

AT605 Syllabus:

An Introduction to the Global Circulation of the Atmosphere

Instructor: David Randall

2017 version

Perpetual Motion

An introductory outline of the course, including a summary of how it relates to other Atmospheric Science courses.

What Makes It Go?

A summary of upper and lower boundary conditions that affect the global circulation of the atmosphere, including the planetary energy budget, the surface energy budget, the atmospheric energy budget, land-sea contrasts, topography, etc.

First Impressions

An introductory overview of the observed global circulation of the atmosphere, with a small amount of conceptual interpretation. Topics covered include the distributions of sea-level pressure, winds, temperatures, and moisture.

The Rules of the Game

A brief but intense review of topics in atmospheric dynamics that are needed in later chapters.

Go with the Flow

A discussion of the meridional transports of energy, moisture, and angular momentum, as seen in isentropic coordinates.

Up Moist, Down Dry

A discussion of the role of cloud processes in the global circulation of the atmosphere.

Heat Where It's Hot, and Cool Where It's Cold

A summary of the energetics of the global circulation of the atmosphere.

A Taxonomy of Eddies

An overview of the many types of eddies that are observed in the global circulation. Topics covered include midlatitude Rossby waves, equatorially trapped waves, and monsoons.

What the Eddies Do

A summary of the effects of the eddies on the zonally averaged circulation. Topics covered include several forms of the Eliassen-Palm theorem.

A Fluid Dynamical Commotion

A perspective on the global circulation as a form of large-scale turbulence.

The Future of the Circulation

A brief discussion of future changes in the global circulation that are expected to result from increasing greenhouse gas concentration.s