

Ahmed B. Tawfik

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Education

University of Michigan, Ann Arbor, MI April 2012
Ph.D. in Atmospheric Science

Dissertation Title: Soil Moisture-Atmosphere Feedbacks on Atmospheric Tracers: The Effects of Soil Moisture on Precipitation and Near-Surface Chemistry

Advisor: Allison Steiner

Committee: Joyce Penner, Chris Poulsen, Sanford Sillman

University of Michigan, Ann Arbor, MI December 2008
M.S. in Atmospheric Science

North Carolina State University, Raleigh, NC May 2007
B.S. in Meteorology
B.S. in Marine Science

Professional Experience

Project Scientist I January 2015 - Present
National Center for Atmospheric Research
Climate and Global Dynamics Division

Earth System Modeling Post-Doctoral Fellow August 2012 - Jan 2015
George Mason University
Center for Ocean-Land-Atmosphere Studies

Visiting Scientist August 2013 - Jan 2015
National Center for Atmospheric Research
Climate and Global Dynamics Division

Research Assistant May 2012 - July 2012
University of Michigan
Department of Atmospheric, Oceanic, and Space Sciences

Graduate Research Assistant June 2007 - May 2012
University of Michigan
Department of Atmospheric, Oceanic, and Space Sciences

Visiting scientist May 2010
International Centre for Theoretical Physics, Trieste, Italy August - October 2009
Physics of the Weather and Climate Group April - June 2008

Publications

1. **Tawfik, A.** et al. (2016) The Land-Atmosphere Coupling Metrics Toolkit (CoMeT), *SoftwareX*, (*In Preparation*)
2. Santanello, J.A., Dirmeyer, P.A., Ferguson, C.F., Findell, K., **Tawfik, A.** et al , Land-Atmosphere Coupling: The LoCo Perspective, *Bull. Amer. Meteo. Society* (*In-Review*)
3. Burakowski, E., **Tawfik, A.**, Ouimette, A., Lepine, L., Zayzycki, C., Novick, K., and Ollinger, S. (2017), Simulating surface energy fluxes using uncoupled and coupled Earth System Models and eddy covariance tower clusters, *Journal of Hydromet.*, (*In-Review*)
4. **Tawfik, A.**, Dirmeyer P.A., Lawrence D.M., (2017), Representing sub-grid convective initiation in Community Earth System Model, *J. Adv. Model. Earth Syst.*, 9, doi:[10.1002/2016MS000866](https://doi.org/10.1002/2016MS000866)
5. Chen, L., P.A. Dirmeyer, **A. Tawfik**, and D.M. Lawrence, (2017): Sensitivities of Land Cover-Precipitation Feedback to Convective Triggering. *J. Hydrometeor.*, 0, doi.org/[10.1175/JHM-D-17-0011.1](https://doi.org/10.1175/JHM-D-17-0011.1)
6. Notaro, M., Chen, G., Yu Y., Wang F., and **Tawfik, A.** (2017), Regional Climate Modeling of Vegetation Feedbacks on the Asian-Australian Monsoon System. *J. Climate*, 20, 1553-1582, doi: [10.1175/JCLI-D-16-0669.1](https://doi.org/10.1175/JCLI-D-16-0669.1)
7. Smith, N.G., Lombardozzi, D., **Tawfik, A.**, and Bonan, G., Dukes, J.S. (2017), Biogeophysical consequences of photosynthetic temperature acclimation for climate, *J. Adv. Model. Earth Syst.*, doi: [10.1002/2016MS000732](https://doi.org/10.1002/2016MS000732)
8. Betts, A.K., **Tawfik, A.**, and Desjardins, R., (2017) Revisiting hydrometeorology using cloud and climate observations, *Journal of Hydromet*, doi: [10.1175/JHM-D-16-0203.1](https://doi.org/10.1175/JHM-D-16-0203.1)
9. Itterly, K., Taylor, P., Dodson, J. , **Tawfik, A.** (2016), On the Sensitivity of the Diurnal Cycle in the Amazon to Convective Intensity, *J. Geophys. Res.*, 21, doi:[10.1002/2016JD025039](https://doi.org/10.1002/2016JD025039)
10. Bombardi, R., **Tawfik, A.**, Marx, L., Shin, C., Schneider, E., Dirmeyer, P.A., and Kinter III, J.L., The Heated Condensation Framework as a Convective Trigger in the NCEP Climate Forecast System version 2 (2016), *J. Adv. Model. Earth Syst.*, doi:[10.1002/2016MS000668](https://doi.org/10.1002/2016MS000668)
11. Betts, A.K. and **Tawfik, A.**, (2016) Annual Climatology of the Diurnal Cycle on the Canadian Prairies, *Frontiers in Earth Sci.* 4:1. doi: [10.3389/feart.2016.00001](https://doi.org/10.3389/feart.2016.00001)
12. Lombardozzi, D. Zeppel, M.J.B., Fisher, R., and **Tawfik, A.**, (2016) Observed nighttime conductance alters modeled global hydrology and carbon budgets, *Geo. Mod. Dev. Discuss.*, 8, 10339-10363, doi: [10.5194/gmdd-8-10339-2015](https://doi.org/10.5194/gmdd-8-10339-2015)
13. **Tawfik, A.**, P.A. Dirmeyer, J.A. Santanello Jr. (2015), The Heated Condensation Framework. Part I: Description and Southern Great Plains Case Study, *Journal of Hydromet.*

