Pensum GEF1100 2015

Lærebok

ATMOSPHERE, OCEAN, AND CLIMATE DYNAMICS: AN INTRODUCTORY TEXT

JOHN MARSHALL AND R. ALAN PLUMB

1. Characteristics of the atmosphere
1.1 Geometry
1.2 Chemical composition of the atmosphere
1.3 Physical properties of air
1.3.1 Dry air
1.3.2 Moist air

2. The global energy balance
2.1 Planetary emission temperature
2.2 The atmospheric absorption spectrum
2.3 The greenhouse effect
2.3.1 A simple greenhouse model
2.3.2 A leaky greenhouse
2.3.3 A more opaque greenhouse

3. The vertical structure of the atmosphere
3.1 Vertical distribution of temperature and greenhouse gases
3.1.1 Typical temperature profile
3.1.2 Atmospheric layers
3.2 The relationship between pressure and density: hydrostatic balance
3.3 Vertical structure of pressure and density
3.3.1 Isothermal atmosphere
3.3.2 Non-isothermal atmosphere
3.3.3 Density

4. Convection
4.3.1 The adiabatic lapse rate (in unsaturated air)
4.3.2 Potential temperature
4.5.2 Saturated adiabatic lapse rate
4.5.3 Equivalent potential temperature

5. The meridional structure of the atmosphere
5.1 Radiative forcing and temperature
5.1.1 Incoming radiation
5.1.2 Outgoing radiation
5.1.3 The energy balance of the atmosphere
5.1.4 Meridional structure of temperature
5.2 Pressure and geopotential height
5.3 Moisture
5.4 Winds
5.4.1 Distribution of winds

6. The equations of fluid motion

6.1 Differentiation following the motion
6.2 Equation of motion for a nonrotating fluid
6.2.1   Forces…
6.2.2   Equations of motion
6.2.3   Hydrostatic balance
6.3 Conversation of mass
6.3.1 Incompressible flow
6.3.2 Compressible flow
6.4 Thermodynamic equation
6.6 Equation of motion for a rotating fluid
6.6.2Transformation into rotating coordinates
6.6.3 Rotating equations of motion
6.6.5 Putting things on the sphere

7. Balanced flow

7.1 Geostrophic motion
7.1.1 Geostrophic wind
7.1.2 Synoptic charts
7.1.3 Balanced flows (Gradient and cyclostrophic wind)
7.2 Taylor-Proudman theorem (only 1 slide, introduced)
7.3 Thermal wind equation (not from the book)
7.4 Subgeostrophic flow: The Ekman layer
Surface wind
7.4.2 Ageostrophic flow…
7.4.3 Ageostrophic flow…

8. The general circulation of the atmosphere

8.1 Understanding the observed circulation
8.2 Mechanistic view of the circulation
8.2.1   The tropical Hadley circulation
8.2.2   The extratropical circulation
8.4 Large-scale atmospheric energy and momentum budget
8.4.1Energy transport
8.4.2 Momentum transport
8.5 Latitudinal variations of climate

9. The ocean and its circulation
   Ocean observations
         Interpreting the observations
   The equation of state
         Density, temperature and salinity distributions
   Hydrostatic and geostrophic balances
         Surface velocities
   Thermal wind-driven
         Subsurface velocities
   Incompressibility

10. The wind-driven circulation
   Surface Ekman transport
   Subsurface flow and the Sverdrup transport
   Western intensification and the Gulf Stream

IPCC AR5

IPCC-lecture under "Undervisningsmateriell"

http://www.uio.no/studier/emner/matnat/geofag/GEF1100/h15/undervisningsmateriale/Forelesninger/gef1100_ipcc_topost.pdf

Summary for Policymakers (SPM): hele doknumentet

http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WGIAR5_SPM_brochure_en.pdf

Chapter 5

Section 5.3.2.1, incl. Figure 5.3

Chapter 6

Section 6.1.1.1, incl. Figure 6.1

Box 6.1

FAQ6.2 (Frequently Asked Questions

Annet

Oblig 1&2 – ikke Matlab

Ekskursjon: måleprogram