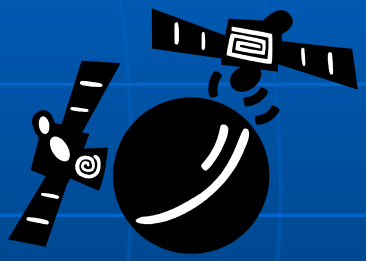
Where Exactly Are We?



Brandy VanDeWalle

University of Nebraska Lincoln EXTENSION

Where are we headed?

- Latitude & Longitude
- GPS
- Your turn
- Ag uses

‘X’ Marks the Spot

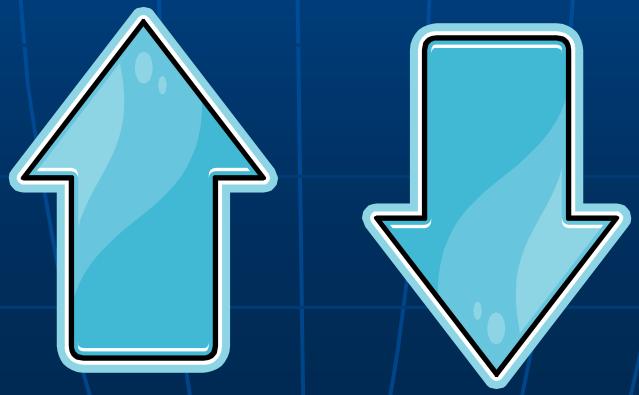
- Two volunteers…
  - One, describe where the X is on the balloon to the other.
  - Draw an X when confident they know the location of X.
  - Do they match?
  - What would be some ways that would have helped get the X Closer?

‘X’ Marks the Spot

- Label the balloon N (North Pole) & S (South Pole) N where balloon is tied
- Draw Equator (latitude)
- Draw Prime Meridian (longitude)
- Draw 0 at Equator, 30 N, 30 S, 60 N, 60 S, 90 N at N Pole, 90 S at S Pole.

Longitude

- "Long way from North to South Pole"
- The angular distance, in degrees, minutes, and seconds, of a point east or west of the **Prime Meridian**.



Latitude

- "Like steps in a ladder between Equator and poles"
- The angular distance, in degrees, minutes, and seconds of a point north or south of the **Equator**. Lines of latitude are often referred to as parallels
- Tropic of Cancer (N) & Tropic of Capricorn (S)

