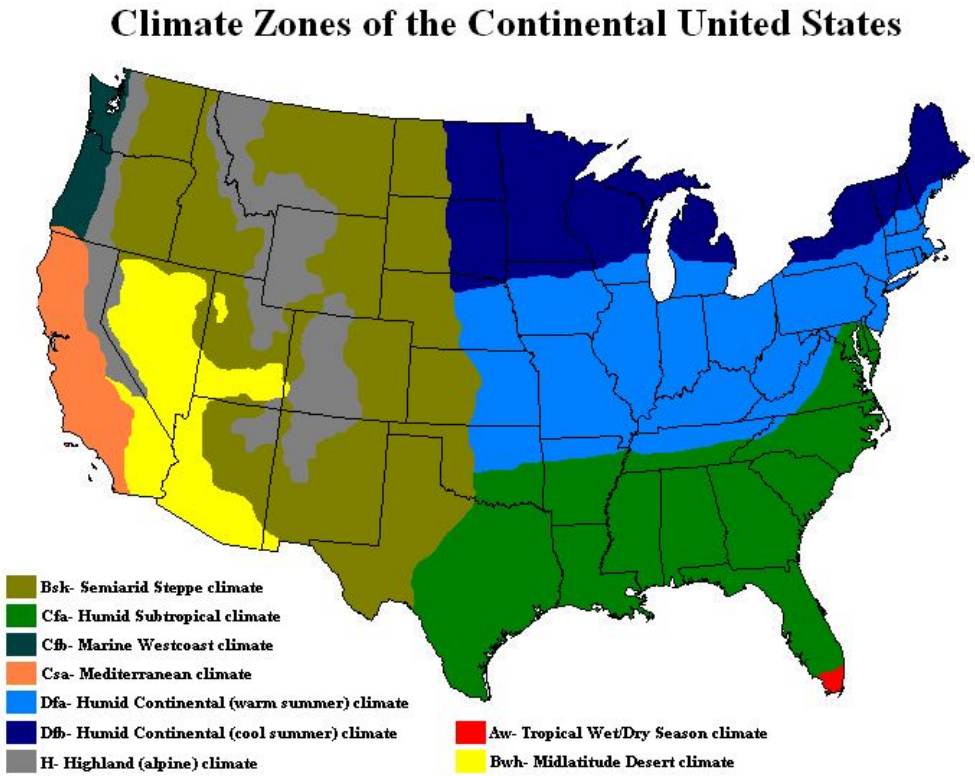
# Let's Talk About the Weather!

Put your current location and any crazy weather you've experienced in the chat!

# Agenda

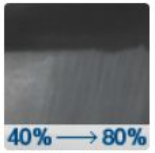
- Basic physics of weather
  - Common weather systems
  - Fronts
- How to read a weather map
- Make our own weather forecast!

