

TAKANOBU YAMAGUCHI

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Chemical Sciences Division (R/CSD2)
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Present position:

Research Scientist III, Cooperative Institute for Research in Environmental Sciences,
University of Colorado Boulder and NOAA Earth System Research Laboratory, Boulder,
Colorado.

Research interests:

Clouds and turbulence, aerosol-cloud interaction, parameterization, numerical modeling and
methods.

Education:

Ph.D., 2010, Atmospheric Science, Colorado State University, advisor: D. A. Randall.

M.S., 2005, Atmospheric Science, Colorado State University, advisor: D. A. Randall.

B.S., 2002, Physics, Ehime University, Matsuyama, Ehime, Japan.

Previous positions:

2014/05 – 2018/04: Research Scientist II, Cooperative Institute for Research in
Environmental Sciences, University of Colorado Boulder and NOAA Earth System Research
Laboratory, Boulder, Colorado.

2011/01 – 2014/04: Research Scientist I, Cooperative Institute for Research in Environmental
Sciences, University of Colorado Boulder and NOAA Earth System Research Laboratory,
Boulder, Colorado.

2010/08 – 2010/12: Postdoctoral Fellow, Department of Atmospheric Science, Colorado
State University.

2002/05 – 2010/08: Graduate Research Assistant, Department of Atmospheric Science,
Colorado State University.

Award

Outstanding Performance Award, Cooperative Institute for Research in Environmental Sciences, University of Colorado Boulder, Boulder, CO, May, 2015.

Funded Projects

2019/06 – 2022/05: **NOAA Climate Variability and Predictability Program**, “Shallow cumulus convection in the tropical Atlantic Ocean: Controls, responses, and mechanisms.” Co-Investigator. **\$498,479**

2018/05 – 2020/011: **Department of Energy, Scientific Discovery through Advanced Computing Program**, “Adaptive vertical grid enhancement for E3SM.” Principal investigator. **\$1,884,000**.

2016/09 – 2019/08: **Department of Energy, Atmospheric System Research Program**, “Quantifying the aerosol-cloud radiative effect through large eddy simulation and ground-based observations at Southern Great Plains.” Co-Principal investigator. **\$437,027**.

2016/06 – 2017/05: **NOAA High Performance Computing and Communications Program**, “A novel approach to quantifying the cloud radiative effect in a changing climate using a statistical emulator.” Co-Investigator. **\$103,259**.

Refereed Journal Publications

25. Goren, T., J. Kazil, F. Hoffmann, **T. Yamaguchi**, and G. Feingold (2019), Anthropogenic air pollution delays marine stratocumulus break-up to open-cells, *Geophys. Res. Lett.*, in press.
24. **Yamaguchi, T.**, G. Feingold, and J. Kazil (2019), Aerosol-cloud interactions in trade wind cumulus clouds and the role of vertical wind shear, *J. Geophys. Res.*, 124, doi: 10.1029/2019JD031073.
23. Pope, C. A., J. P. Gosling, S. Barber, J. Johnson, **T. Yamaguchi**, G. Feingold, and P. G. Blackwell (2019), Gaussian process modeling of heterogeneity and discontinuities using Voronoi tessellations, *Technometrics*, in press.
22. Glassmeier, F., F. Hoffmann, J. S. Johnson, **T. Yamaguchi**, K. S. Carslaw, and G. Feingold (2019), An emulator approach to stratocumulus susceptibility, *Atmos. Chem. Phys.*, 19(15), 10191-10203, doi:10.5194/acp-19-10191-2019.
21. Klinger, C., G. Feingold, and **T. Yamaguchi** (2019), Cloud droplet growth in shallow cumulus clouds considering 1-D and 3-D thermal radiative effects, *Atmos. Chem. Phys.*, 19(9), 6295-6313, doi:10.5194/acp-19-6295-2019.
20. Hoffmann, F., **T. Yamaguchi**, and G. Feingold (2019), Inhomogeneous mixing in Lagrangian cloud models: Effects on the production of precipitation embryos, *J. Atmos. Sci.*, 76(1), 113-133, doi:10.1175/JAS-D-18-0087.1.