Imaginary Lines…

23.5 N

23.5 S

Tropic of Cancer

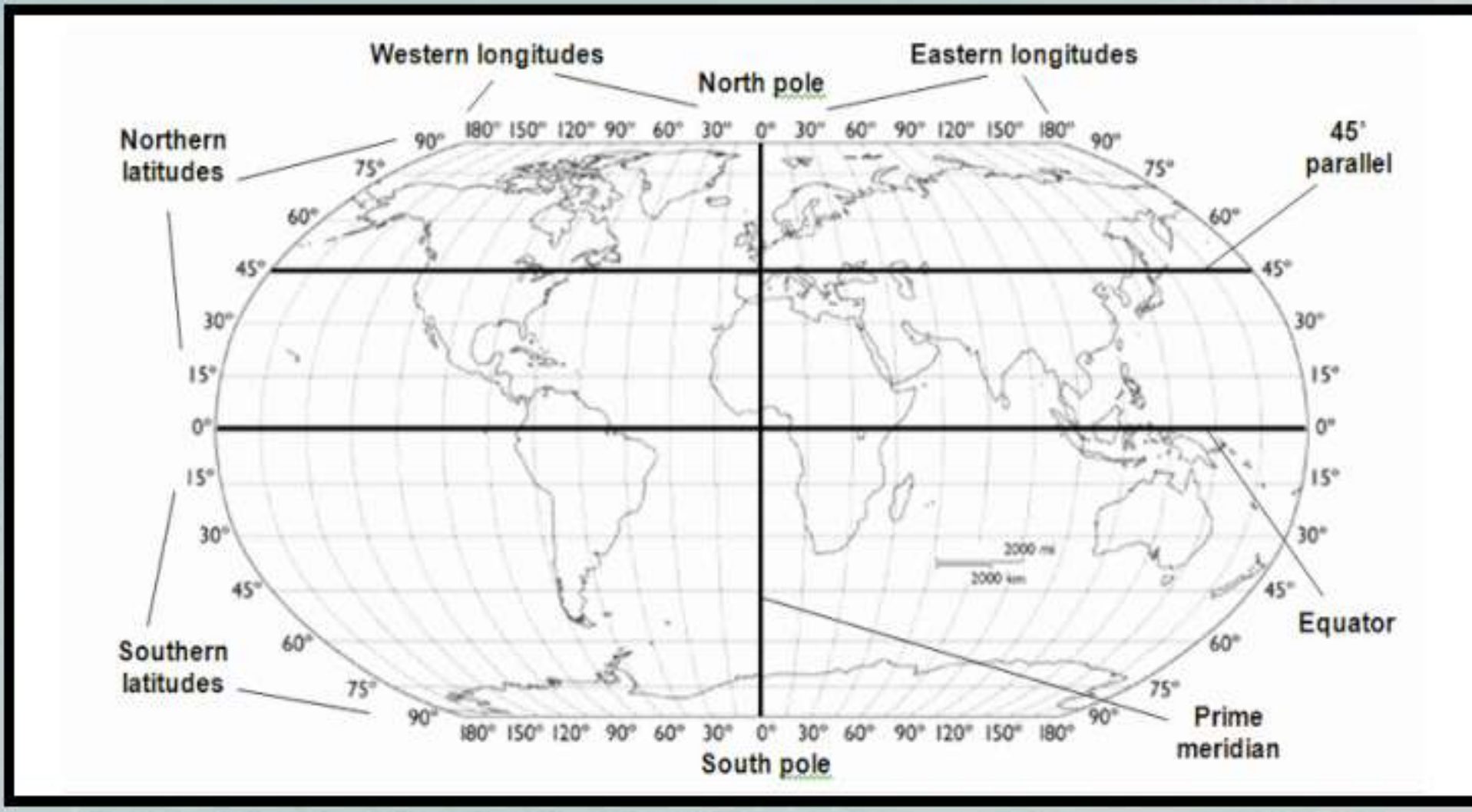
Equator

Tropic of Capricorn

Prime Meridian

Latitude and Longitude

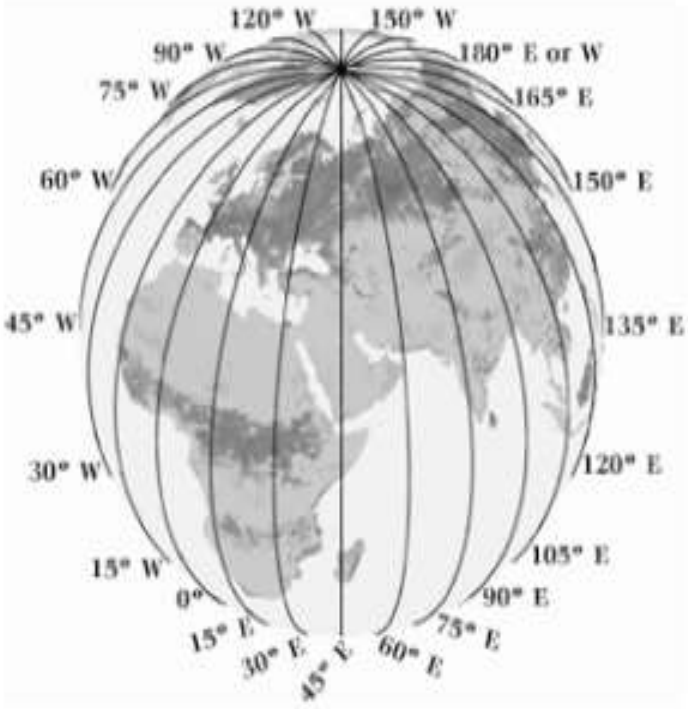
As shown in the figure below, geographic **latitude** represents global location in North/South direction while **longitude** indicates position with respect to East/West.