# What is the difference between weather and climate?

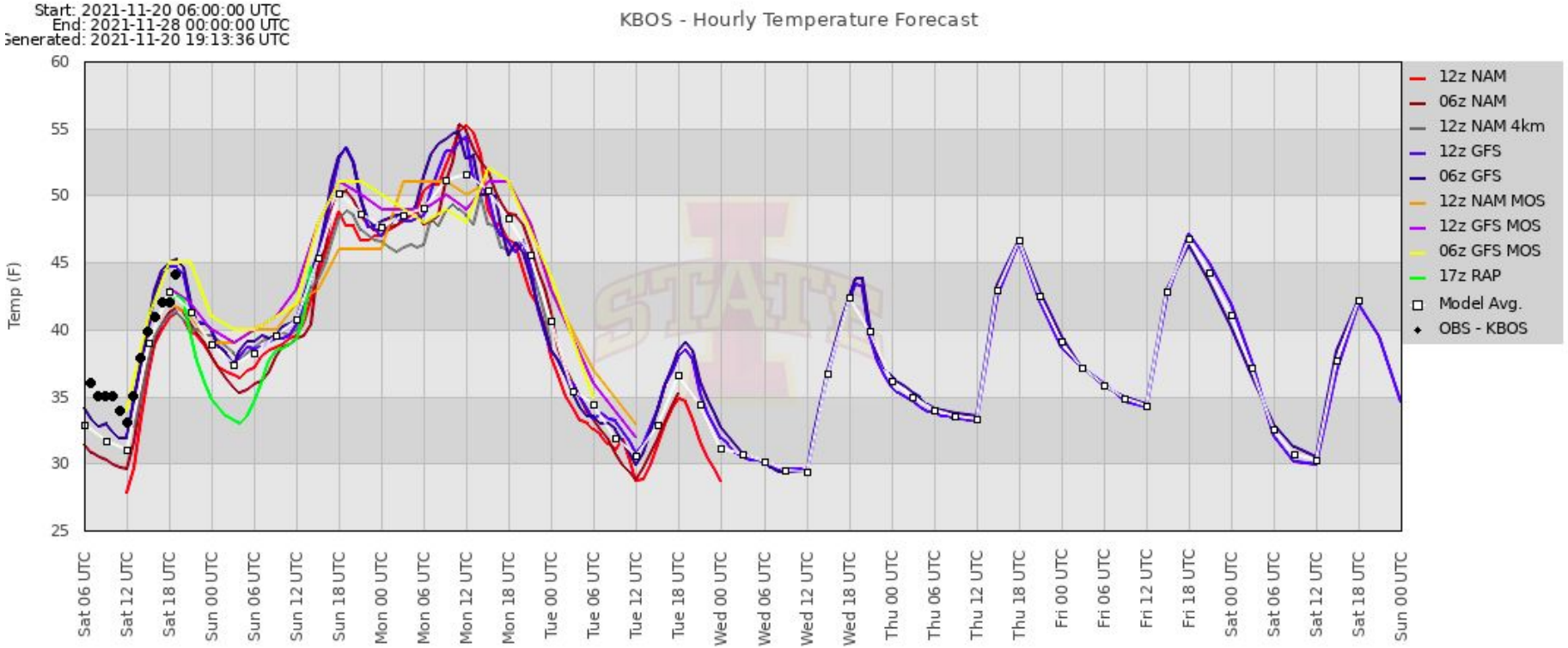


# Why not just look at the weather app on my phone?

Extended Forecast for
**Newton Center MA**

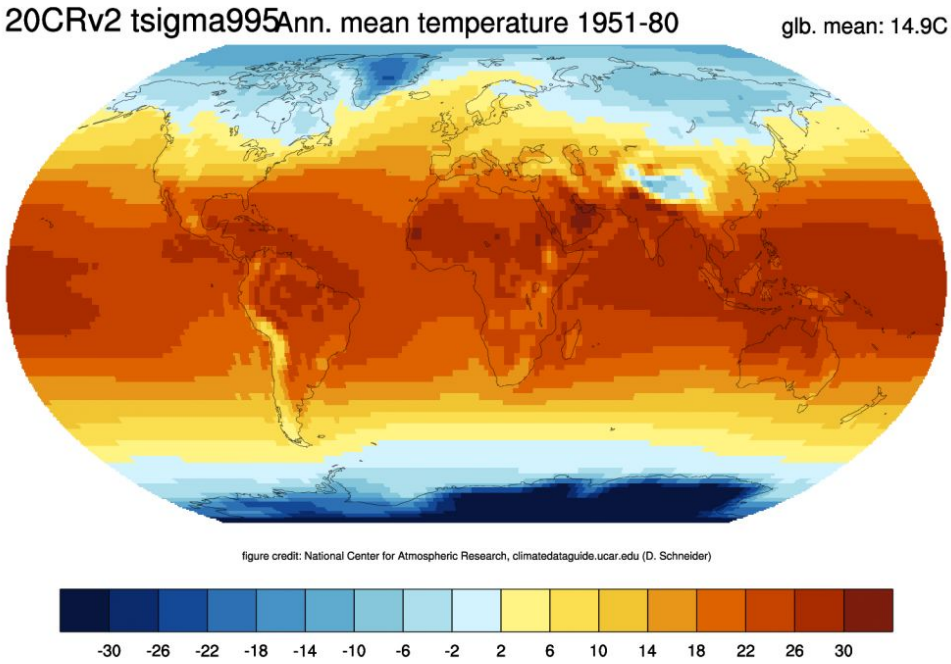
| This Afternoon | Tonight | Sunday | Sunday Night | Monday | Monday Night | Tuesday | Tuesday Night | Wednesday |
|---|---|---|---|---|---|---|---|---|
| | | |   | | | | | |
| Mostly Sunny | Mostly Cloudy | Cloudy | Chance Showers then Showers | Showers then Chance Showers | Mostly Cloudy | Sunny | Mostly Clear | Sunny |
| High: 46 °F | Low: 36 °F | High: 53 °F | Low: 47 °F | High: 55 °F | Low: 29 °F | High: 40 °F | Low: 27 °F | High: 43 °F |

# Sometimes the forecast models can be wrong!



# What controls the daily weather?

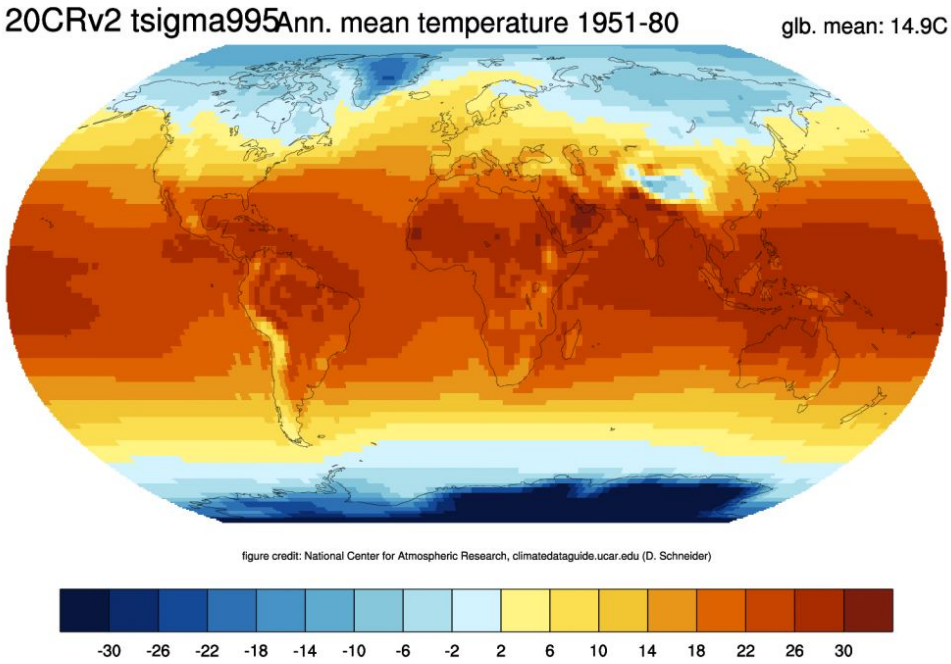
- Temperature
- Wind direction / speed
- Precipitation



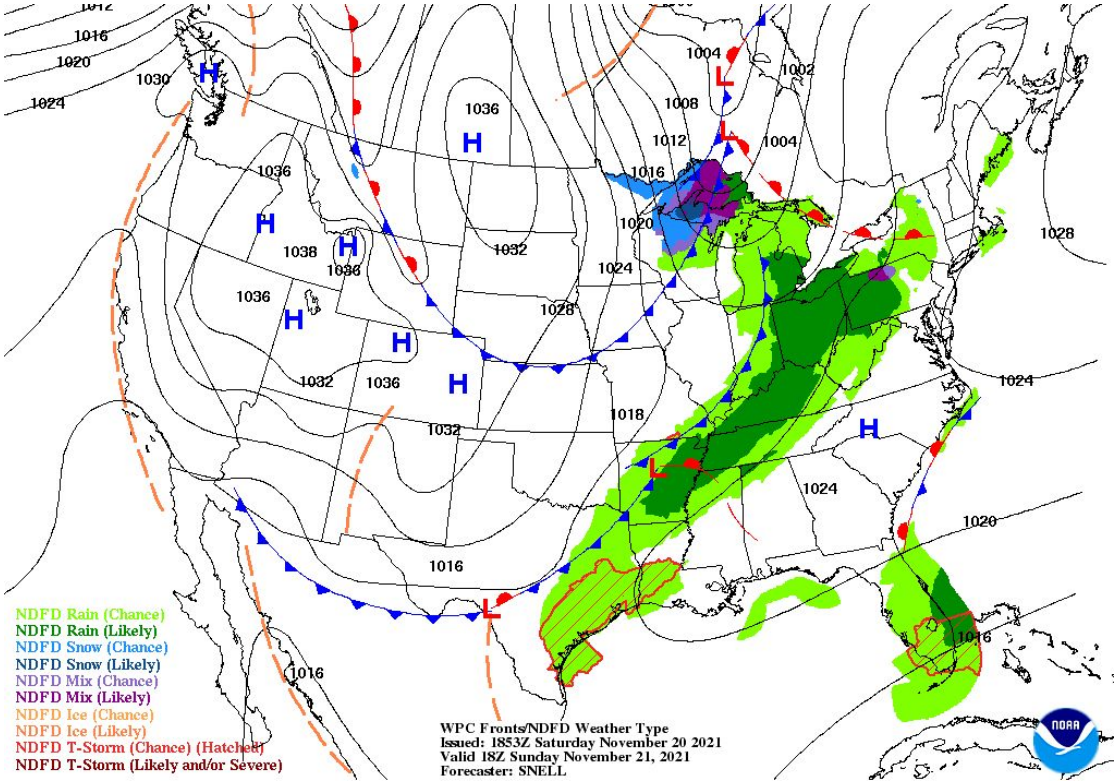
# What controls the daily weather?

