GEOF328 Mesoscale Dynamics

Spring 2017

Aim and Content

GEOF328 addresses a wide variety of weather phenomena that are smaller than synoptic scale but larger than micro-scale. These phenomena have spatial scales generally ranging from around a few hundred meters to several hundred kilometers, temporal scales of a day or less, and large horizontal and vertical wind accelerations, for which the Rossby number is large and the hydrostatic approximation is not valid any longer. It is the world in which quasi-geostrophic theory breaks down. The material covered in GEOF328 includes fronts, land-sea breezes, gravity waves, hydraulic theory, downslope windstorms, orographic flow distortion, valley wind systems, thunderstorms and squall lines. The course will build on conceptual models and theoretical derivations to describe observed phenomena.

Course website http://www.uib.no/course/GEOF328

Lecturer

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Learning Outcomes

On completing this course you should be able to:

- Define and characterize a mesoscale phenomena
- Formulate the problem in a physical and mathematical framework
- Develop ideas for analytical and (to some extend) numerical solutions to the problem
- Write a toy computer code to solve your numerical problem and view the results

Compulsory requirements

Regular attendance of the course exercise including presentation of own solutions. Presentation of seminar assignment. Mid-term exam, written, must be passed in order to be allowed to take final exam.

Assesment Methods

Written mid-term exam, counts 20% of the final grade and must be passed. Final exam, oral, 45 minutes. Counts 80% of the final grade and must be passed. No auxiliary material allowed for the exam.

Textbooks

Markowski, P. and Y. Richardson, 2010: Mesoscale Meteorology in Midlatitudes, Wiley-Blackwell, ISBN: 978-0-470-74213-6 (67) This book gives a good introduction into Mesoscale Meteorology and is richly illustrated. The course will mainly rely on this book.

Lin, Y.-L., 2007: Mesoscale Dynamics, Cambridge University Press, ISBN: 978-0-521-80875-0 (61) This is a comprehensive graduate-level text that covers mesoscale dynamics at a more advanced theoretical/mathematical level.

Holton, J.R., 2004: An Introduction to Dynamic Meteorolgy, Elsevier Academic Press, ISBN 0-12-354015-1 (28) This is one of the standard textbooks on dynamics meteorology and it has a chapter on mesoscale circulations. However, it only covers a small fraction of the material covered in this class.

Reading list

We will cover chapters 1-13 in the book Mesoscale Meteorology in Midlatitudes by Markowski and Richardson.