.S. Department of Energy's policy negotiations and technical documentation for commercial and residential appliance rulemakings
- Contributed to scalable cross industry models of production cost vs. efficiency for stakeholder negotiations and responded to public comments on proposed federal standards

## OUTREACH

**Graduate Climate Conference, Media Organizer**, Harvard University *2019*

- Facilitated media outreach to invite abstract submissions
- Reviewed and selected submitted abstracts for participation in conference

**Geoengineering Junior Researcher's Community, Organizer**, Harvard University *2020-present*

- Manage an online journal club and Slack discussion forum focused on solar geoengineering
- Built a welcoming community for undergraduate to postdoctoral researchers, connecting individuals across 6 continents

**REFERENCES**

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