Building a Simple Model of Atmospheric Circulation and Testing the Model

Gregory Fitzgibbons
Seminole State College

Composition of the atmosphere

78 % N_2 (molecular nitrogen)
21 % O_2 (molecular oxygen)
Traces of Ar, H_2O, CO_2, etc.

Suppose a student got the following exam scores:

Exam I: 80

Exam II: 70

What is the student's average score?
If the student gets a 70 on the third exam, what happens to the student's average?

Under the same conditions of temperature and pressure which is denser, dry air or wet (humid) air?

Warm humid air is less dense than cold dry air and therefore rises.

Cold dry air is denser than warm humid air and therefore sinks.

Earth’s uneven solar heating results in large-scale atmospheric circulation.

Simple model of the atmosphere

Where does most evaporation occur?

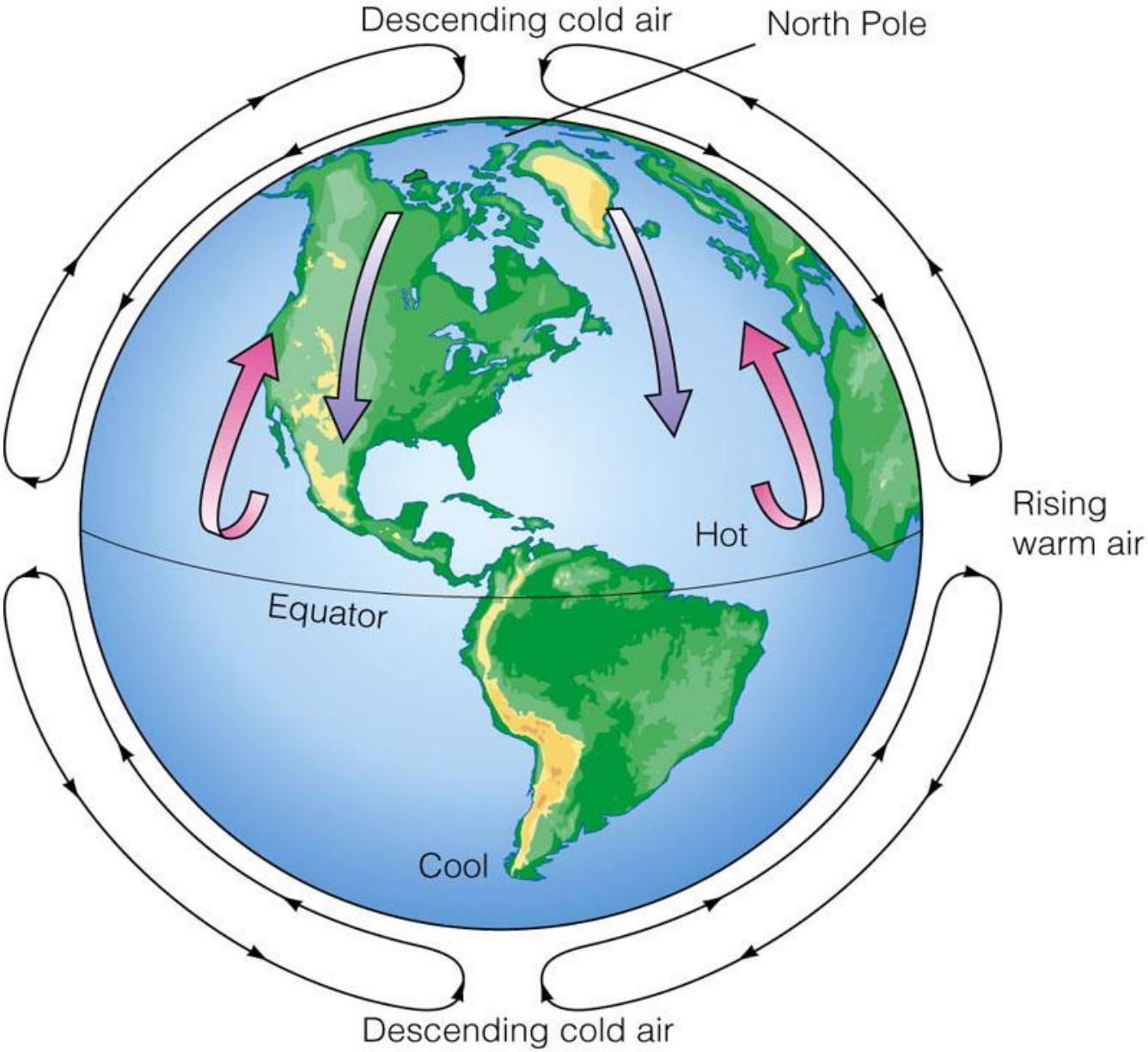
=> warm moist air that rises.

Where is air densest?

=> cold dry air that sinks.

In a closed system (the atmosphere) the resulting motion is called *convection.*

Predicting the direction of surface winds in this model.



Testing the model by comparing to actual surface winds as indicated by moving clouds.

https://www.weather.gov/satellite

Result of test: Global circulation is governed by two factors – uneven solar heating and we will add Earth's rotation.