CURRICULUM VITAE

CHIN-HOH MOENG

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EDUCATION INFORMATION

Ph.D. 1979 Atmospheric Sciences, University of California, Los Angeles

M.S. 1974 Meteorology, South Dakota School of Mines and Technology

B.S. 1972 Atmospheric Physics, National Central University of Taiwan

PROFESSIONAL EXPERIENCE

2006–present: Deputy Director, Center for Multi-Scale Modeling of Atmospheric Processes (CMMAP), Fort Collins, CO

2006–2007: Visiting Professor, Department of Atmospheric and Oceanic Sciences, UCLA, Los Angeles, CA

1995–present: Senior Scientist, National Center for Atmospheric Research Microscale Meteorology Section/MMM, Boulder, CO

1994–1994: Visiting Faculty, Colorado State University Department of Atmospheric Science, Fort Collins, CO

1987–1995: Scientist III, National Center for Atmospheric Research Microscale Meteorology Section/MMM, Boulder, CO

1982–1987: Scientist II, National Center for Atmospheric Research Mesoscale Research Section/AAP, Boulder, CO

1979–1982: Senior Mathematics Analyst, Sigma Data Co. Goddard Space Flight Center/NASA, Greenbelt, MD.

SCIENTIFIC/TECHNICAL ACCOMPLISHMENTS

- Pioneered in developing and promoting the LES (Large-Eddy Simulation) technique for better understanding of PBL processes and for improving PBL parameterizations in meteorological models (e.g., Moeng and Wyngaard 1984; 1986; 1989)

- Built a unique, Fourier-based LES code from scratch, which remains the framework of today's NCAR-LES code and has been used by many researchers worldwide (Moeng 1984).

- Introduced LES to investigating physical processes of radiation, cloud microphysics, turbulent mixing and entrainment in the marine stratocumulus-topped PBL (e.g., Moeng 1987; Moeng et al. 1992).

- Launched the first GCSS (GEWEX Cloud System Study) intercomparison study and lead-authored the first GCSS intercomparison paper (Moeng et al. 1996).

- Initiated the first HATS (Horizontal Array Turbulence Study) field experiment at NCAR in 1999.

- Explored the feasibility of horizontal nesting of LESs in WRF (Moeng et al. 2007), with the goal of using WRF to study interactions between mesoscale and turbulence, as well as for wind energy applications.

- Helped Dave Randall (CSU) establish and lead an NSF Science and Technology Center CMMAP aiming at better understanding and representations of deep and shallow clouds in climate models.

- Promoted the use of large-domain LESs of tropical deep convection systems as benchmark for better understanding and developing subgrid-scale representations in kilometer-grid, cloud-resolving models (Moeng et al. 2009; 2010; Moeng and Arakawa 2012; Moeng 2014).

COMMUNITY SERVICE

- Teaching and education:

  - Taught two PBL courses at the Department of Atmospheric and Oceanic Sciences, UCLA during sabbatical, 2006-2007.
  - Gave six lectures at the ISIATA-III Summer School on Planetary Boundary Layer Turbulence and Air Pollution Modelling, Castra Marina, Italy, 2001.
  - Taught two PBL courses in the Department of Atmospheric Sciences, CSU in 1994 and 1998.
  - Gave two lectures at the NATO ASI on Buoyancy Convection in Geophysical Flows, Pforzheim, Germany, 1997.
  - Served on student thesis committees.

- NCAR programs:

  - Led an NCAR PBL Model Evaluation and Development Project, 1990-1997, which included a dozen of scientists from CGD, MMM, and universities; that project helped launch the K-profile and KPP PBL schemes in the NCAR climate model.
  - Served on NCAR Climate System Modeling Advisory Committee (CSMAC), 1992-1994.
  - Helped build a WRF-LES standard code for WRF community users.
  - Organized several workshops and symposiums including the 1995 ASP Summer Colloquium.

- National and international communities:

  - Served on Executive Committee of CMMAP, 2006–present.