(<http://journals.ametsoc.org/doi/abs/10.1175/JHM-D-14-0117.1>)

14. **Tawfik, A.**, P.A. Dirmeyer, J.A. Santanello Jr. (2015), The Heated Condensation Framework. Part II: Climatological behavior of convective initiation and land-atmosphere coupling over the Continental United States, *Journal of Hydromet.*
(<http://journals.ametsoc.org/doi/abs/10.1175/JHM-D-14-0118.1>)
15. Bombardi, R., Schneider, E., Marx, L., Halder, S., Singh, B., **Tawfik, A.**, Dirmeyer, P.A., and Kinter III, J.L., (2015) Improvements in the representation of the Indian Summer Monsoon in the NCEP Climate Forecast System version 2, *Clim. Dynamics*, doi:[10.1007/s00382-015-2484-6](https://doi.org/10.1007/s00382-015-2484-6)
16. Betts, A.K., R. Desjardins A.C.M. Beljaars and **A.Tawfik**, Observational study of land-surface-cloud-atmosphere coupling on daily timescales, (2015) *Frontiers in Earth Science*, Front. Earth Sci. 3:13. doi: [10.3389/feart.2015.00013](https://doi.org/10.3389/feart.2015.00013)
17. **Tawfik, A.B.**, and P.A. Dirmeyer (2014), A process-based framework for quantifying the atmospheric preconditioning of surface-triggered convection, *Geophys. Res. Lett.*, 41, doi:10.1002/2013GL057984.
(<http://onlinelibrary.wiley.com/doi/10.1002/2013GL057984/pdf>)
18. A.L. Steiner, **A.B. Tawfik**, A. Shalaby, A.S. Zakey, M.M. Abdel Wahab, Z. Salah, F. Solmon, S. Sillman and R.A. Zaveri (2014), Climatological simulations of ozone and atmospheric aerosols in the Greater Cairo region, *Climate Research*, doi:10.3354/cr01211
(<http://www.int-res.com/prepress/c01211.html>)
19. **Tawfik, A.** and A.L. Steiner (2013) A proposed physical mechanism for ozone-meteorology correlations using land-atmosphere coupling regimes. *Atmospheric Environment*,
(<http://dx.doi.org/10.1016/j.atmosenv.2013.03.002>)
20. **Tawfik A.**, R. Stockli, A. Goldstein, S. Pressley, and A.L. Steiner, (2012), Quantifying the contribution of environmental variables to isoprene flux interannual variability, *Atmospheric Environment*, doi: 10.1016/j.atmosenv.2012.02.01
(<http://www.sciencedirect.com/science/article/pii/S1352231012001331>)
21. Shalaby A., A.S. Zakey, **A. Tawfik**, F. Solmon, F. Giorgi, F. Stordal, S. Sillman, and R. Zaveri, and A.L. Steiner (2012), Implementation and evaluation of online gas-phase chemistry within a regional climate model (RegCM-CHEM), doi: 10.5194/gmd-5-741-2012
(<http://www.geosci-model-dev.net/5/741/2012/gmd-5-741-2012.html>)
22. Giorgi F., E. Coppola, F. Solmon, L. Marriotti, M.B. Sylla, X. Bi, N. Elguindi, G.T. Diro, V. Nair, G. Giuliani, S. Cozzini, I. Guettler, T.A. O'Brien, **A. Tawfik**, A. Shalaby, A.S. Zakey, A.L. Steiner, F. Strodal, L.C. Sloan, C. Brankovic (2012), RegCM4: Model description and preliminary tests over multiple CORDEX domains, *Climate Research*, 52:7-29, doi: 10.3354/cr01018.
(<http://www.int-res.com/abstracts/cr/v52/p7-29/>)
23. **Tawfik A.**, and A.L. Steiner (2011), The role of soil ice in land-atmosphere coupling over the United States: A soil moisture–precipitation winter feedback mechanism, *J. Geophys. Res.*, 116, D02113, doi: 10.1029/2010JD014333.