- Temperature
- Wind direction / speed
- Precipitation

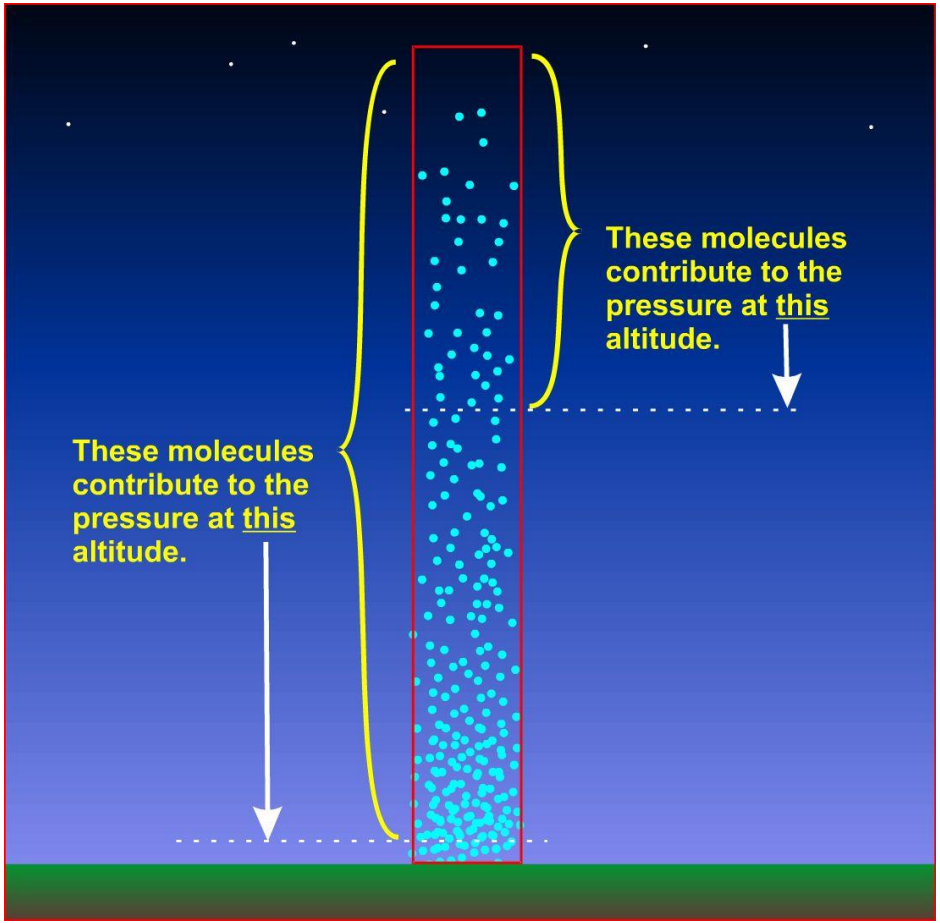
Basic physics can explain most of these patterns!



# Surface map for 11/21



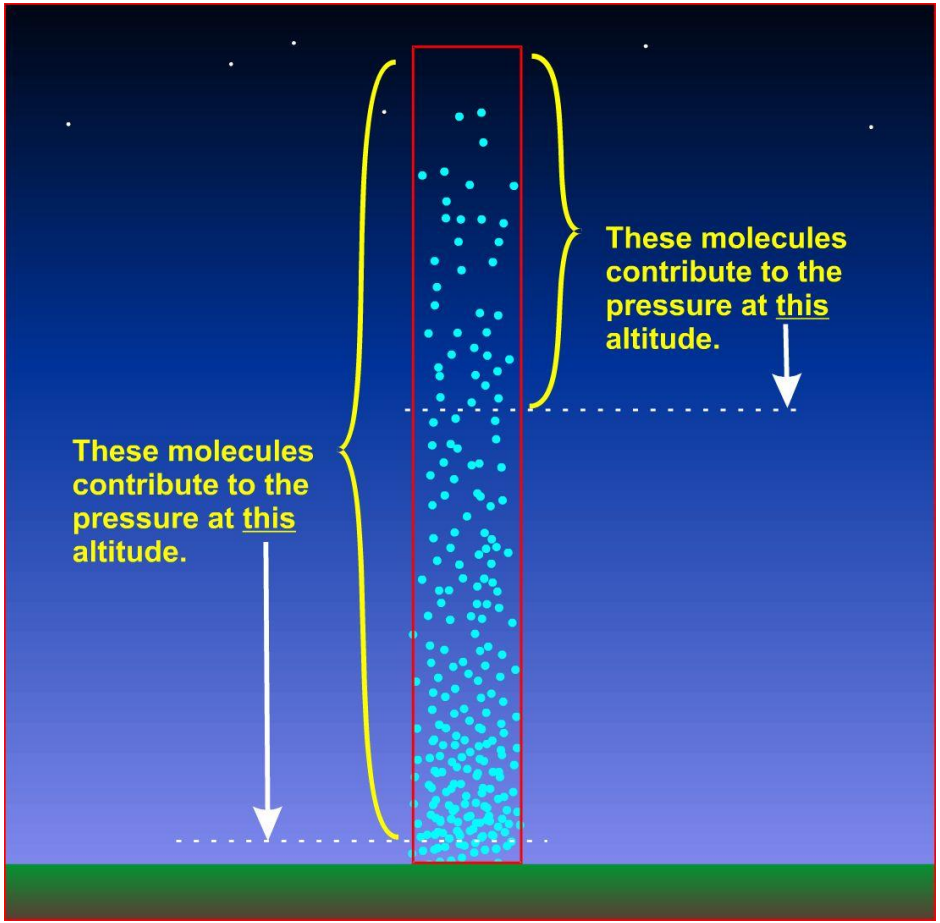
# What is atmospheric pressure?



# What is atmospheric pressure?

Pressure exerted by the weight of air in the atmosphere

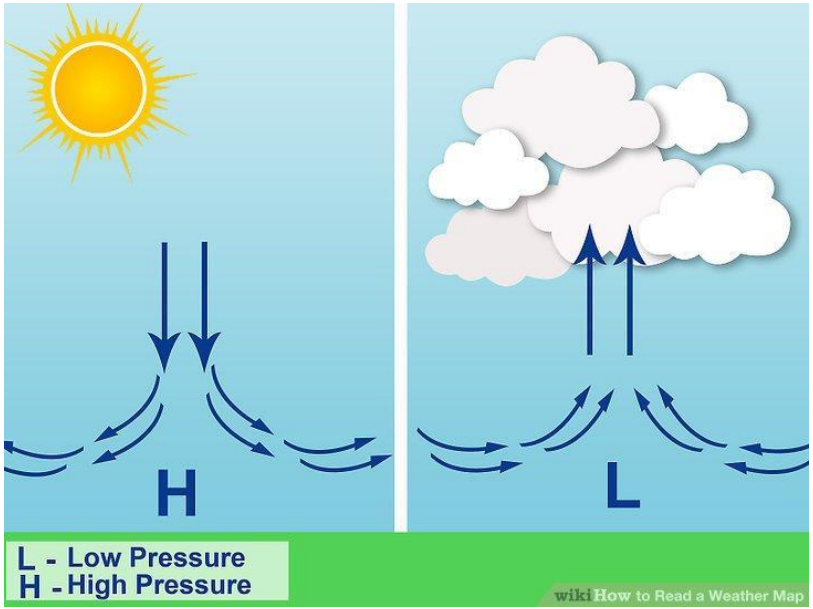
Depends on elevation (height above sea level) and temperature