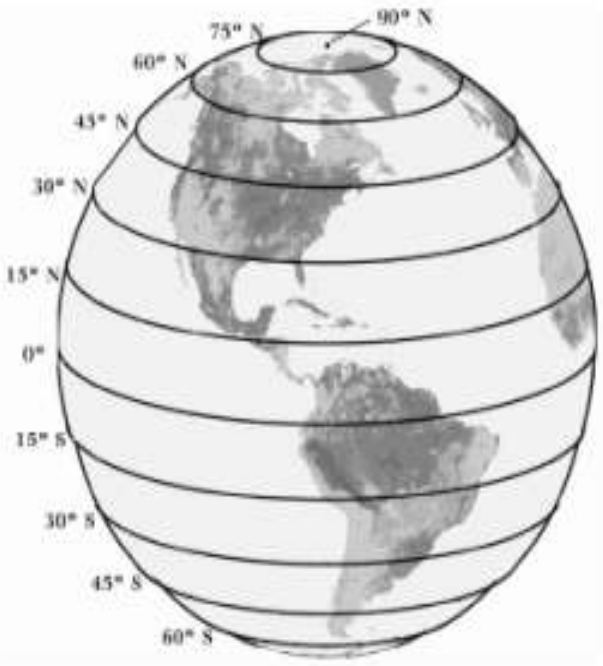


Meridians and Parallels

An imaginary line that has the same longitude is called a meridian. The Prime Meridian has zero longitude. All meridians merge in two points called **poles**. The meridian opposite the Prime Meridian has 180˚ longitude.

An imaginary line that has the same latitude is called a **parallel**. The Equator is the longest parallel, and it has zero latitude. The North and South poles are the shortest parallels with 90˚ latitude and are actually just two points.





Source: University of Texas Institute for Geophysics

Degrees, Minutes and Seconds

As with any angle, these geographic coordinates can be expressed in degrees (°). One degree consists of 60 minutes (′), and one minute consists of 60 seconds (″).

Some examples:

N 40°48′27.34″ W 96°40′22.24″
N 51°03′18.54″ W 114°03′44.78″
N 33°53′19.06″ E 35°29′43.72″
S 31°57′19.44″ E 115°51′30.92″
S 23°32′56.19″ W 46°38′19.75″
S 4°19′15.01″ E 15°17′55.18″

With parallels 69 miles apart, one minute equals 1.15 miles (69 ÷ 60 = 1.15) and one second equals 0.01967 miles or 101.19 feet (1.15 ÷ 60 = 0.01967 • 5280 = 101.19).

