

3/12/08

Class 23 GEOL 117

OCEAN CIRCULATION – Preview

Wind-driven surface currents

Density-driven deep circulation

OCEAN CIRCULATION – INTRODUCTION

1. Surface Currents

Horizontal currents: upper few hundred meters;

velocity = about 1 m/s

Driving force: prevailing winds

Modifying factors: deflection by ...

1) Coriolis effect

2) Continents

General pattern -- rotary circulation;

major **gyres** centered in sub-tropics

See Figures in textbook

No need to memorize names of the currents, except for a few clearly emphasized in class

The overall pattern is very important, though.

Atlantic -- rotary, or circular motion- the gyres (e.g., N Atlantic)

gyre is a circular group of currents...

Equatorial currents

Gulf Stream

North Atlantic Drift –warms Northern Europe

Canary Current

North Pacific Ocean – same pattern

-- California Current

-- Kuroshio Current

-- North Pacific Drift

-- Equatorial Counter Current

2. Deep Circulation/Currents

Everything below upper few hundred meters is unaffected by winds, so motion is caused by...

Driving force:

Sinking of dense water (e.g., N. Atlantic)

Review: What controls the density of the water?

Temperature-

Salinity (evap. and sea ice)

General pattern --

Sinking, spreading, eventual upwelling

Modifying factors: deflection/channeling by ...

1) Coriolis effect

2) Continents and mid-ocean ridges

Surface and deep circulation are coupled in what we call the

"Global Conveyor Belt"

-- Transport of surface waters to high latitudes

-- Sinking and flow at depth

-- Upwelling -- return to surface