19. **Yamaguchi, T.**, G. Feingold, and J. Kazil (2017), Stratocumulus to cumulus transition by drizzle, *J. Adv. Model. Earth Syst.*, *9*(6), 2333-2349, doi:10.1002/2017MS001104.
18. Kazil, J., **T. Yamaguchi**, and G. Feingold (2017), Mesoscale organization, entrainment, and the properties of a closed-cell stratocumulus cloud, *J. Adv. Model. Earth Syst.*, *9*(5), 2214-2229, doi:10.1002/2017MS001072.
17. Feingold, G., J. Balsells, F. Glassmeier, **T. Yamaguchi**, J. Kazil, and A. McComiskey (2017), Analysis of albedo versus cloud fraction relationships in liquid water clouds using heuristic models and large eddy simulation, *J. Geophys. Res.*, *122*(13), 7086-7102, doi: 10.1002/2017JD026467.
16. **Yamaguchi, T.**, G. Feingold, and V. E. Larson (2017), Framework for improvement by vertical enhancement: A simple approach to improve representation of low and high-level clouds in large-scale models, *J. Adv. Model. Earth Syst.*, *9*(1), 627-646, doi: 10.1002/2016MS000815.
15. Kazil, J., G. Feingold, and **T. Yamaguchi** (2016), Wind speed response of marine non-precipitating stratocumulus clouds over a diurnal cycle in cloud-system resolving simulations, *Atmos. Chem. Phys.*, *16*(9), 5811-5839, doi:10.5194/acp-16-5811-2016.
14. Feingold, G., A. McComiskey, **T. Yamaguchi**, J. S. Johnson, K. S. Carslaw, and K. S. Schmidt (2016), New approaches to quantifying aerosol influence on the cloud radiative effect, *P. Natl. Acad. Sci. USA*, *113*(21), 5812-5819, doi:10.1073/pnas.1514035112.
13. **Yamaguchi, T.**, G. Feingold, J. Kazil, and A. McComiskey (2015), Stratocumulus to cumulus transition in the presence of elevated smoke layers, *Geophys. Res. Lett.*, *42*(23), 10,478-410,485, doi:10.1002/2015GL066544.
12. Feingold, G., I. Koren, **T. Yamaguchi**, and J. Kazil (2015), On the reversibility of transitions between closed and open cellular convection, *Atmos. Chem. Phys.*, *15*(13), 7351-7367, doi: 10.5194/acp-15-7351-2015.
11. **Yamaguchi, T.**, and G. Feingold (2015), On the relationship between open cellular convective cloud patterns and the spatial distribution of precipitation, *Atmos. Chem. Phys.*, *15*(3), 1237-1251, doi:10.5194/acp-15-1237-2015.
10. Lee, S. S., G. Feingold, A. McComiskey, **T. Yamaguchi**, I. Koren, J. Vanderlei Martins, and H. Yu (2014), Effect of gradients in biomass burning aerosol on shallow cumulus convective circulations, *J. Geophys. Res.*, *119*(16), 2014JD021819, doi:10.1002/2014JD021819.
9. Solomon, A., M. D. Shupe, O. Persson, H. Morrison, **T. Yamaguchi**, P. M. Caldwell, and G. de Boer (2014), The sensitivity of springtime arctic mixed-phase stratocumulus clouds to surface-layer and cloud-top inversion-layer moisture sources, *J. Atmos. Sci.*, *71*(2), 574-595, doi:10.1175/JAS-D-13-0179.1.
8. Kazil, J., G. Feingold, H. Wang, and **T. Yamaguchi** (2014), On the interaction between marine boundary layer cellular cloudiness and surface heat fluxes, *Atmos. Chem. Phys.*, *14*(1), 61-79, doi:10.5194/acp-14-61-2014.