Funding Record

National Science Foundation and United States Department of Agriculture Award #1419445 (*Current*)
“Land Use Change and Land Atmosphere Feedback Processes as Regulators of Regional Climate Change”

Teaching Experience

Lab assistant for CLM Tutorial Workshop	February 2014
Nation Center for Atmospheric Research, Boulder, Colorado	Sept 2016
Lab instructor for ICTP Regional Climate Workshop	May 2012
International Centre for Theoretical Physics, Trieste, Italy	June 2010
Workshop on Theory and Regional Climate Modeling	
Lab assistant/grader for Regional Downscaling course	January - April 2011
University of Michigan	
Department of Atmospheric, Oceanic, and Space Sciences	
Instructor for Weather and Forecasting Lab	Sept - December 2006
North Carolina State University	
Department of Marine, Earth, and Atmospheric Sciences	

Honors and Awards

- 2015 Editor’s Citations for Excellence in Refereeing – 2015
 - 7th International GEWEX Conference Outstanding Presentation Award – 2014
 - National Center for Atmospheric Research Small University Computing Allocation – 2012
 - Richard and Eleanor Towner Award Nominee for Outstanding PhD Research – 2011
 - American Geophysical Union Outstanding Student Paper Award – 2010
 - Michigan Geophysical Union 1st Place Poster Award – 2010
 - Rackham Merit Fellowship – 2007-2012
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Professional Service and Membership