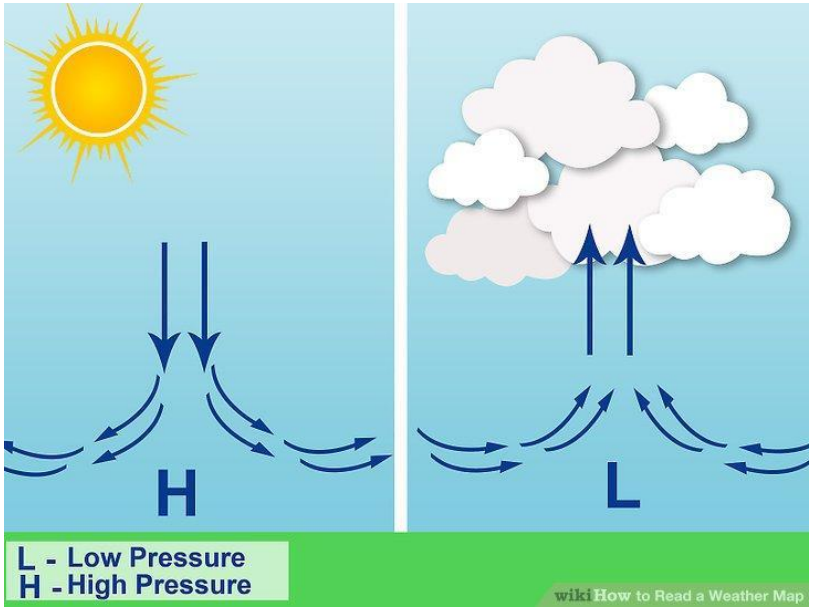
# Pressure and Temperature

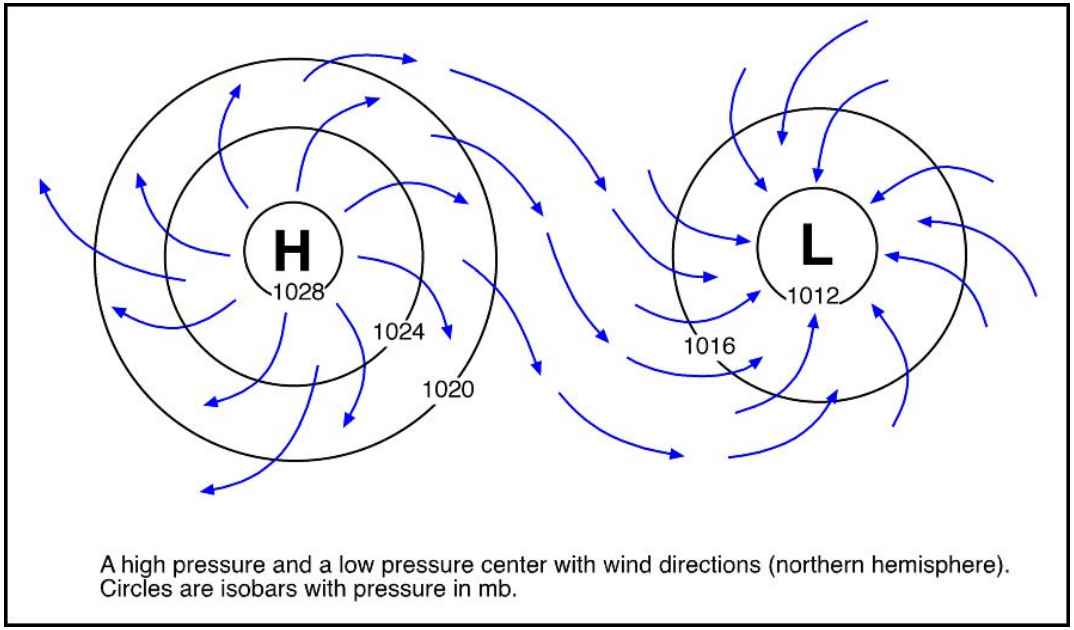
- PV = nRT
- As temperature increases, so does pressure

# High/Low pressure systems



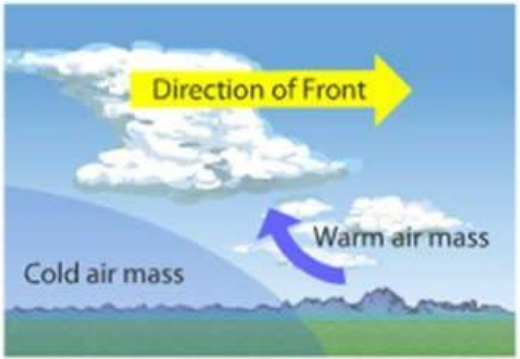
# High/Low pressure systems



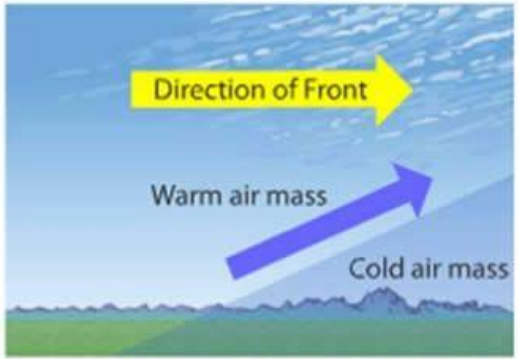




A high pressure and a low pressure center with wind directions (northern hemisphere). Circles are isobars with pressure in mb.