7. **Yamaguchi, T.**, W. A. Brewer, and G. Feingold (2013), Evaluation of modeled stratocumulus-capped boundary layer turbulence with shipborne data, *J. Atmos. Sci.*, *70*(12), 3895-3919, doi:10.1175/JAS-D-13-050.1.
6. **Yamaguchi, T.**, and G. Feingold (2013), On the size distribution of cloud holes in stratocumulus and their relationship to cloud-top entrainment, *Geophys. Res. Lett.*, *40*(10), 2450-2454, doi:10.1002/grl.50442.
5. **Yamaguchi, T.**, and G. Feingold (2012), Technical note: Large-eddy simulation of cloudy boundary layer with the Advanced Research WRF model, *J. Adv. Model. Earth Syst.*, *4*(3), M09003, doi:10.1029/2012ms000164.
4. **Yamaguchi, T.**, and D. A. Randall (2012), Cooling of entrained parcels in a large-eddy simulation, *J. Atmos. Sci.*, *69*(3), 1118-1136, doi:10.1175/jas-d-11-080.1.
3. **Yamaguchi, T.**, D. A. Randall, and M. F. Khairoutdinov (2011), Cloud modeling tests of the ULTIMATE-MACHO scalar advection scheme, *Mon. Wea. Rev.*, *139*(10), 3248-3264, doi: 10.1175/mwr-d-10-05044.1.
2. Lappen, C.-L., D. Randall, and **T. Yamaguchi** (2010), A higher-order closure model with an explicit PBL top, *J. Atmos. Sci.*, *67*(3), 834-850, doi:doi:10.1175/2009JAS3205.1.
1. **Yamaguchi, T.**, and D. A. Randall (2008), Large-eddy simulation of evaporatively driven entrainment in cloud-topped mixed layers, *J. Atmos. Sci.*, *65*(5), 1481-1504, doi: 10.1175/2007JAS2438.1.

Manuscripts Submitted / in Review

3. Glenn, I. B., G. Feingold, J. Gristey, and **T. Yamaguchi** (2019), Quantification of the radiative effect of aerosol-cloud-interactions in shallow continental cumulus clouds, *J. Atmos. Sci.*, submitted
2. Hoffmann, F., F. Glassmeier, **T. Yamaguchi**, and G. Feingold (2019), Liquid water path steady states in stratocumulus: Insights from process-level emulation and mixed-layer theory, *J. Atmos. Sci.*, submitted.
1. Kazil, J., C. Klinger, J. Balsells, **T. Yamaguchi**, and G. Feingold (2019), Saturation of longwave radiation and stratocumulus turbulence, *J. Geophys. Res.*, in review.

Other Publications

Dissertation and thesis:

Yamaguchi, T. (2010), Cloud-top entrainment analyzed with a Lagrangian parcel tracking model in large-eddy simulations, Ph.D. Dissertation, 131 pp, Colorado State University, Fort Collins, CO.

Yamaguchi, T. (2005), Analysis of PBL-top entrainment using LES, MS thesis, 108 pp, Colorado State University, Fort Collins, CO.

First Author Presentations

Conference talks:

- Yamaguchi, T., R. Yoshida, P. A. Bogenschutz, H.-H. Lee, Y.-S. Chen, and G. Feingold (2019), Ameliorating low cloud representation in km-scale global and regional models using the Framework for Improvement by Vertical Enhancement, Latsis Symposium 2019 High-resolution climate modeling: Perspectives and challenges, Zurich, Switzerland, August, 2019.
- Yamaguchi, T., P. A. Bogenschutz, G. Feingold, D. F. Martin, Y.-S. Chen, H.-H. Lee, P. Schwartz, and R. Yoshida (2019), Progress toward adaptive vertical grid enhancement in E3SM, 2019 Scientific Discovery through Advanced Computing (SciDAC-4) Principal Investigator Meeting, Rockville, MD, July, 2019.
- Yamaguchi, T., P. A. Bogenschutz, Y.-S. Chen, R. Yoshida, G. Feingold, D. F. Martin, H.-H. Lee, and P. Schwartz (2018), Alleviating the low cloud problem in climate and weather forecast models by adaptive vertical grid enhancement, American Geophysical Union Fall Meeting, Washington D.C., December, 2018.
- Yamaguchi, T., P. A. Bogenschutz, Y.-S. Chen, R. Yoshida, G. Feingold, D. F. Martin, H.-H. Lee, and P. Schwartz (2018), Alleviating the low cloud problem in climate and weather forecast models by adaptive vertical grid enhancement, 5th International Workshop on Nonhydrostatic Models, Tokyo, Japan, November, 2018.
- Yamaguchi, T., P. A. Bogenschutz, G. Feingold, D. F. Martin, Y.-S. Chen, H.-H. Lee, P. Schwartz, and R. Yoshida (2018), Improving clouds in E3SM by framework for improvement by vertical enhancement coupled with adaptive vertical grid enhancement, Earth and Environmental System Modeling Principal Investigator Meeting, Potomac, MD, November, 2018.
- Yamaguchi, T., P. A. Bogenschutz, G. Feingold, and D. F. Martin (2018), Adaptive vertical grid enhancement for E3SM, 2018 Scientific Discovery through Advanced Computing (SciDAC-4) Principal Investigator Meeting, Rockville, MD, July, 2018.
- Yamaguchi, T., G. Feingold, and J. Kazil (2018), Sheared anvil clouds from shallow cumulus cloud tops in response to aerosol-induced deepening, American Meteorological Society 15th Conference on Cloud Physics, Vancouver, British Columbia, Canada, July, 2018.
- Yamaguchi, T., G. Feingold, and J. Kazil (2018), Stratocumulus to cumulus transition by drizzle, Aerosols, Clouds, Precipitation and Climate (ACPC) Workshop, Boulder, CO, April, 2018.
- Yamaguchi, T., G. Feingold, and J. Kazil (2018), Perspectives on absorbing-aerosol-cloud interactions gained from recent modeling studies, 2018 ARM/ASR Joint User Facility and Principal Investigator Meeting, Tysons, VA, March, 2018.

