

**Science 1206**

**Weather Dynamics**

Meteorology



# Forecasting Weather (Chp 14, pg. 542)

- Meteorology: The study of the atmosphere and weather forecasting



# North American Weather Systems

- Weather System:
  - A set of weather variables that move as a unit for a few days
- Air Mass:
  - Large body of air in which temp and moisture is fairly uniform

# Types of Air Masses (See Fig 1, pg 546)



- 6 different air masses
- Combinations of
  - Maritime or Continental
    - (Dry or Moist)
  - Polar or Tropical
    - (Warm or cold)

Air Masses	Temperature	Moisture Content
Maritime Polar (West Coast)		
Maritime Polar (East Coast)		
Continental Polar		
Maritime Tropical (West Coast)		
Maritime Tropical (East Coast)		
Continental Tropical		

# Front – the boundary between a cold air mass and a warm air mass

- **Warm front:** the leading edge of a warm air mass
- **Cold front:** the leading edge of a cold air mass
- **Stationary front:** warm and cold air masses remain still for some time

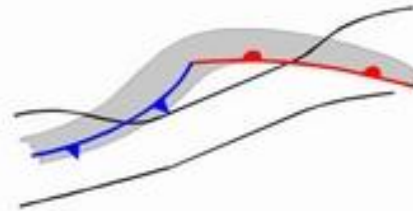
## Symbols



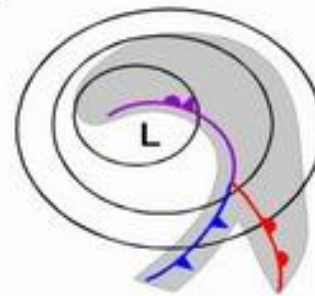
# Fronts (Continued...)

- Occluded Front
  - cold front catches up with a warm front; the warm air is lifted above the earth's surface and is cut off (occluded) from the cooler air below

A



C

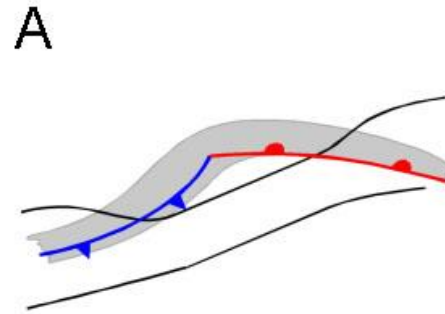


# Low Pressure Systems

- Pressure is lowest at the center and increases outward.
- Rotate counterclockwise in the Northern Hemisphere (CW in Southern)
- Tend to bring cloudy skies and stormy weather
- Also known as a cyclone, or cyclonic storm

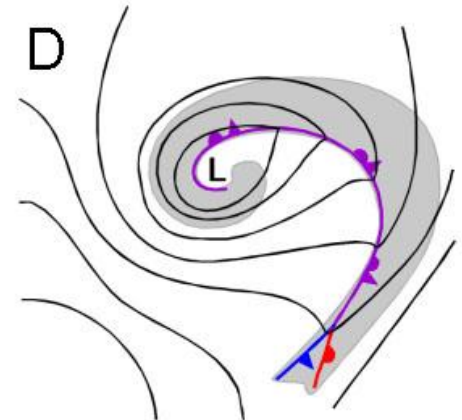
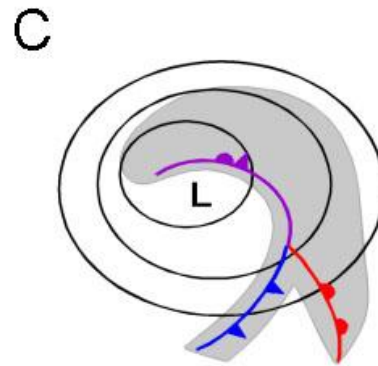
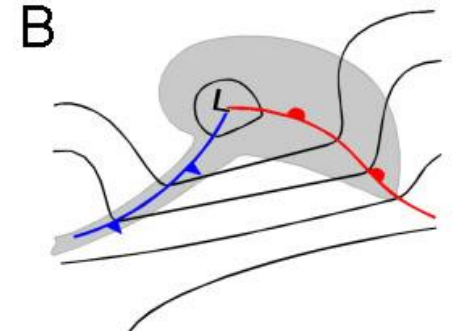
# Life Cycle of a Cyclone (fig 2, pg 547)

A: Warm and Cold front meet



B: Main Stage:

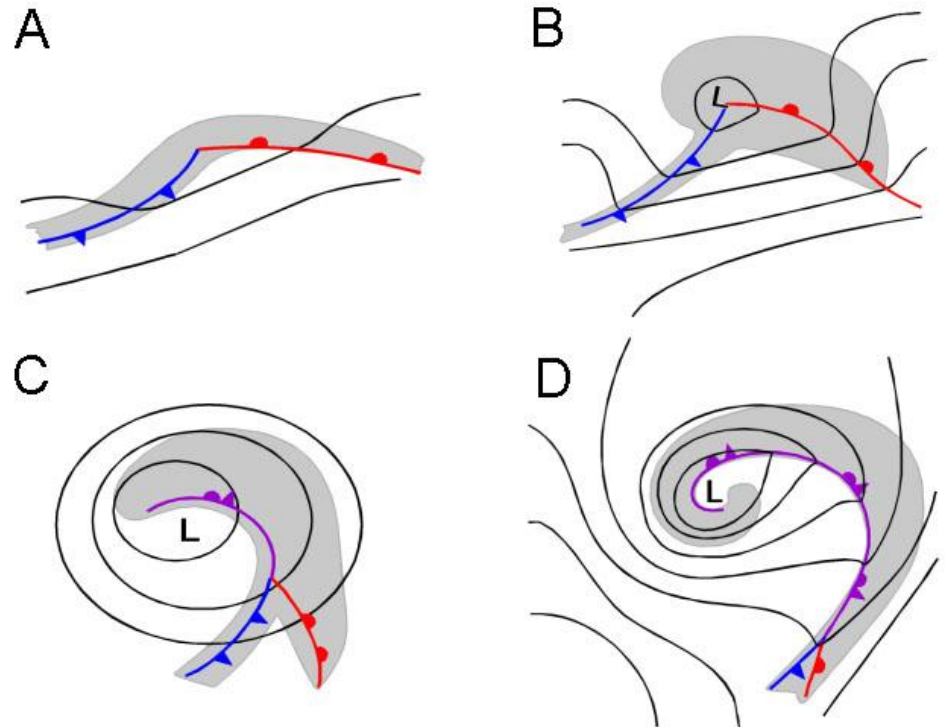
Warm air is pushed up, lots of precipitation



# Life Cycle of a Cyclone (fig 2, pg 547)

C: Occluding Stage: Storm weakens as fronts combine

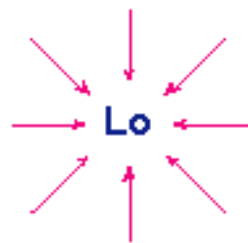
D: Final Stage  
Flow of air dissipates,  
storm ends



# High Pressure Systems

- Pressure is highest at the center and decreases outward.
- Rotate clockwise in the Northern Hemisphere (CCW in Southern)
- Tend to bring clear skies and fair weather
- Also known as an anti-cyclone

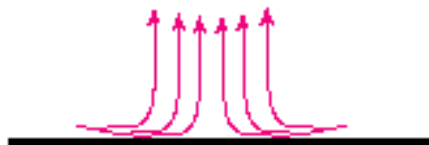
Top View:



Counterclockwise  
Wind Flow

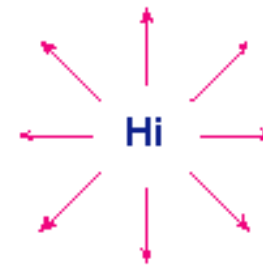


Side View:

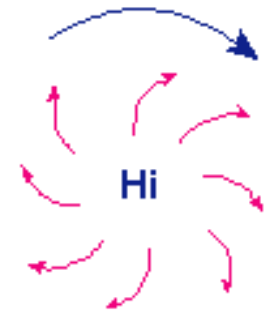


With Coriolis  
Effects

Top View:



Clockwise  
Wind Flow



Side View:



With Coriolis  
Effects

# Weather Forecasting

- Has become more accurate because:
  - Advanced technologies (satellites, computers, etc)
  - More observation stations
  - Better ability to collect and analyze data
  - Improved understanding factors that cause weather

# Weather Forecasting

- Gathering Weather Data
  1. Ground-based weather stations
    - many locations across Canada and the world.
    - data collated and used to create weather maps

# Gathering Weather Data

## 2. Weather Balloons

- helium-filled balloons carrying weather instruments.
  - record conditions at various altitudes
  - can be used to track upper-level winds

# Gathering Weather Data

## 3. Satellites

- Orbiting spacecraft located at various distances above earth (1000 – 36000 km)
- relay imagers and data back to earth
- provide a broad view of changes in the atmosphere .

# Gathering Weather Data

4. High altitude aircraft
  - up to about 20 km
  - collect atmospheric data in troposphere and stratosphere

# Analyzing Weather Data

## Computer Technology

- Store and analyze large volumes of weather data
- Run complex simulations (models) to forecast weather
- Current forecasts accurate for about 3 days

Weather Data	Instrument	Units
Air Temperature	Thermometer	Degrees Celsius
Wind Speed	Anemometer	km/h
Wind Direction	Wind Vane	
Atmospheric Pressure	Barometer	kiloPascals
Precipitation	Rain Gauge	mm (Rain) cm (Snow)
Relative Humidity	Psychrometer	percent