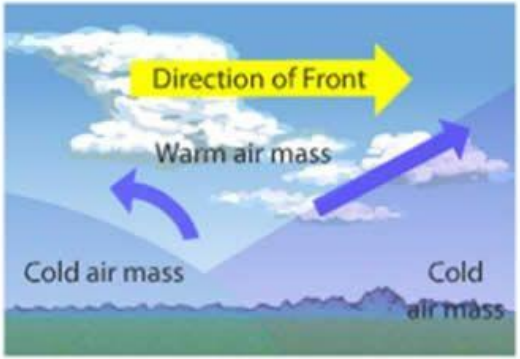
# Fronts



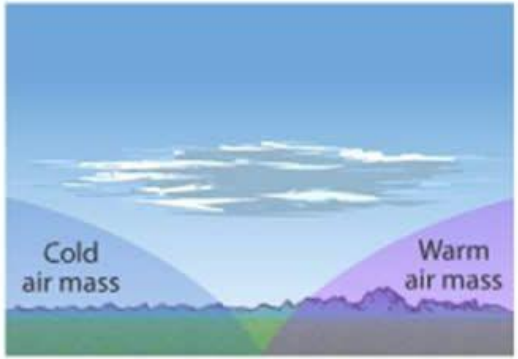

Cold front



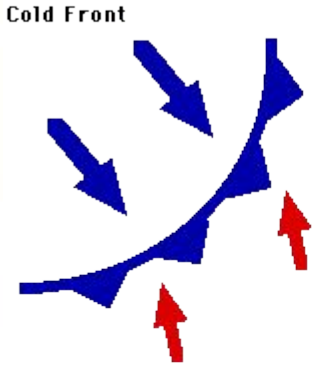

Warm front

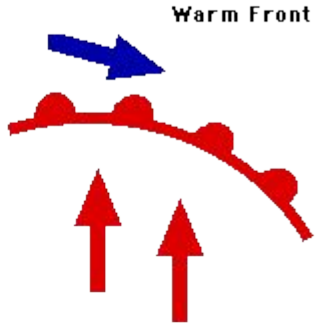


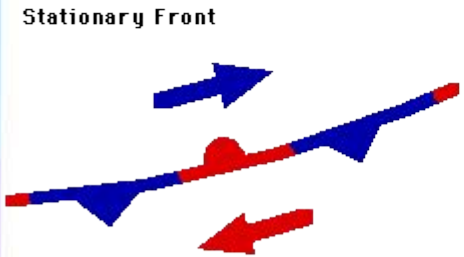

Occluded front

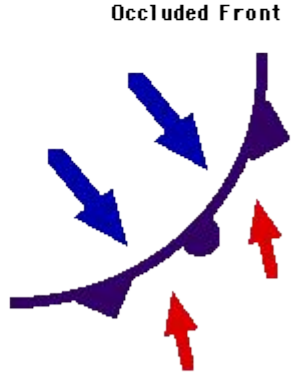



Stationary front

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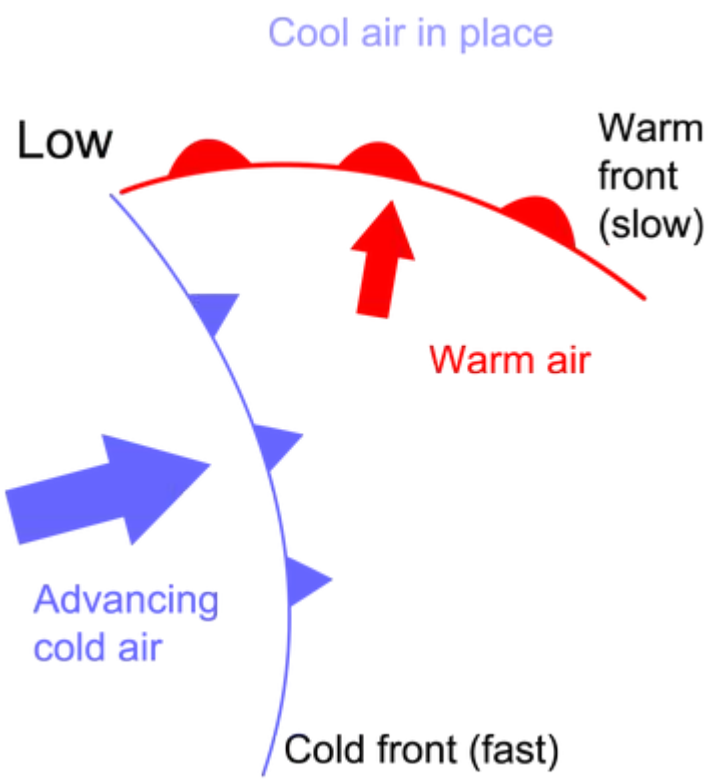
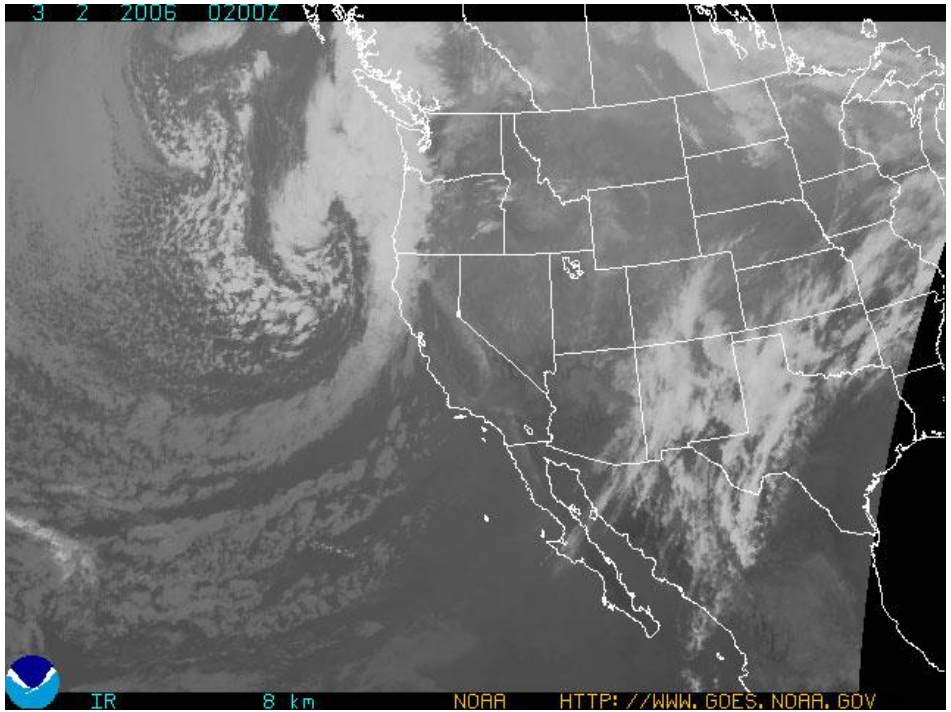
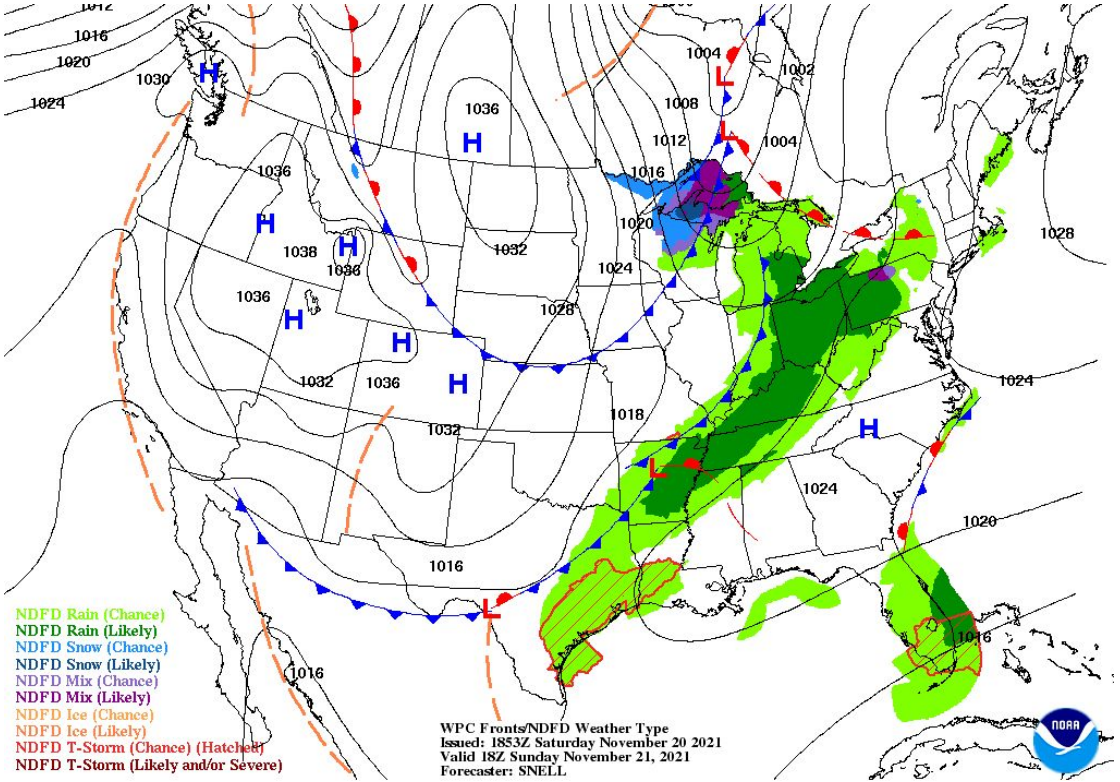
# Classic mid-latitude weather systems