- Yamaguchi, T., P. A. Bogenschutz, G. Feingold, and D. F. Martin (2018), A new SciDAC project to improve representation of low clouds in E3SM, 2018 ARM/ASR Joint User Facility and Principal Investigator Meeting, Tysons, VA, March, 2018.
- Yamaguchi, T., G. Feingold, and J. Kazil (2017), New pathway of stratocumulus to cumulus transition via aerosol-cloud-precipitation interaction, American Geophysical Union Fall Meeting, New Orleans, LA, December, 2017.
- Yamaguchi, T., G. Feingold, and V. E. Larson (2016), Framework for Improvement by Vertical Enhancement: A simple approach to improve low and high clouds in large-scale models, American Geophysical Union Fall Meeting, San Francisco, CA, December, 2016.
- Yamaguchi, T., G. Feingold, and V. E. Larson (2016), Framework for Improvement by Vertical Enhancement: A simple approach to improve low and high clouds in large-scale models. 4th International Workshop on Nonhydrostatic Models, Hakone, Kanagawa, Japan, December, 2016.
- Yamaguchi, T., G. Feingold, and J. Kazil (2016), Stratocumulus to cumulus transition by rain, Workshop on Global Precipitation System 2016, Yokohama, Kanagawa, Japan, November 2016.
- Yamaguchi, T., G. Feingold, and J. Kazil (2016), Modulation of stratocumulus to cumulus transition by rain, 17th International Conference on Clouds and Precipitation, Manchester, United Kingdom, July 2016.
- Yamaguchi, T., G. Feingold, J. Kazil, and A. McComiskey (2015), Stratocumulus to cumulus transition capped by a light absorbing smoke layer, American Geophysical Union Fall Meeting, San Francisco, CA, December, 2015.
- Yamaguchi, T., and G. Feingold (2014), Influence of spatial distribution of rain on transformation of open cellular circulation, American Meteorological Society 14th Conference on Cloud Physics, Boston, MA, July, 2014.
- Yamaguchi, T., and G. Feingold (2012), What are the dominant spatial scales for entrainment in marine stratocumulus? American Geophysical Union Fall Meeting, San Francisco, CA, December, 2012.
- Yamaguchi, T., and D. A. Randall (2010), Tracking parcels that are entrained across cloud tops, American Geophysical Union Fall Meeting, San Francisco, CA, December, 2010.
- Yamaguchi, T. (2009), Marine stratocumulus cloud-top entrainment, 3rd Atsushi Numaguchi Symposium, Kashiwa, Chiba, Japan, March, 2009.
- Yamaguchi, T., and D. A. Randall (2006), Large-eddy simulation of evaporatively driven entrainment in cloud-topped mixed layers, American Meteorological Society 17th Symposium on Boundary Layers and Turbulence, San Diego, CA, May 2006.