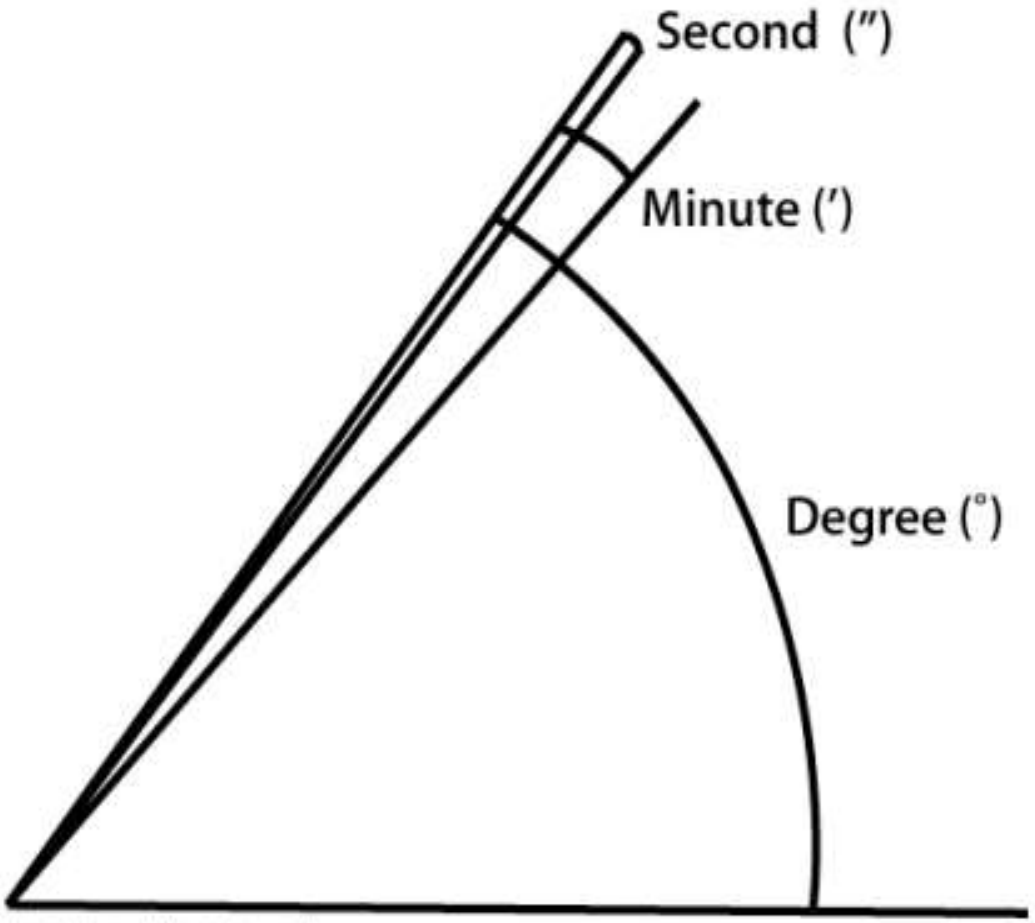
