

## GEOL 117 Class 25

El Niño/La Niña cycles (= ENSO)

### Review: H and L pressure zones and winds

Prevailing winds (Trades, Westerlies, Polar Easterlies) drive surface currents

Rising/sinking air masses and H and L pressure zones alter the basic pattern of these winds

Example: Continents in summer are warm, create semi-permanent LOW pressure, so the winds tend to be from the ocean to the continent

-- Convection cells

### **El Niño / Southern Oscillation (ENSO): Intro**

- Major change in both ocean and air currents (EQUATORIAL PACIFIC)
- Happens every 3(?) to 7 years
- The system oscillates back and forth
  - El Niño conditions occur in some years
  - La Niña conditions in some other years
  - Normal conditions in the rest

### **Normal Conditions:**

1. Seasonal High Pressure over Tropical E. Pacific “Easter Island High”
2. Seasonal Low Pressure over Equatorial W. Pacific “Indonesian Low”
3. Winds blow from high to low pressure
4. In this case, this enhances the Trade Winds
5. These winds push warm water toward Indonesia
6. This warm water enhances the “Indonesian Low”

We also observe:

- Cool surface waters and upwelling on American side
    - Huge fish harvest- Peru
  - Tilting of sea surface -- higher on Asian side
  - Tilting of thermocline (= temperature dropoff) higher on American side
- See figures in textbook.

### **El Niño conditions:**

Something triggers a breakdown of the normal conditions. One way of viewing this is:

1. Warm water mounded up in W. Pacific begins to “slosh” eastward
2. This moves the Indonesian low eastward and weakens Easter Island High
3. This weakens the trade winds
4. This weakens westward ocean currents
5. Back to Step 1 above (a vicious circle)