Seminar talks:

- Yamaguchi, T. (2018), Untangling aerosol-cloud interactions with process level numerical modeling, Texas A&M University, College Station, TX, December, 2018.
- Yamaguchi, T., G. Feingold, and J. Kazil (2018), Role of vertical wind shear in aerosol-cloud interactions in marine shallow cumulus clouds, University of Tokyo, Kashiwa, Chiba, Japan, November, 2018.
- Yamaguchi, T., G. Feingold, and J. Kazil (2018), Role of vertical wind shear in aerosol-cloud interactions in marine shallow cumulus clouds, Nagoya University, Nagoya, Aichi, Japan, November, 2018.
- Yamaguchi, T., G. Feingold, and J. Kazil (2016), Modulation of stratocumulus to cumulus transition by rain, University of Tokyo, Kashiwa, Chiba, Japan, August, 2016.
- Yamaguchi, T., G. Feingold, J. Kazil, and A. McComiskey (2016), Stratocumulus to cumulus transition in the presence of elevated smoke layers, Nagoya University, Nagoya, Aichi, Japan, June, 2016.
- Yamaguchi, T. (2016), Exploring scale lows for PBL parameterization development, RIKEN Advanced Institute for Computational Science, Kobe, Hyogo, Japan, June, 2016.
- Yamaguchi, T. (2014), On the relationship between open cellular convective cloud patterns and the spatial distribution of precipitation, University of Wyoming, Laramie, WY, November, 2014.
- Yamaguchi, T. (2014), On the relationship between open cellular convective cloud patterns and the spatial distribution of precipitation, NOAA ESRL, Boulder, CO, September, 2014.
- Yamaguchi, T. (2013), An introduction to atmospheric science, Ehime University, Matsuyama, Ehime, Japan, October, 2013.
- Yamaguchi, T., and G. Feingold (2013), On the size distribution of cloud holes in stratocumulus and their relationship to cloud-top entrainment, Nagoya University, Nagoya, Aichi, Japan, October, 2013.
- Yamaguchi, T., and G. Feingold (2013), On the size distribution of cloud holes in stratocumulus and their relationship to cloud-top entrainment, University of Tokyo, Hongo, Bunkyo-ku, Tokyo, Japan, October, 2013.
- Yamaguchi, T. (2011), Marine stratocumulus and large-eddy simulation, RIKEN Advanced Institute for Computational Science, Kobe, Hyogo, Japan, September, 2011.
- Yamaguchi, T., and D. A. Randall (2011), Cooling of entrained parcels in a large-eddy simulation, Nagoya University, Nagoya, Aichi, Japan, September, 2011.
- Yamaguchi, T., and D. A. Randall (2011), Cooling of entrained parcels in a large-eddy simulation, University of Tokyo, Kashiwa, Chiba, Japan, September, 2011.
- Yamaguchi, T. (2009), Marine stratocumulus cloud-top entrainment, Nagoya University, Nagoya, Aichi, Japan, March, 2009.

Yamaguchi, T., and D. A. Randall (2007), Large-eddy simulation of evaporatively driven entrainment in cloud-topped mixed layers, Nagoya University, Nagoya, Aichi, Japan, May, 2007.

Posters:

Yamaguchi, T., P. A. Bogenschutz, G. Feingold, D. F. Martin, Y.-S. Chen, H.-H. Lee, P. Schwartz, and R. Yoshida (2019), Progress toward adaptive vertical grid enhancement in E3SM, 2019 Scientific Discovery through Advanced Computing (SciDAC-4) Principal Investigator Meeting, Rockville, MD, July, 2019.

Yamaguchi, T., P. A. Bogenschutz, G. Feingold, and D. F. Martin (2018), Adaptive vertical grid enhancement for E3SM, 2018 Scientific Discovery through Advanced Computing (SciDAC-4) Principal Investigator Meeting, Rockville, MD, July, 2018.

Yamaguchi, T., G. Feingold, J. Kazil, and A. McComiskey (2017), Changes in the pace of the stratocumulus to cumulus transition by aerosol-cloud feedback, Workshop on the Future of Cumulus Parametrization, Delft, Netherlands, July, 2017.