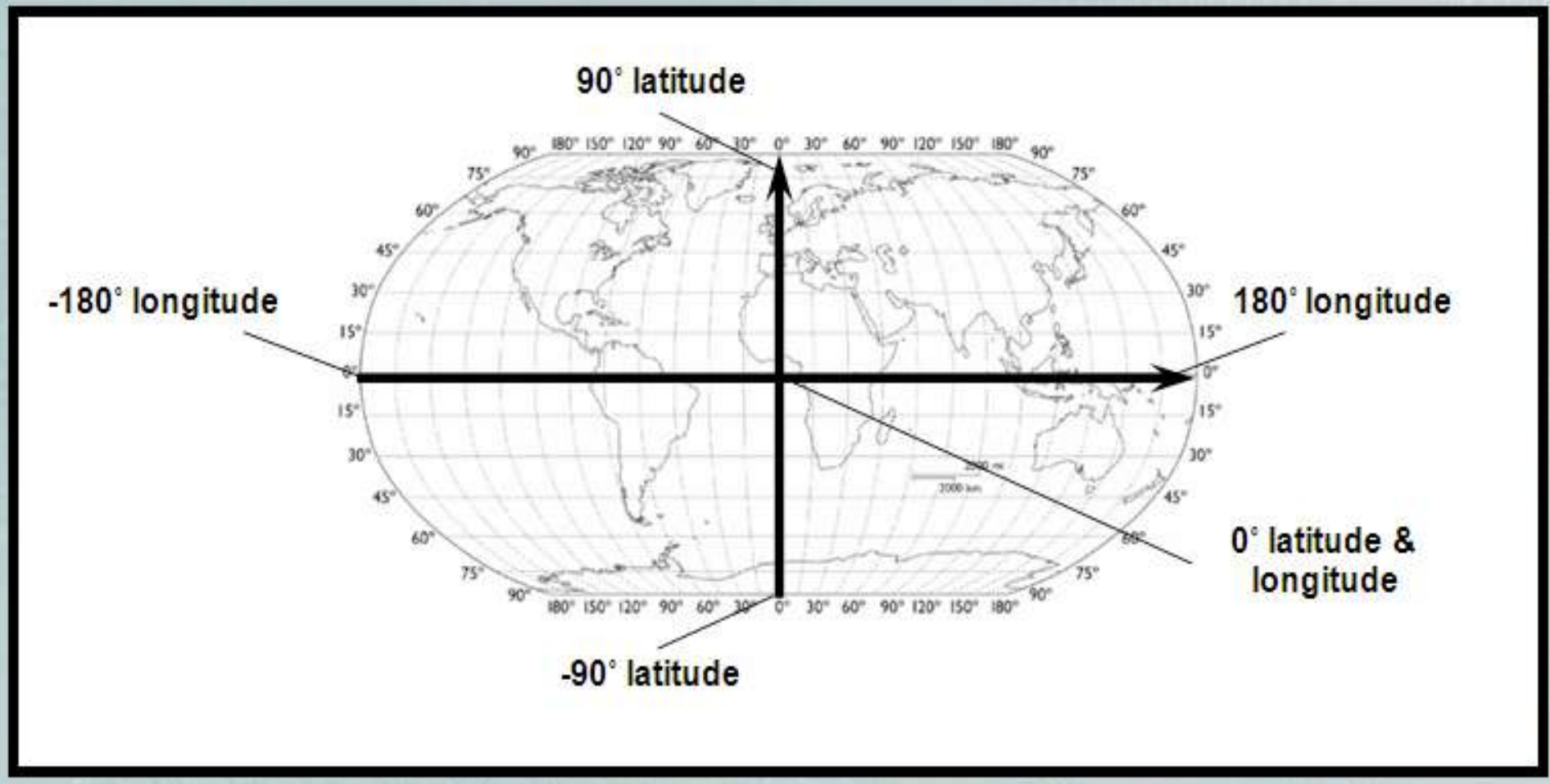