- Served on Committee of Visitors (COV) for DOE Climate and Environmental Sciences Division, 2013.
- Served on Review Committee for DOE/BERAC/ARM Climate Research Facility Program, 2011.
- Served on Search Committee for a department chair at the Uppsala University, Sweden, 2009.
- Reviewed Swedish meteorology program for the Swedish Research Council, 2004.
- Served as JAS Editor, 2000-2003, and Associate Editor, 1992-1999.

HONORS/AWARDS

- 2007 Fellow, American Meteorological Society
- 2005 University Distinguished Alumni, National Central University, Taiwan
- 2004 NCAR Outstanding Publication Award
- 1997 AMS Clarence Leroy Meisinger Award
- 1994 AMS JAS Editor's Award
- 1989 NCAR Outstanding Publication Award

RESEARCH GRANTS

- NSF-Science and Technical Center, CMMAP grant; Co-PI with David Randall, Scott Denning, Wayne Schubert (all CSU), and John Helly (UCSD); total 20 million of which about 1 million is a subcontract to NCAR, 2006–2011.
- NSF-Science and Technical Center, CMMAP renewal grant; total 20 million of which about 1 million is a subcontract to NCAR, 2012–2017.
- DOE Office of Biological and Environmental Research; total fund to NCAR is $\$291,056$ for three years 2012–2015.

PUBLICATIONS

- Thesis

  Stability of a turbulent layer cloud within the planetary boundary layer, 1979, Department of Atmospheric Science, UCLA.

- Refereed Journal and Book Articles

  1. $\star$ Moeng, C.-H., and A. Arakawa, 1980: A numerical study of a marine subtropical stratus cloud layer and its stability. *J. Atmos. Sci.*, **37**, 2661–2676.
  2. $\star$ Moeng, C.-H., and A. Arakawa, 1982: Reply. *J. Atmos. Sci.*, **39**, 692–694.

3. Moeng, C.-H., and D. A. Randall, 1984: Problems in simulating the stratocumulus-topped boundary layer with a third-order closure model. *J. Atmos. Sci.*, **41**, 1588–1600.

4. Moeng, C.-H., 1984: A large-eddy-simulation model for the study of planetary boundary-layer turbulence. *J. Atmos. Sci.*, **41**, 2052–2062.

5. Moeng, C.-H., and J. C. Wyngaard, 1984: Statistics of conservative scalars in the convective boundary layer. *J. Atmos. Sci.*, **41**, 3161–3169.

6. Fiedler, B. H., and C.-H. Moeng, 1985: A practical integral closure model for mean vertical transport of a scalar in a convective boundary layer. *J. Atmos. Sci.*, **42**, 359–363.

7. Moeng, C.-H., and D. A. Randall, 1985: Reply. *J. Atmos. Sci.*, **42**, 1562.

8. Moeng, C.-H., and J. C. Wyngaard, 1986: Recalculation of the pressure-gradient/scalar-covariance in top-down and bottom-up diffusion. *J. Atmos. Sci.*, **43**, 1182–1183.

9. Moeng, C.-H., and J. C. Wyngaard, 1986: An analysis of closures for pressure-scalar covariances in the convective boundary layer. *J. Atmos. Sci.*, **43**, 2499–2513.

10. Moeng, C.-H., 1986: Large-eddy simulation of a stratus-topped boundary layer. Part I: Structure and budgets. *J. Atmos. Sci.* ,**43**, 2886-2900.

11. Moeng, C.-H., 1986: A large-eddy simulation model for the stratus-topped boundary layer. *Proceedings of EUROMECH 199, Notes on Numerical Fluid Mechanics*, Vol. 15, ed. by E. H. Hirschel, M Pandolfi, A. Rizzi, and B. Roux, Vieweg Publishing, F. R. Germany. 291–303.

12. Moeng, C.-H., 1987: Large-eddy simulation of a stratus-topped boundary layer. Part II: Implications for mixed-layer modeling. *J. Atmos. Sci.*, **44**, 1605-1614.

13. Carruthers, D. J., and Moeng, C.-H., 1987: Waves in the overlying inversion of the convective boundary layer. *J. Atmos. Sci.*, **44**, 1801-1808.