- GEWEX GLASS Panel Member – 2016-present
 - GEWEX GLASS Local Coupling Working Group Member – 2014-present
 - Discussed a career in science with Colorado College students – 2016
 - Volunteered at the NCAR Super Science Saturday event – 2016
 - Judge poster session for SOARS program – 2016
 - GEWEX Regional Hydroclimate Project for the Water Availability Grand Challenge – 2016
 - High school student interview about career in STEM – 2016
 - Mentor for Undergraduate Leadership Workshop 2015 – 2016
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- Earth Explorers Middle School Science Outreach Program – 2014
- Co-chair of Organized Convection session – American Geophysical Union Fall Meeting – 2014
- NSF Hydrologic-Atmospheric Community Workshop Participant – 2014
- International Centre for Theoretical Physics Regional Climate Model Development Team
- Member, American Geophysical Union – 2009-Present
- Meteorologist for the Jackson Hot Air Balloon Jubilee – 2011
- Planetary science education outreach for afterschool science writing program – 2011
- Climate and meteorology education outreach for Detroit Public Middle School – 2011
- University of Michigan delegation member to the United Nations Conference on Climate Change Conference of Parties 15 – 2009
- Session co-chair for Graduate Engineering Symposium – 2008
- Organizing committee member for Michigan Geophysical Union – 2008-2009
- Manuscript Reviewer for:
 - Science of the Total Environment
 - Journal of Geophysical Research
 - International Journal of Climatology
 - Atmospheric Chemistry and Physics Discussions
 - Geophysical Research Letters
 - Climate Change
 - Journal of Hydrology
 - Journal of Hydrometeorology
 - Journal of Advances in Modeling Earth Systems
 - Journal of Atmospheric Science
 - Journal of Climate

Presentations and Posters

Oral Presentations:

Tawfik, A. and J.A. Santanello, LoCo Updates and Perspectives, GLASS Panel Meeting, Tokyo, Japan, May 2017.

Tawfik, A., L. Chen, P.A. Dirmeyer, and D.M. Lawrence, Convection and Land Cover Change: Interpretation, gaps, and moving forward, Hydrology delivers Earth Sciences to Society 4, Tokyo, Japan, May 2017

Tawfik, A., P.A. Dirmeyer, and D.M. Lawrence, Dynamic Scale Awareness: Switching parameterized convection on at the right time, American Meteorological Society Annual Meeting, Seattle, Washington, January 2017

Tawfik, A., When does the land surface matter? Surface-Convection Feedbacks and Models, CGD Seminar Series, Boulder, Colorado, November 2016

Tawfik, A., Know Your Forcing: Extracting land-atmosphere feedback information from offline simulations, CESM Annual Workshop, Breckenridge, Colorado June 2016

Tawfik, A., Tracking land-atmosphere coupling in CESM, Mini Breckenridge Meeting, Boulder,

Colorado February 2016

Tawfik, A., D. Lawrence, and P. Dirmeyer, Observed Local Soil Moisture-Atmosphere Feedbacks within the Context of Remote SST Anomalies: Lessons from recent droughts, American Geophysical Union Fall Meeting, San Francisco, California December 2015

Tawfik, A., Land-Atmosphere Feedbacks: A Local Look at How Droughts Depend, Climate and Global Dynamics Seminar Series, Boulder, Colorado December 2015

Tawfik, A., Land-Atmosphere feedback lessons learned from seasonal drought, George Mason University Departmental Seminar, Fairfax, Virginia September 2015 (**invited**)

Tawfik, A., Assessment of land-atmosphere coupling in CAM-CLM, CESM Annual Workshop, Breckenridge, Colorado June 2015

Tawfik, A. and P. Dirmeyer, A new sub-grid convective initiation scheme, Atmosphere Working Group Meeting, Boulder, Colorado February 2015

Tawfik, A., P. Dirmeyer, and J.A Santanello, Rethinking convective initiation and implications for land-atmosphere feedbacks, North Carolina State University Brown Bag Seminar, Raleigh, North Carolina February 2015

Tawfik, A. and P. Dirmeyer, A new sub-grid convective initiation parameterization, American Meteorological Society Annual Meeting, Phoenix, Arizona January 2015

Tawfik, A. and P. Dirmeyer, Soil moisture-convection coupling against the backdrop of global oscillations, American Geophysical Union Fall Meeting, San Francisco, California December 2014

Tawfik, A. and P. Dirmeyer, Daily coupling and predicting convective initiation, World Weather Open Science Conference, Montreal, Canada August 2014

Tawfik, A. and P. Dirmeyer, How land-convection interactions produce different diurnal cycles and mean conditions: A coupled problem, Land Model Working Group Meeting 2014, Boulder, Colorado February 2014