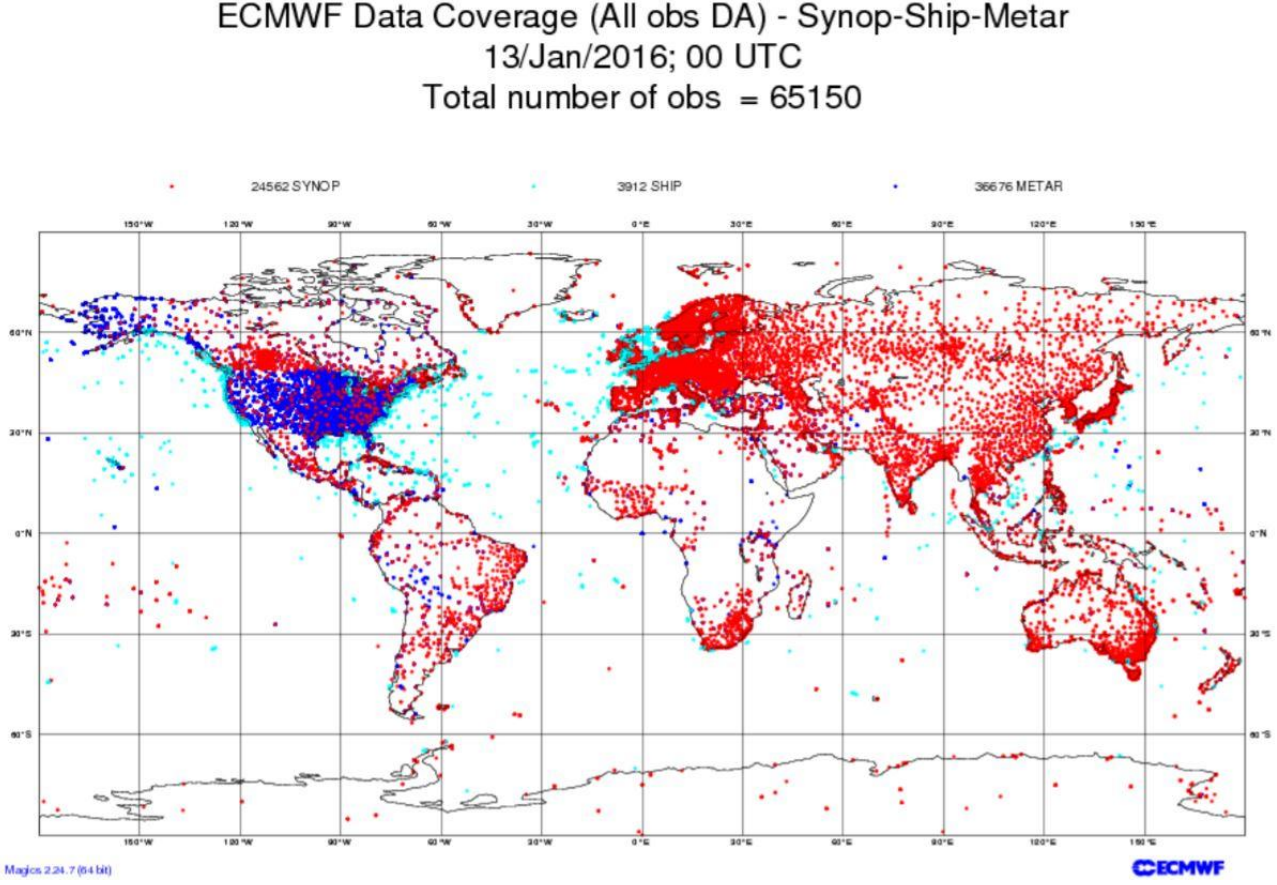
# Surface map for 11/21



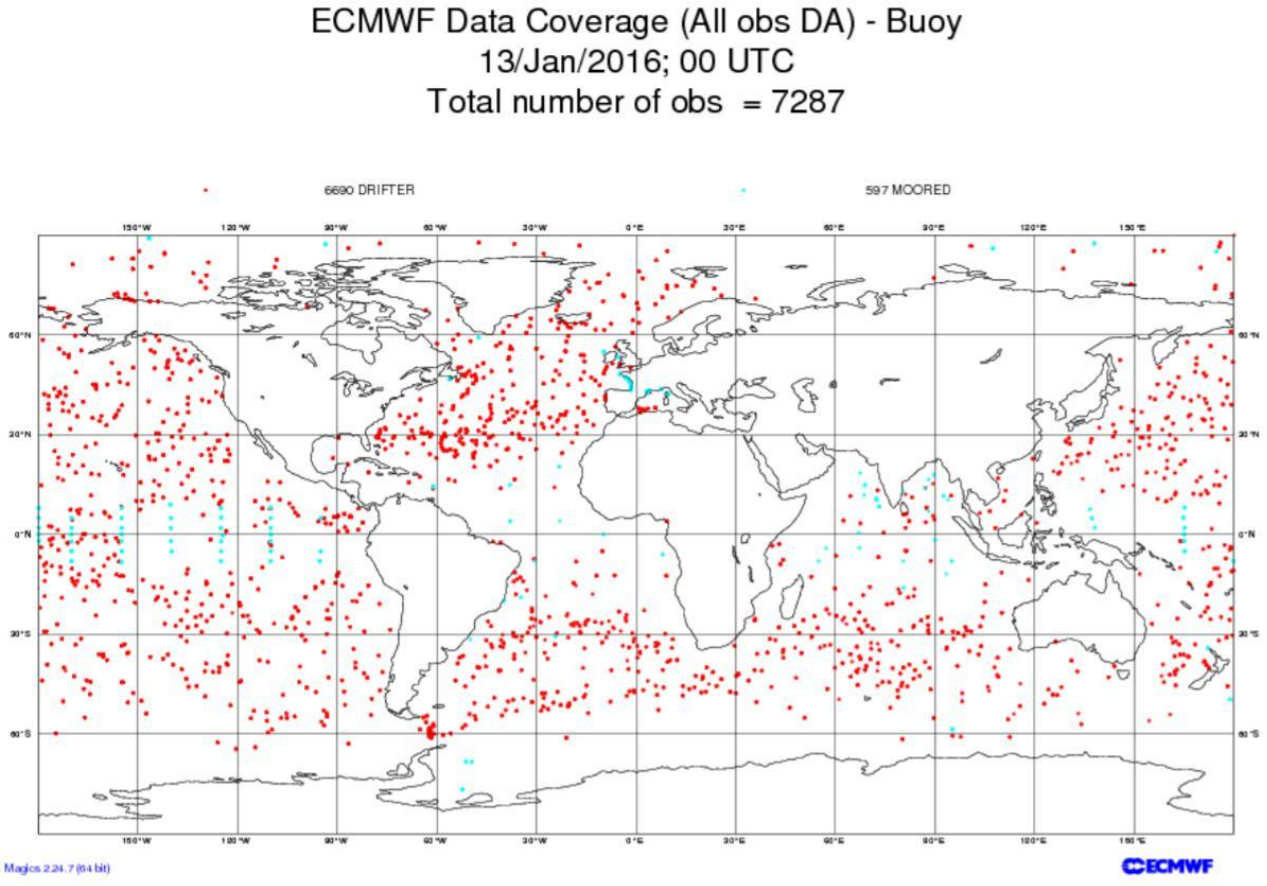
# Predicting the Weather

ILOXI, MS

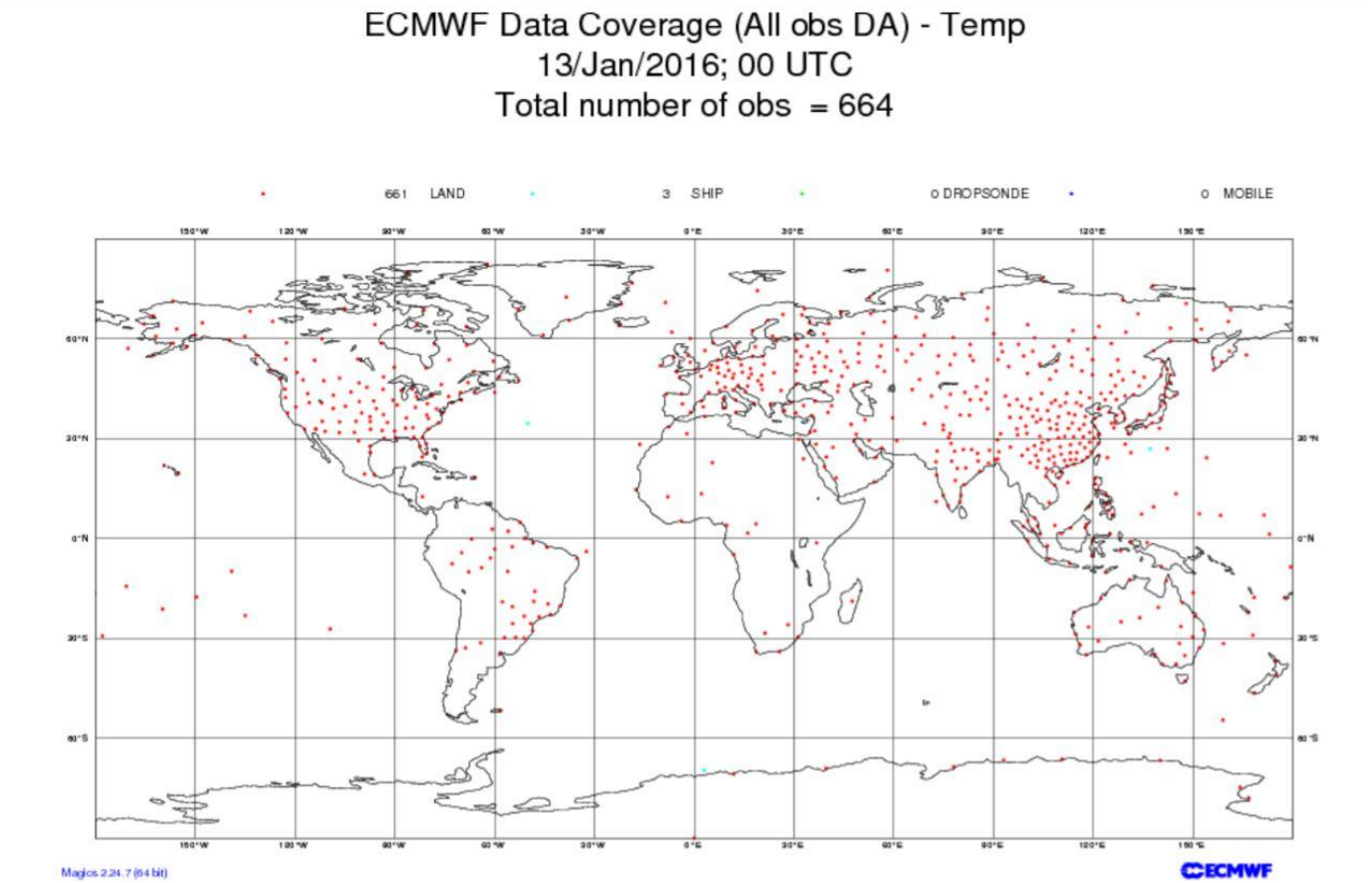
# Surface observations



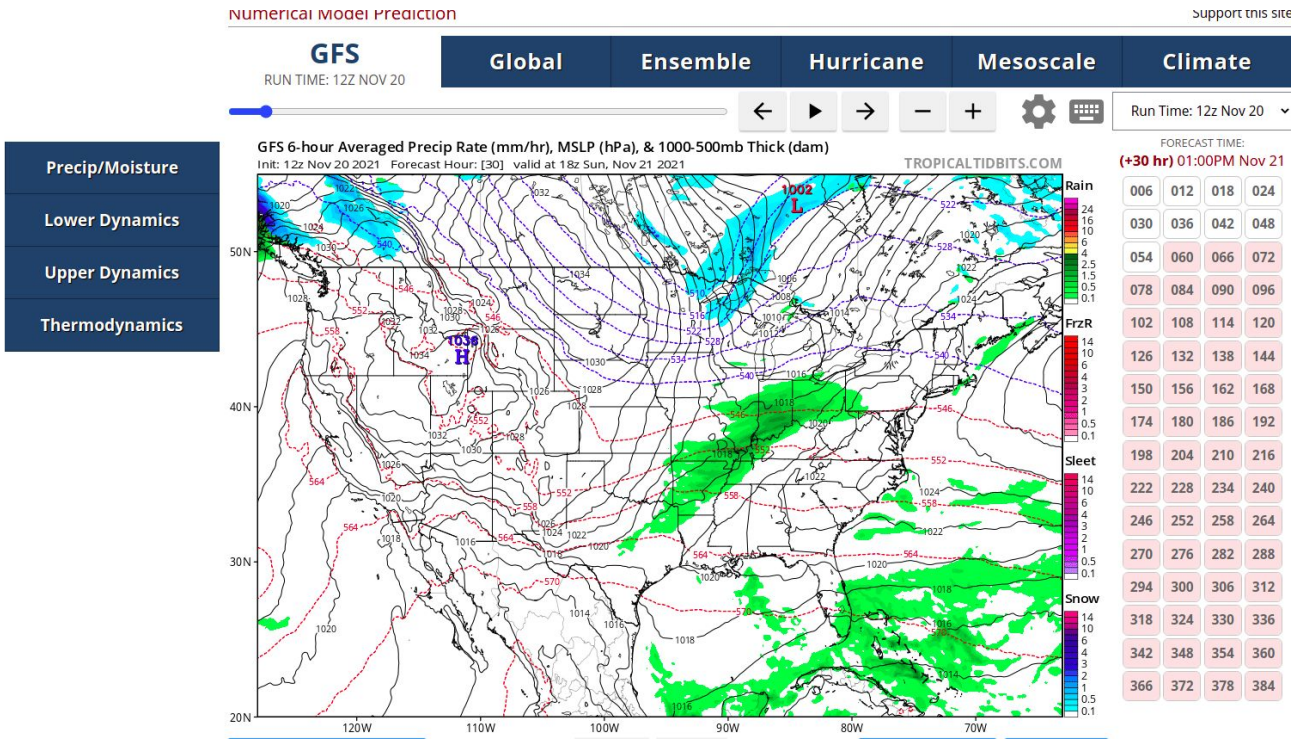
# Ocean Buoys: measure pressure



# Weather balloons at airports: vertical measurements



# Observations are inputted into weather forecast models



# Forecasting the weather

Basic steps:

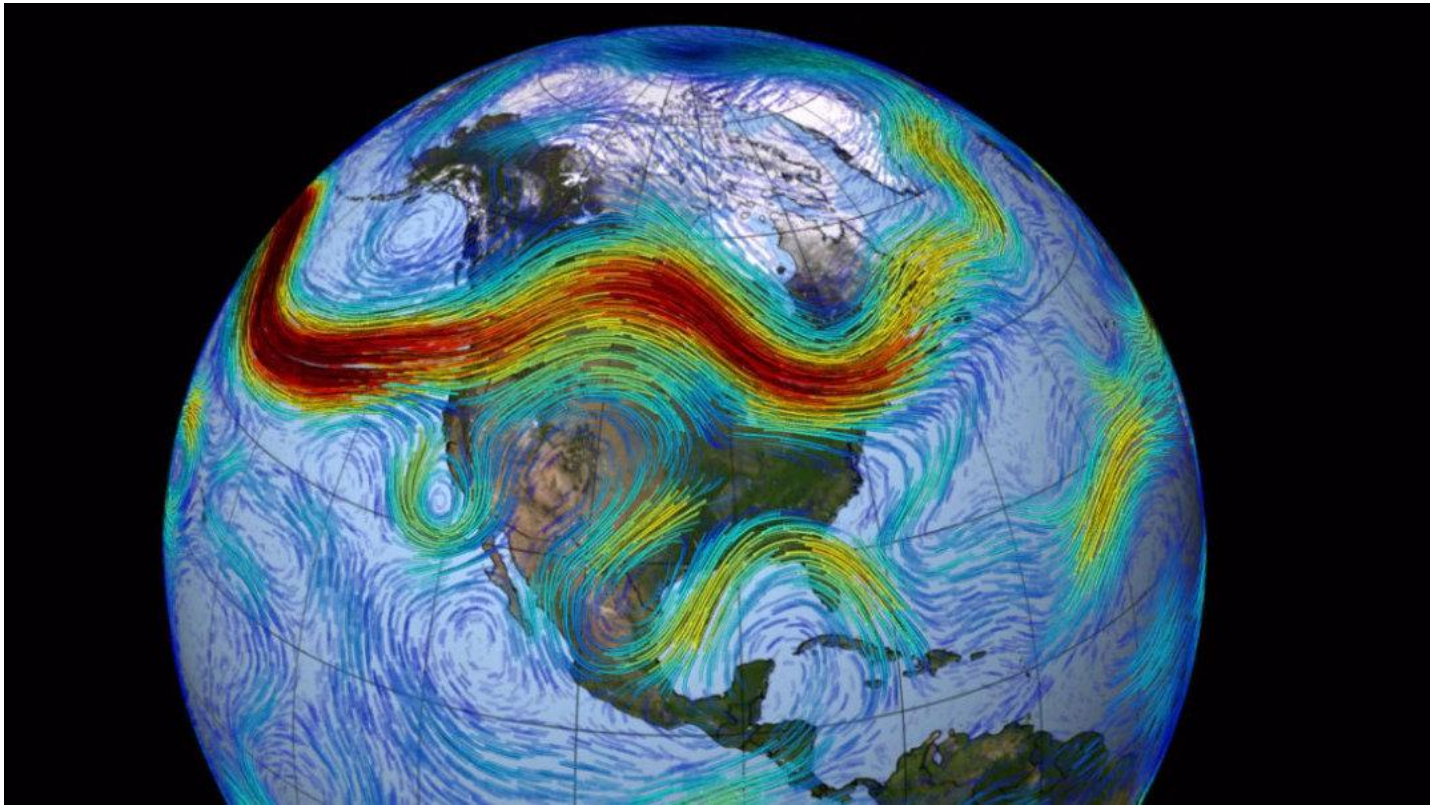
1. Look at current weather, satellites
2. Climatology – what it the weather usually like at this time in past years?