14. Moeng, C.-H., and J. C. Wyngaard, 1988: Reply. *J. Atmos. Sci.*, **45**, 1973.

15. Moeng, C.-H., and J. C. Wyngaard, 1988: Spectral analysis of large-eddy simulations of the convective boundary layer. *J. Atmos. Sci.*, **45**, 3573–3587.

16. Moeng, C.-H., and J. C. Wyngaard, 1989: Evaluation of turbulent transport and dissipation closures in second-order modeling. *J. Atmos. Sci.*, **46**, 2311–2330.

17. Curry, J. A., and C.-H. Moeng, 1989: Role of cloud-top radiative cooling in the production of turbulence kinetic energy. *IRS (International Radiation Symposium)'88: Current Problems in Atmospheric Radiation*, J. Lenoble, ed. A. Deepak, publ., 60–63.

18. Moeng, C.-H., and R. Rotunno, 1990: Vertical-velocity skewness in the buoyancy-driven boundary layer. *J. Atmos. Sci.*, **47**, 1149–1162.

19. Hechtel, L. M., C.-H. Moeng, and R. B. Stull, 1990: The effects of nonhomogeneous surface fluxes on the convective boundary layer: A case study using large-eddy simulation. *J. Atmos. Sci.*, **47**, 1721–1741.

20. Holtslag, A.A.M., and C.-H. Moeng, 1991: Eddy diffusivity and countergradient transport in the convective atmospheric boundary layer. *J. Atmos. Sci.*, **48**, 1690–1698.

21. Schumann, U., and C.-H. Moeng, 1991: Plume fluxes in clear and cloudy convective boundary layers. *J. Atmos. Sci.*, **48**, 1746–1757.

22. Schumann, U., and C.-H. Moeng, 1991: Plume budgets in clear and cloudy convective boundary layers. *J. Atmos. Sci.*, **48**, 1758–1770.

23. Moeng, C.-H., and U. Schumann, 1991: Composite structure of plumes in stratus-topped boundary layers. *J. Atmos. Sci.*, **48**, 2280–2291.

24. Wyngaard, J. C., C.-H. Moeng, and J. Weil, 1991: Parameterizing turbulent diffusion in the atmospheric boundary layer. *Studies in Turbulence: In Recognition of Contributions by John Lumley*, T. B. Gatski, C. G. Speziale, and S. Sarkar, Eds. Springer-Verlag, 3–16.

25. Wyngaard, J. C., and C.-H. Moeng, 1992: Parameterizing turbulent diffusion through the joint probability density. *Boundary-Layer Meteor.*, **60**, 1–13.

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27. Moeng, C.-H., S. Shen, and D. A. Randall, 1992: Physical processes within the nocturnal stratus-topped boundary layer. *J. Atmos. Sci.*, **49**, 2384–2401.

28. Shen, S., and C.-H. Moeng, 1993: Comparison of a computer-simulated stratus-topped boundary layer with aircraft observations. *Boundary-Layer Meteor.*, **65**, 29–53.

29. Andren, A., and C.-H. Moeng, 1993: Single-point closures in a neutrally stratified boundary layer. *J. Atmos. Sci.*, **50**, 3366–3379.

30. Nieuwstadt, F.T.M., P. J. Mason, C.-H. Moeng, and U. Schumann, 1993: Large-eddy simulation of the convective boundary layer: A comparison of four computer codes. *Turbulent Shear Flows 8*, Springer-Verlag, Berlin, eds. Durst, et al.. 431p.

31. Wyngaard, J. C., and C.-H. Moeng, 1993: Large-eddy simulation in geophysical turbulence parameterization. *Large Eddy Simulation of Complex Engineering and Geophysical Flows*, Eds. B. Galperin and S. A. Orszag, Cambridge University Press, New York, 550pp.

