Cloud Physics

Fall 2010

Lecturer

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Lecture Contents

Rayleigh-Bénard Convection

Cloud Microphysics

Cloud Dynamics

Parameterization of Cloud Processes in Numerical Models

Aerosol-Cloud Interactions

References

1. Cloud Dynamics, R. A. Houze, Jr., 1993, Academic Press, 573 pp.
2. A Short Course in Cloud Physics, 3rd Edition, R. R. Rogers and M. K. Yau, 1989, Pergamon Press, 293 pp.
3. Microphysics of Clouds and Precipitation, H. R. Pruppacher and J. D. Klett, 1997, Kluwer Academic Publishers, 954 pp.
4. Atmospheric Convection, K. A. Emanuel, 1994, Oxford University Press, 580 pp.
5. The Representation of Cumulus Convection in Numerical Models, Meteorological Monographs, Vol. 24, No. 46, K. A. Emanuel and D. J. Raymond, Ed., 1993, American Meteorological Society, 246 pp.
6. Fluid Mechanics, 4th Edition, P. K. Kundu and I. M. Cohen, 2008, Academic Press, 872 pp.
7. Bénard Cells and Taylor Vortices, E. L. Koschmieder, 1993, Cambridge University Press, 337 pp.
8. Atmospheric Chemistry and Physics, J. H. Seinfeld and S. N. Pandis, 2006, Wiley-Interscience, 1203 pp.

Grading

mid-term exam: 35%

final exam: 35%

homework: 30%

Homework: Solving Problems

Problems will be given in the class.

Homework: Reading and Summarizing Articles

1. Historical Review (p. 1-9) in *Microphysics of Clouds and Precipitation*, H. R. Pruppacher and J. D. Klett, 1997, Kluwer Academic Publishers, 954 pp. (9/6)
2. Cloud Microphysics and Dynamics (p. 179-259) in *Historical Essays on Meteorology 1919-1995*, American Meteorological Society, 617 pp. (9/13)
3. Bühler, K., and H. Oertel, 1982: Thermal cellular convection in rotating rectangular boxes. *J. Fluid Mech.*, **114**, 261-282. (9/20)
4. Riemer, N., and A. S. Wexler, 2005: Droplets to drops by turbulent coagulation. *J. Atmos. Sci.*, **62**, 1962-1975. (10/11)
5. Lin, Y.-L., R. D. Farley, and H. D. Orville, 1983: Bulk parameterization of the snow field in a cloud model. *J. Clim. Appl. Meteor.*, **22**, 1065-1092. (10/25)
6. D. M. Romps, 2010: A direct measure of entrainment. *J. Atmos. Sci.*, **67**, 1908-1927. (11/8)
7. Weisman, M. L., and J. B. Klemp, 1982: The dependence of numerically simulated convective storms on vertical wind shear and buoyancy. *Mon. Wea. Rev.*, **110**, 504-520. (11/22)

* 1, 5: 2-page summary, 2: 3-page summary, 3, 4, 6, 7: 1-page summary (in English)