

# Finley M. Hay-Chapman

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## Education

### ***Ph.D., Climate Dynamics***

2024

George Mason University

Fairfax, VA

Dissertation: Analyzing the role of land-atmosphere coupling sensitivity and subgrid spatial heterogeneity in earth system models

Advisor: Paul A. Dirmeyer

### ***B.S., Applied Mathematics, Engineering, & Physics***

2019

University of Wisconsin – Madison

Madison, WI

## Professional Experience

### ***Postdoctoral Scholar***

(2024 – )

Northwestern University

### ***Graduate Research Assistant***

(2019 – 2024)

George Mason University (GMU)

### ***Visiting Scientist***

National Center for Atmospheric Research (NCAR)

(Summer 2022)

Duke University

(Summer 2023)

## Publications (peer-reviewed)

**Hay-Chapman, F. M.** and P. A. Dirmeyer (2023): A Novel Method for Diagnosing Land-Atmosphere Coupling Sensitivity in a Single-Column Model, *Journal of Hydrometeorology*, **24**, 2207–2223, <https://doi.org/10.1175/JHM-D-22-0237.1>.

**Hay-Chapman, F. M.** P. A. Dirmeyer, J. Simon, N. Chaney (*in-preparation*): Relative Entropy as an Evaluation Metric for Subgrid Parameterizations of Spatial Heterogeneity: Part I – Description and Southern Great Plains Study.

Waterman, T., A. D. Bragg, **F. M. Hay-Chapman**, P. A. Dirmeyer, M. Fowler, J. Simon, N. Chaney (2024): Two-Column Model Parameterization for Subgrid Surface Heterogeneity Driven Circulations, *Journal of Advances in Modeling Earth System*, **16**, e2023MS003936, <https://doi.org/10.1029/2023MS003936>.

Dirmeyer, P. A., **F. M. Hay-Chapman**, J. S. Simon, and N. W. Chaney (*in-preparation*): Thermodynamic constraints on the sensitivity of boundary layer clouds to land surface flux partitioning.

**Hay-Chapman, F. M.** and P. A. Dirmeyer (*in-preparation*): Relative Entropy as an Evaluation Metric for Subgrid Parameterizations of Spatial Heterogeneity. Part II – Extension to Other Hydroclimates.

## **Publications (non peer-reviewed)**

**Hay-Chapman, F. M.** (2020): Can plants and animals adapt to global warming?, *Skeptical Science*, <https://skepticalscience.com/Can-animals-and-plants-adapt-to-global-warming-advanced.htm>.

Dirmeyer, P. A., K. Huang, N. Lydeen, Z. H. Manthos, S. Knapp, **F. M. Hay-Chapman** (2022): Projected Hydroclimate Changes Driven by Carbon Dioxide Trends and Vegetation Modeling in CMIP6, <https://doi.org/10.1002/essoar.10506162.1>.

Chaney, N. W., Dirmeyer, P. A., K. Findell, F. Hoffman, D. Lawrence, P.-L. Ma, J. Santanello, **F. M. Hay-Chapman**, and T. Waterman (2023): Coupling land and atmosphere sub-grid parameterizations (CLASP). GEWEX News, 33(2), 8-10, [https://www.gewex.org/gewex-content/files\\_mf/1685746439Q22023.pdf](https://www.gewex.org/gewex-content/files_mf/1685746439Q22023.pdf).

## **Honors & Awards**

Ethel Mabie Faulk Scholarship – Madison East High School (2015)

Shukla Doctoral Fellowship – George Mason University (2019 – 2021)

NCAR University Small Computing Allocation (2021 – present)

## **Affiliations**

*Member*, American Geophysical Union (AGU)

*Member*, American Meteorological Society (AMS)

*Member*, Climate Consensus

## **Conference and Workshop Presentations**

**Hay-Chapman, F. M.**, P. A. Dirmeyer, J. Simon, N. Chaney (2020): Land-Atmosphere Coupling States & Sensitivity, *Atmospheric, Earth, and Oceanic Sciences Department Student Seminar Series – George Mason University, Fairfax, VA, USA*

Dirmeyer, P. A., **F. M. Hay-Chapman**, K. Huang, S. Knapp, M. Korendyke, N. Lydeen, Z. Manthos (2020): Evaluation of land-atmosphere coupling and the Budyko relationship in CMIP6 models, *AGU Fall Meeting 2020 (virtual)*, A057 – 07

Simon, J., P. A. Dirmeyer, T. Waterman, **F. M. Hay-Chapman**, G. Katul, N. Chaney (2020): Semi-coupling of a Field-scale Resolving Land-surface Model and WRF-LES to Investigate the Influence of Land-surface Heterogeneity on PBL Development, *AGU Fall Meeting 2020 (virtual)*, A080 – 04

**Hay-Chapman, F. M.** and P. Dirmeyer (2021): Diagnosing Boundary Layer Coupling Sensitivity to Evaporative Fraction Using a Novel Single-Column Modeling Approach (Poster), *AGU Fall Meeting 2021, New Orleans, LA, USA, H25M – 1192*

Simon, J., A. Bragg, P. A. Dirmeyer, K. Findell, Z. Yin, T. Waterman, **F. M. Hay-Chapman**, N. Chaney (2021): A Statistical Analysis of the Atmospheric Response to Land-Surface Heterogeneity Using Large-Eddy Simulation Over the Southern Great Plains Site in Oklahoma, *AGU Fall Meeting 2021, New Orleans, LA, USA, H23D – 08*