Yamaguchi, T., G. Feingold, and J. Kazil (2015), Stratocumulus to cumulus transition capped by a light absorbing smoke layer, Gordon Research Conference, Lewiston, ME, July, 2015.

Yamaguchi, T., G. Feingold, I. Koren, and J. Kazil (2015), Two-way transitions between closed and open cellular convection, 2015 ARM/ASR Joint User Facility and Principal Investigator Meeting, Tysons, VA, March, 2015.

Yamaguchi, T., and G. Feingold (2014), Role of spatial distribution of rain in formation of open cellular circulation, American Geophysical Union Fall Meeting, San Francisco, CA, December, 2014.

Yamaguchi, T., G. Feingold, V. E. Larson, and P. N. Blossey (2013), Reconstructing the inversion layer in the stratocumulus-capped boundary layer, American Geophysical Union Fall Meeting, San Francisco, CA, December, 2013.

Yamaguchi, T., and G. Feingold (2012), What are the dominant spatial scales for entrainment in marine stratocumulus?, American Geophysical Union Fall Meeting, San Francisco, CA, December, 2012.

Yamaguchi, T., W. A. Brewer, and G. Feingold (2012), Turbulence statistics of the nocturnal stratocumulus boundary layer: New approaches to model evaluation based on ship-borne data, 1st Pan-Global Atmospheric System Studies Conference, Boulder, CO, August, 2012.

Yamaguchi, T., W. A. Brewer, and G. Feingold (2012), Cloud microphysics and turbulence statistics of the nocturnal stratocumulus-capped boundary layer: New approaches to model evaluation based on ship-borne data, 13th CMMAP Team Meeting, Fort Collins, CO, August, 2012.

Yamaguchi, T., W. A. Brewer, and G. Feingold (2012), Cloud microphysics and turbulence statistics of the nocturnal stratocumulus-capped boundary layer: New approaches to model

evaluation based on ship-borne data, 16th International Conference on Clouds and Precipitation, Leipzig, Germany, July, 2012.

Yamaguchi, T., W. A. Brewer, and G. Feingold (2011), Turbulence structure in LES and ship borne data during VOCALS-REx, American Geophysical Union Fall Meeting, San Francisco, CA, December, 2011.

Yamaguchi, T., W. A. Brewer, and G. Feingold (2011), Evaluation of WRF-LES with ship borne data during VOCALS-REx, World Climate Research Programme Open Science Conference, Denver, CO, October, 2011.

Yamaguchi, T., and D. A. Randall (2007), Large-eddy simulation of evaporatively driven entrainment in cloud-topped mixed layers, 87th American Meteorological Society Annual Meeting, San Antonio, TX, January, 2007.

Yamaguchi, T., and D. A. Randall (2006), Large-eddy simulation of evaporatively driven entrainment in cloud-topped mixed layers, 86th American Meteorological Society Annual Meeting, Atlanta, GA, February, 2006.

Professional Activities and Experiences

Membership:

American Geophysical Union, American Meteorological Society

Grant proposal reviewer:

National Aeronautics and Space Administration, National Science Foundation

Journal peer reviewer:

Atmospheric Chemistry and Physics, Geophysical Research Letters, Journal of Advances in Modeling Earth Systems, Journal of Applied Meteorology and Climatology, Journal of Geophysical Research, Journal of the Atmospheric Sciences, Progress in Earth and Planetary Science, Quarterly Journal of the Royal Meteorological Society

Field work:

Physics Of Stratocumulus Top (POST), Monterey, CA, 2008

Postdoc supervising:

Yao-Sheng Chen, CIRES CU / NOAA ESRL, July 2018 – present

Ryuji Yoshida, CIRES CU / NOAA ESRL, August 2018 – present

Graduate student's committee:

Jianhao Zhang, University of Miami, advisor P. Zuidema, April 2017 – present

Student advising / mentoring:

Joseph Balsells, Yale University, summer 2015, 2016, and 2017

Teaching:

Teaching assistant, Atmospheric Modeling, Department of Atmospheric Science, Colorado State University, 2005