32. McWilliams, J. C., P. C. Gallacher, C.-H. Moeng, and J. C. Wyngaard, 1993: Modeling the oceanic planetary boundary layer. *Large Eddy Simulation of Complex Engineering and Geophysical Flows*, Eds. B. Galperin and S. A. Orszag, Cambridge University Press, New York, 550pp.

33. Moeng, C.-H., and P. P. Sullivan, 1994: A comparison of shear and buoyancy driven planetary-boundary-layer flows. *J. Atmos. Sci.*, **51**, 999–1022.

34. Sullivan, P. P., J. C. McWilliams, and C.-H. Moeng, 1994: A subgrid-scale model for large-eddy simulation of planetary boundary-layer flows. *Boundary-Layer Meteor.*, **71**, 247–276.

35. Andren, A., A. Brown, J. Graf, P. Mason, C.-H. Moeng, F.T.M. Nieuwstadt, U. Schumann, 1994: Large-eddy simulation of a neutrally stratified boundary layer: A comparison of four computer codes. *Q. J. Roy. Meteor. Soc.*, **120**, 1457–1484.

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48. Stevens, B., W. R. Cotton, G. Feingold, and C.-H. Moeng, 1998: Large-eddy simulations of strongly precipitating, shallow, stratocumulus-topped boundary layers. *J. Atmos. Sci*, **55**, 3616–3638.

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50. Moeng, C.-H. 1998: Parameterizations of the convective boundary layer in atmospheric models. NATO ASI Book Chapter on *Buoyancy Convection in Geophysical Flows*, E.J. Plate, E.E. Fedorovich, D.X. Viegas, and J.C. Wyngaard, Eds., Kluwer, 291–312.

51. Moeng, C.-H. 1998: Stratocumulus-topped atmospheric planetary boundary layer. NATO ASI Book Chapter on *Buoyancy Convection in Geophysical Flows*, E.J. Plate, E.E. Fedorovich, D.X. Viegas, and J.C. Wyngaard, Eds., Kluwer, 421–440.

52. Moeng, C.-H. 1998: Large eddy simulation of atmospheric boundary layers. Book chapter on *Clear and Cloudy Boundary Layer*, Royal Netherlands Academy of Arts and Sciences, Amsterdam, Eds. Holtslag and Duynkerke, Published by Elsevier Science, North-Holland, 372pp.

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55. Moeng, C.-H., P.P. Sullivan, and B. Stevens, 1999: Including radiative effects in an entrainment-rate formula for buoyancy-driven PBLs. *J. Atmos. Sci*, **56**, 1031–1049.

56. Stevens, B, C.-H. Moeng, and P.P. Sullivan, 1999: Large-eddy simulations of radiatively driven convection: Sensitivities to the representation of small scales. *J. Atmos. Sci.*, **56**, 3963–3984.

57. McWilliams, J.C., C.-H. Moeng and P.P. Sullivan, 1999: Turbulent fluxes and coherent structures in marine boundary layers: Investigations by large-eddy simulation. *Air-Sea Exchange: Physics, Chemistry, Dynamics, and Statistics*, Ed. G. Greenaert, Kluwer Academic Publishers, the Netherlands, 578pp.

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60. Sullivan, P.P., J.C. McWilliams, and C.-H. Moeng, 2000: Simulation of turbulent flow over idealized water waves. *J. Fluid Mech.*, **404**, 47–85.

61. Moeng, C.-H. 2000: Entrainment rate, cloud fraction, and liquid water path of PBL stratocumulus clouds. *J. Atmos. Sci.*, **57**, 3627–3643.

62. Moeng, C.-H. and B. Stevens, 2000: Marine stratocumulus and its representation in GCMs. Book chapter on *General Circulation Model Development: Past, Present, and Future*, Proceedings of a Symposium in honor of Professor Akio Arakawa. Ed. D.A. Randall, Published by Academic Press, 807pp.

63. Stevens, B., C.-H. Moeng, and P.P. Sullivan, 2000: Entrainment and subgrid length scales in large-eddy simulations of atmospheric boundary layer flows. *Developments in Geophysical Turbulence*, Eds. B. Kerr and Y. Kimura, Kluwer, Dordrecht.

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