

Pensum GEF1100 2016

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 Conservation 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
 - 6.6.2 Transformation into rotating coordinates
 - 6.6.3 Rotating equations of motion
 - 6.6.5 Putting things on the sphere
- 6.8 Problems: Vorticity

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)
- 7.3 Thermal wind equation (not from the book)
- 7.4 Subgeostrophic flow: The Ekman layer
 - Surface (friction) wind
 - 7.4.2 Ageostrophic flow...