Geographic Influences on identity
Movement of the Crust

- A German scientist named Alfred Wegener noticed that the shape of many continental land masses suggest that they might once have been joined together.
- From this observation he developed the theory of **continental drift**.
- Wegener believed that all of the earths continents once formed one supercontinent called **Pangaea**.
Evidence for Wegener’s theory

- The fit of the continental land masses
- The presence of similar fossils in rocks now separated by oceans
- Matching magnetic bands in the rocks on either side of the Mid-Atlantic ridge
- The fact that fossils of sea animals have been found high in the rocks of the Himalayas.
• Formation of the himalayas

• http://www.youtube.com/watch?v=HuSHOQ6gv5Y&spfreload=1
• Colliding Continents Documentary on youtube
  http://www.youtube.com/watch?v=KCSJNBMOjJs

• Pacific ring of fire
  http://www.youtube.com/watch?v=uw7Uq137YJQ&safety_mode=true&safe=active&persist_safety_mode=1
Himalayas: South Asia

Elevation: 8,848 M
Area: 1,089,133 km2
Canada’s Crust

- Canada is located on the northern part of the North American Plate, which is moving west at 2-4cm per year as it separates from the Eurasian Plate along the Mid-Atlantic ridge.

- The Pacific plate moves in a northeastern direction, creating a Subduction zone, when one slides beneath the other creating volcanoes and earthquakes.
The History of Earth
How are landforms Built

• The earth's surface is built of material that comes from beneath the earth's crust, or formed by the movement of crust.

• The heat of the earth's interior creates convection currents in the mantle. The CC cause the magma in the mantle to break through the crust of the earth as lava or volcanic ash. At other times, moving magma may cause the plates to separate or collide at their boundaries, resulting in parts of the crust moving upward.
How are Landforms Shaped

1. The building up forces of mountain building
2. The wearing down forces of weathering
3. The wearing down forces of erosion
4. The building up forces of deposition

See page 25 Figure 2.8 weathering, erosion and deposition
• Other slides on Landforms!!
• **Meteorology**
• The science of weather
Weather

• This is a description of atmosphere conditions from day to day.
• Ex. Today we have 5mm of rain and 18 degrees.
Climate

- This is the pattern of weather conditions over a long period of time.
- Ex. Newfoundland had 125 cm of snow last winter.
Weather vs climate video

- http://www.youtube.com/watch?v=VHgyOa70Q7Y
Global Factors

- Facts about our Earth control weather and climate.
- These are our global factors:
  - 1. Latitude
  - 2. Air Masses
  - 3. Winds
  - 4. Ocean Currents
  - 5. Precipitation
1. Latitude

- Farther from the equator the average monthly temperature decreases.
- Higher latitude locations get less direct sunlight.
- Sunlight strikes these high altitudes at an angle.
- Ex. Canada is, on average, colder than the USA.
2. Air Masses (p.34)

- These are large bodies of air with a few predictable atmospheric features.
- They move toward Canada and influence our weather and climate.
- They are formed in certain places on Earth.
- Where they form enables us to predict what they will bring.
Maritime Air Masses

• They form over the water.
• The air will be moist.
Continental Air Masses

• They form over the land.
• The air will be dry.
Polar and Arctic Air Masses

- They are formed at high latitudes.
- The air will be cool or cold.
Tropical Air Masses

• They are formed near the equator.
• These air masses will be warm or hot.
Canada’s Four Air Masses

- Canada is affected by 4 air masses:
  - 1. Maritime Tropical
  - 2. Maritime Polar
  - 3. Continental Arctic
  - 4. Continental Tropical
Maritime Tropical

• This air mass brings moist, warm air to Canada.
Maritime Polar

• This air mass brings moist, cold air to Canada.
Continental Arctic

- This one brings dry, cold air to Canada.
Continental Tropical

• This one brings dry, hot air to Canada.
3. Winds

• They generally blow eastward across Canada (from B.C. to N.L)
• Canadian winds follow the direction of the high altitude wind called the jet stream.
Winds Bill Nye Video 22 min

- http://www.youtube.com/watch?v=TMPf9NX7o6U
Jet Stream

• The jet stream always flows eastward but changes its position and speed from summer to winter.
• It moves slower and is found further north in the summer.
Jet Stream and Air Masses

• After air masses arrive in Canada they move eastward following the path of the jet stream.

• In the winter they move quickly and in summer they move more slowly.
Jet st

- http://www.youtube.com/watch?v=huweohlh_Bw
4. Ocean Currents

• Four ocean currents affect Canadian climate:
2 East Coast Currents

- They are:
  - A. Labrador Current (cold)
  - B. Gulf Stream Current (warm)
2 West Coast Currents

- They are:
- A. Alaska Current (warm)
- B. North Pacific Current (warm)
Current Summary

• Canada’s west coast has warmer climate because of the 2 warm currents there.
5. Precipitation

- Precipitation is a component of climate.
- When warm air, carrying water vapour, rises, cools, and releases the vapour as precipitation.
- Warm air is lighter than cold air and holds the most water vapour.
- Depending on the air temperature, precipitation could be solid (ex. snow) or liquid (ex. rain).
There are 3 general things that can force warm air to rise.