3. Look at weather models to see what math and physics think the weather will be like
    a. what model biases exist in your area?
    b. butterfly effect

# Websites for forecasting

1. Current weather
   a. https://www.wrh.noaa.gov/mesowest/getobext.php?wfo=sto&sid=KBOS&num=72 (3-day history)
   b. https://www.star.nesdis.noaa.gov/GOES/conus_band.php?sat=G16&band=13&length=36 (satellite)
   c. https://radar.weather.gov/ (radar)
   d. https://www.wpc.ncep.noaa.gov/basicwx/basicwx_ndfd.php (surface maps)

2. Climatology
   a. https://www.weather.gov/pqr/cliplot (current year compared to “normal”)
   b. https://www.wunderground.com/history/daily/KBOS/date/2021-3-25 (observations from any previous day)

3. Climate models
   a. https://www.tropicaltidbits.com/analysis/models/ (in map form)
   b. https://www.pivotalweather.com/model.php (in map form)
   c. https://meteor.geol.iastate.edu/~ckarsten/bufkit/image_loader.phtml? (time series)

4. National weather service
https://forecast.weather.gov/MapClick.php?x=184&y=121&site=box&zmx=&zmy=&map_x=184&map_y=121#.YZlMZ5HMJH4

# Bonus pretty website! https://earth.nullschool.net/