Tawfik, A., Description and practical applications of the Model of Emissions of Gases and Aerosols from Nature (MEGAN), Community Land Model Tutorial Workshop 2014, Boulder, Colorado February 2014

Tawfik, A. and P. Dirmeyer, Isolating the Impact of Local and Large-Scale Forcings on Surface Triggered Convection, American Meteorological Society, Annual Meeting 2014, Atlanta, Georgia February 2014

Tawfik, A. and P. Dirmeyer, Separating the Impact of Local and Large-scale Forcings on Soil Moisture-Precipitation Coupling, American Geophysical Union, Fall Meeting 2013, San Francisco, California December 2013

Tawfik, A. and P. Dirmeyer, When is the Land Surface Important for Triggering Convection?

George Mason University, Workshop on Land Surface Modeling in Support of NWP and Sub-Seasonal Climate Prediction, Fairfax, Virginia December 2013

Tawfik, A. and P. Dirmeyer, Can We Separate Local from Large-scale Forcing for Moist Convection?, UK Met Office, Global Land/Atmosphere System Study, Exeter, United Kingdom October 2013

Tawfik, A. and P. Dirmeyer, Evaluation of Land-Atmosphere Coupling Processes in High-Resolution Simulations, National Center for Atmospheric Research, Land Model Working Group Meeting, Boulder, Colorado February 2013

Tawfik, A. and A. L. Steiner, The Intersection between Climate and Ozone Air Quality: Applying a Coupled-System Framework, George Mason University, Fairfax, Virginia January 2013 (**invited**)

Tawfik, A. and A. L. Steiner, Connecting Climate and Air Quality through Soil Moisture-Atmosphere Feedbacks, Argonne National Laboratory, Argonne, Illinois May 2012 (**invited**)

Tawfik, A. and A. L. Steiner, Cold Season Feedbacks and Insights into Coupling from Near-Surface Ozone Chemistry, Center for Ocean-Land-Atmosphere Studies, Beltsville, Maryland June 2012 (**invited**)

Tawfik, A. and A. L. Steiner, Connecting Climate and Air Quality through Soil Moisture-Atmosphere Interactions, Lamont-Doherty Earth Observatory, Palisades, New York June 2012 (**invited**)

Tawfik, A., A. L. Steiner, A. Shalaby, A. Zakey, F. Solmon, The Effects of Soil Moisture-Atmosphere Feedbacks on Ground-Level Ozone, Workshop on Theory and Regional Climate Modeling, Trieste, Italy May 2012 (**invited**)

Tawfik, A., A. L. Steiner, A. Shalaby, A. Zakey, F. Solmon, Understanding the Model Ozone Bias over the Southeastern U.S.: The Role of Soil Moisture and Regional Climate, EOS Trans. AGU, Fall Meet. Suppl., Abstract, A13K-08, December 2011

Tawfik, A., A. L. Steiner, A. Shalaby, A. Zakey, A Climate-Air Quality Connection: Soil Moisture Controls on Isoprene and Ozone, Egyptian Meteorological Authority, Cairo, Egypt, November 2011 (**invited**)

Omar M., A. Shalaby, **A. Tawfik**, Regional Climate over Egypt, Chemistry-Climate Feedbacks on Egypt and the Nile River Basin Workshop, Cairo, Egypt, November 2011

Tawfik, A., A. L. Steiner, A. Shalaby, A. Zakey, A Climate-Air Quality Connection: Soil Moisture Controls on Isoprene and Ozone, Chemistry-Climate Feedbacks on Egypt and the Nile River Basin Workshop, Cairo, Egypt, November 2011

Tawfik, A., A. L. Steiner, A. Shalaby, A. Zakey, Biogenic VOC Emissions and their Effects on Ozone, Chemistry-Climate Feedbacks on Egypt and the Nile River Basin Workshop, Cairo, Egypt, November 2011