Simon, J., T. Waterman, **F. M. Hay-Chapman**, P. A. Dirmeyer, A. Bragg, N. Chaney (2021): An Analysis of the Importance of a Fully-Coupled Atmosphere and Land-Surface When Considering the Impact of Multi-Scale Land Spatial Heterogeneity on Cloud Development, *EGU General Assembly 2021, Vienna, Austria, AS2.3 – 13379*

**Hay-Chapman, F. M.**, P. A. Dirmeyer, N. Chaney, J. Simon (2022): Diagnosing Sensitive Land–Atmosphere Coupling Days and Investigating the Impact of Land Surface Heterogeneity

on the Overlying Atmosphere (Oral), *American Meteorological Society 35th Conference on Hydrology (virtual)*, 4.8

**Hay-Chapman, F. M.**, P. A. Dirmeyer, M. Fowler, J. Simon (2022): Examining the Fidelity of Climate Model Simulations over Sub-grid Scale Heterogeneous Land Surfaces (Poster), *AGU Fall Meeting 2022, Chicago, IL, USA, H12I – 0801*

**Hay-Chapman, F. M.**, P. A. Dirmeyer, M. Fowler, T. Waterman, N. Chaney (2023): Land-Atmosphere Interactions over Sub-grid Scale Heterogeneous Surfaces and their Representation in Earth System Models with a Suite of Up-and-coming Parameterizations (Poster), *AGU Fall Meeting 2023, San Francisco, CA, USA, A33S – 2825*

Waterman, T., A. Bragg, **F. M. Hay-Chapman**, P. A. Dirmeyer, M. Fowler, N. Chaney (2023): Parameterizing the Large Scale Impact of Land Surface Heterogeneity Induced Circulations on Convective Cloud Development, *EGU General Assembly 2023, Vienna, Austria, AS2.4 – 10938*

**Hay-Chapman, F. M.** and P. A. Dirmeyer (2023): Subgrid-scale Land Surface Heterogeneity and its Relation with Climate Model Behavior and Fidelity (Oral), *Coupling of Land and Atmosphere Subgrid Parameterizations (CLASP) Climate Process Team (CPT) Project Meeting 2023 – Geophysical Fluid Dynamics Laboratory (GFDL), Princeton, NJ, USA*

**Hay-Chapman, F. M.**, P. A. Dirmeyer, M. Fowler, T. Waterman, N. Chaney (2024): Subgrid Surface Heterogeneity and Land-Atmosphere Interactions: a Hierarchy of Parameterizations for Global Climate Models (Oral), *American Meteorological Society 38th Conference on Hydrology, Baltimore, MD, USA, J7B5*

Dirmeyer, P. A., **F. M. Hay-Chapman**, J. Simon, and N. Chaney (2024): Thermodynamic constraints on the sensitivity of boundary layer clouds to land surface flux partitioning. *American Meteorological Society 38th Conference on Hydrology, Baltimore, MD, USA, J5B3*

Fowler, M. D., A. Herrington, R. B. Neale, T. Waterman, D. Lawrence, **F. M. Hay-Chapman**, P. A. Dirmeyer, J. T. Bacmeister, and N. Chaney (2024): Assessing the Sensitivity of Atmospheric Convective Updrafts to Subgrid Land Surface Heterogeneity in CESM2. *American Meteorological Society 38th Conference on Hydrology, Baltimore, MD, USA, J8B6*

## **Reviewer for the following professional journals**

Nature Partner Journals: Climate and Atmospheric Science

European Geophysical Union: Geoscientific Model Development

American Geophysical Union: Journal of Geophysical Research: Atmospheres

## **Leadership & Service**

**Organizing Committee Member** (2021 – 2023)

Earth System Observations and Modeling Graduate Student Symposium

**Treasurer** (2021 – 2024)

Atmospheric Oceanic & Earth Sciences (AOES) Graduate Student Organization

**Student Representative** (2023)

AOES Tenure-Track Faculty Position Hiring Committee

## **Additional Skills**

Programming: Python, bash, FORTRAN, NCL, SQL, PySpark, R, MATLAB, Java

Software: UNIX systems, LaTeX, Slurm, Dask, Pandas, Xarray, Pangeo, sklearn, Git, Docker, ANSYS, AutoCAD, Microsoft Office

Dynamical Models: Community Earth System Model (CESM), Weather Research and Forecasting (WRF) Large-eddy Simulation (LES) Model

Experience with high performance computing (HPC) systems

Experience with satellite remote sensing datasets such as MODIS, SMAP, TRMM/GPM

Quadcopter drone piloting experience for remote sensing and other research applications

Languages: English (native), French (intermediate)

## **Interests/Hobbies**

Painting, Ceramics, Cooking, Cycling, Hiking, Rock Climbing

## **References**

### **Paul A. Dirmeyer**

Professor, George Mason University – Atmospheric, Oceanic, and Earth Sciences Department  
Senior Research Scientist, Center for Ocean, Land, and Atmosphere (COLA) Studies

E-mail: [pdirmeye@gmu.edu](mailto:pdirmeye@gmu.edu)

Phone: (703)-993-5363

Relationship: PhD Supervisor

### **Megan D. Fowler**

Project Scientist II, Climate and Global Dynamics Lab – NCAR

E-mail: [mdfowler@ucar.edu](mailto:mdfowler@ucar.edu)

Phone: (303)-497-1313

Relationship: PhD Committee Member, Research Collaborator, Colleague

### **Nathaniel Chaney**

Assistant Professor, Duke University – Department of Civil and Environmental Engineering

E-mail: [nathaniel.chaney@duke.edu](mailto:nathaniel.chaney@duke.edu)

Phone: (919)-660-5195

Relationship: CLASP CPT Principal Investigator, Colleague