They are:

A. Fronts of air masses
B. Convection
C. Mountains
A. Frontal Precipitation

- The leading edge of an air mass is called a front.
- When the fronts with different air temperatures meet, warm air rises and precipitation is formed.
Cold Front Precipitation

- You are located in an area with a warm air mass.
- A cold front arrives and forces the warm air upward.
- Precipitation begins.
Warm Front Precipitation

• You are located in an area with a cold air mass.
• A warm front arrives and rises up over the cold air.
• Precipitation begins.
B. Convectional Precipitation

- Sunlight heats a point on the earth surface.
- Warm air, over this hot spot, rises.
- The warm air cools and the vapour in it is released as precipitation.
B. Convectional Precipitation

Warm, light air rises and expands. Water becomes too heavy for air to hold.

Hot surface heats the air above it. The heated air expands and becomes lighter, therefore it rises.
C. Orographic Precipitation

- Wind forces warm air to rise up over a mountain.
- This air cools, clouds form, and precipitation begins.
• http://www.youtube.com/watch?v=vNIPBfKbec8
Canada’s Climate Regions

• Canada is big enough to have several climate regions or zones.
• They experience similar weather conditions.
• Canada has 4 climate zones:
• Zone B, C, D, and E
Canada’s Climate Regions

Map showing the climate regions of Canada, with labels B, C, D, and E, and a legend indicating the following zones:

- **B Zones**: Dry climates
- **C Zones**: Warm, moist climates
- **D Zones**: Temperate continental climates
- **E Zones**: Polar climates
Zone B

• It is located in southern Alberta and Saskatchewan.
• Here the climate is dry.
Zone C

- This zone is found along the coast of British Columbia (including Vancouver Island).
- The climate is warm and moist.
- Vancouver Island has climate like that in southern Europe (Mediterranean)
Zone D

• This is the largest climate zone in Canada – over 70%.
• The climate is cool and moist.
• Most of this zone has precipitation throughout the year.
• The northern part of this zone has very short summers.
Zone E

- It is the second largest climate zone in Canada – about 25%.
- It’s located in the far north of Canada.
- Here the climate very cold and dry.
Regional Factors

• Climate regions may have features which make their weather unique.
• These features include:
  • A. Altitude (elevation)
  • B. Bodies of Water
  • C. Mountain Barriers
A. Altitude

• As altitude increases the air temperature decreases.
• Places with higher elevation are colder.
A. Altitude

- Barren rocks
- Mosses and lichens
- Cushion plants
- Open grassland
- Alm meadows
- (Dwarf)bushes
- Needletrees forest
- Deciduous trees forest

Cold to Warm gradient
B. Bodies of Water

• Summer sunshine heats up land quickly and heats up water slowly..

• In winter, land cools off quickly but water cools off slowly.

• Areas close to large bodies of water do not have big differences in climate (ie. moderate climate).
Bodies of Water

**In Summer**
- Land is warm
- Water is cold
- Summer is cool, not hot.

**In Winter**
- Land is cold
- Water is warm
- Winter is mild, not cold.
B. Bodies of Water

- Because they are near large bodies of water:
  1. places on the east and west coast of Canada have moderate climates.
  2. Places far away from large bodies of water have much bigger changes in their climate throughout the year.
C. Mountain Barriers

- In Canada, almost all precipitation falls on the western slopes of large mountain chains.
C. Mountain Barriers

- Prevailing winds, traveling eastward, strike the western slopes first and drop their precipitation there.
- By the time the winds reach the other side of the mountain (eastern side) they are dry.
- The eastern side gets little or no precipitation.
- This effect is called **rain shadow**.
Climograph Video

- http://www.youtube.com/watch?v=7I5uQQTqxz4
Climographs

- This graph has one horizontal axis and two vertical axes.

Winterland

Temperature (°C)

Precipitation (mm)

J F M A M J J A S O N D

Months of the Year
In-Class Assignment

• Handout: Climograph Construction and Analysis
Weather Disasters Video

- http://www.youtube.com/watch?v=Kg-6whkbZXs
Climograph Data: St. John’s

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http://www.trailcanada.com/canada/weather/
# Climograph: Iqaluit

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![Whitehorse, Yukon](chart.png)
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http://www.trailcanada.com/canada/weather/
In-Class Assignment

• Handout: Factors That Influence Climate
In-Class Assignment

• Handout: Explain the Climate Conditions
• Slide on Landforms!!