Tawfik, A. and A. L. Steiner, Implementation of CLM into RegCM: What's new and how to use it,

Workshop on Theory and Regional Climate Modeling, Trieste, Italy, June 2010. **(invited)**

Tawfik, A., A. Shalaby, A. Zakey, A. L. Steiner, From Land Surface to Atmospheric Chemistry: Implementation of CLM and several Gas Phase Chemistry Mechanisms into RegCM, International Centre for Theoretical Physics, Trieste, Italy, September 2009

Tawfik, A. and A.L. Steiner, Implementation of Biogenic VOC Emissions Model, Chemistry-Climate Feedbacks on Egypt and the Nile River Basin Workshop, Trieste, Italy, April 2009

Posters:

Tawfik, A. and D.M. Lawrence, Do soil water limitations inhibit convection?, Hydrology delivers Earth Sciences to Society 4, Tokyo, Japan, May 2017.

Tawfik, A., P.A. Dirmeyer, and D.M. Lawrence, Dynamic Scale Awareness: Switching parameterized convection on at the right time, Convection Permitting Workshop, Boulder, Colorado, September 2016.

Tawfik, A. and P.A. Dirmeyer, Directly quantifying land-atmosphere coupling, 7th International Conference on the Global Energy and Water Cycle, The Hague, Netherlands, July 2014.

Tawfik, A. and P.A. Dirmeyer, Rethinking convective triggering in CESM, Community Earth System Modeling Workshop, Breckenridge, CO, June 2014.

Tawfik, A. and P.A. Dirmeyer, A new method for evaluating the triggering of moisture convection, Climate Diagnostic and Prediction Workshop, College Park, MD, October 2013.

Tawfik, A., A.L. Steiner, S. Sillman, A. Shalaby, A. Zakey, Why do regional climate-chemistry models overestimate ozone in the Southeast? University of Michigan Engineer Graduate Symposium, Ann Arbor, MI, November 2011. *Poster nominated for the Richard and Eleanor Towner Award for Outstanding PhD Research*

Tawfik, A., A.L. Steiner, A. Shalaby, A. Zakey, The Role of soil moisture on isoprene and ozone concentrations, Community Earth System Model Workshop, Breckenridge, CO, June 2011.

Tawfik, A., A.L. Steiner, A. Shalaby, A. Zakey, Understanding the ozone-land surface relationship, Michigan Geophysical Union, Ann Arbor, MI, April 2011.

Tawfik, A., A.L. Steiner, A. Shalaby, A. Zakey, Soil moisture controls on isoprene and ozone variability, EIS Trans. American Geophysical Union, Fall Meet. Supple., Abstract A53C-230, December 2010. *Poster won the AGU Outstanding Student Paper Award*

Tawfik, A. and A.L. Steiner, Soil moisture controls on interannual variability of biogenic isoprene emissions and ozone, University of Michigan Engineer Graduate Symposium, Ann Arbor, MI, November 2010.

Tawfik, A. and A.L. Steiner, Soil moisture controls in the interannual variability of biogenic isoprene emissions, Gordon Conference on Biogenic Hydrocarbons and the Atmosphere, Les Diablerets, Switzerland, May 2010.

Tawfik, A. and A.L. Steiner, Seasonal variations in land-atmosphere coupling strength in the continental US, Michigan Geophysical Union, Ann Arbor, MI, April 2010. *Poster won the AOSS 1st prize in the Michigan Geophysical Union competition.*

Tawfik, A. and A.L. Steiner, Seasonal variations in land-atmosphere coupling strength over the continental US, EOS Trans. AGU, 89(52), Fall Meet. Suppl., Abstract, A33A-0212, 2009.

Tawfik, A. and A.L. Steiner, Land surface and biogenic volatile organic compound (VOC) emissions modeling in a regional climate model (RegCM), Michigan Geophysical Union, Ann Arbor, MI, March 2009.