Image is not drawn to scale.

Source: University of Nebraska Board of Regents

Positive and Negative Spaces

To make it easier dealing with geographic coordinates when creating maps, it is assumed that western longitudes and southern latitudes have negative values. Therefore, while in Nebraska or other continental states of the US, latitude should be positive and longitude negative.



Application…

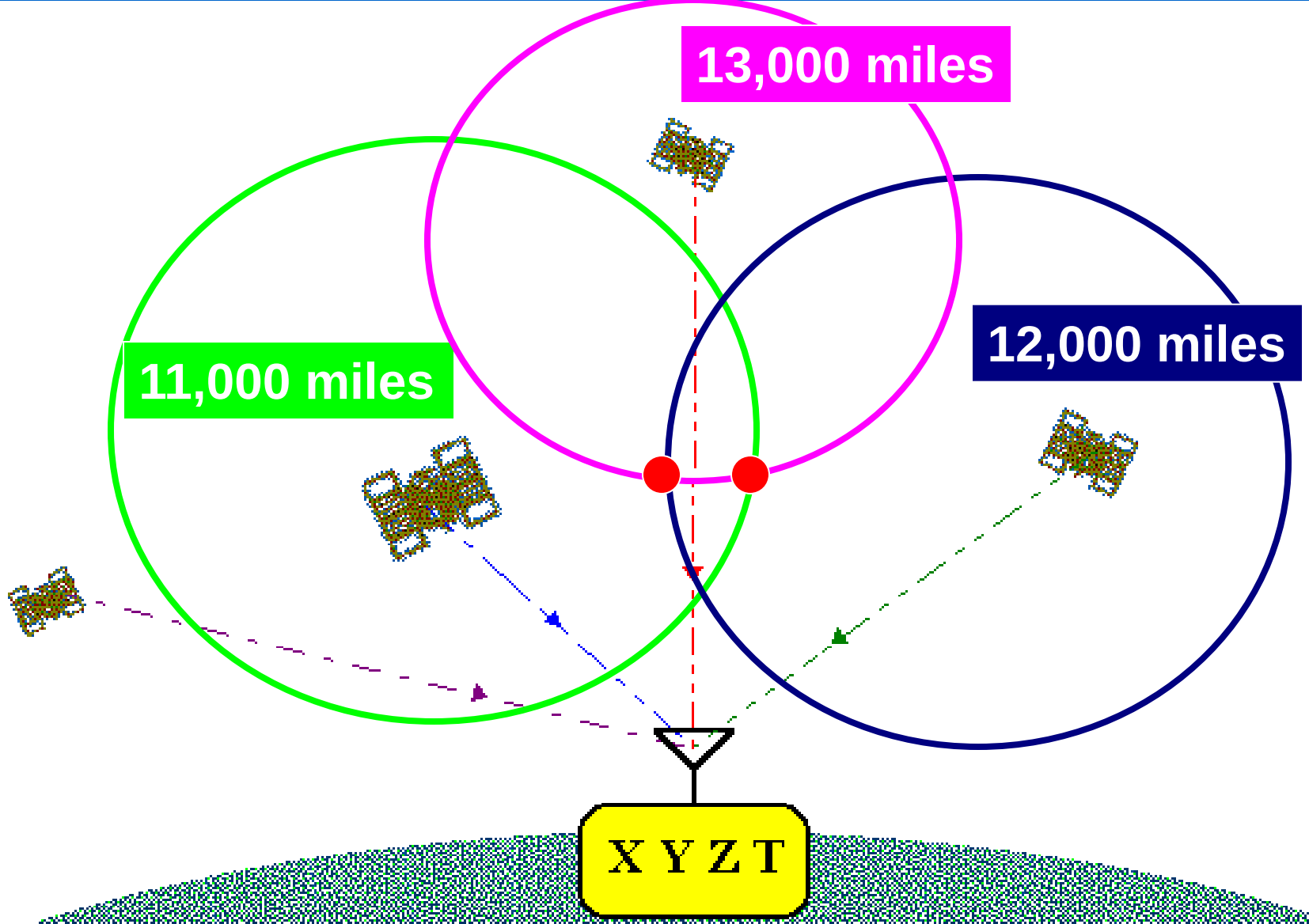
- Locate the approximate location of these continents, countries or cities on the balloon..
  - Australia – South 25, East 135
  - South America – South 0 West 60
  - China – North 30 East 30
  - Ames, IA - North 42 West 93

Where are you going or have gone for vacation?

What is GPS?

- Global Positioning System
  - It is a system of satellites that work with a GPS receiver to determine your location on the earth
- Waypoint
  - Named for coordinates representing points on the surface of the earth

- 24 Satellites Total
  - 22 are active and 2 & reserve
- Need 4 satellites to find a position on Earth



The Global Positioning System

Measurements of code-phase arrival times from at least four satellites are used to estimate four quantities: position in three dimensions (X, Y, Z) and GPS time (T).

What is GPS?

- Cache (Geocaching)
  - A hidden container filled with a log book & pencil, & prize
  - Types of Caches
    - Virtual Cache-historical markers & info plaques
    - Earthcaches – geologically interesting spots
    - Puzzle caches – crack the code to continue
    - Multi-cache – problem solving involved

- Over 35 geocaches within 50 miles of Geneva!

What is GPS?

- Applications:
  - Scientists, sportsmen, farmers, soldiers, pilots, surveyors, hikers, delivery drivers, sailors, dispatchers, lumberjacks, fire-fighters, etc. etc. etc.

Your turn..

- eTrex GPS Receivers
  - Power button
  - Page button
  - Up button
  - Down button
  - Enter
  - LCD Display

eTrex Description

Your turn…

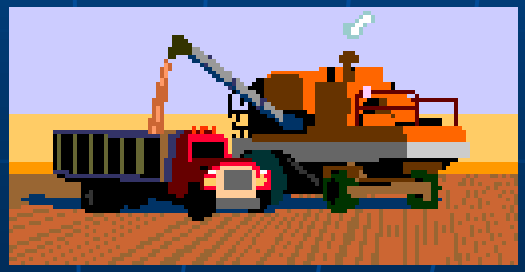
- With a partner, make a waypoint, switch to see if you can find the spot
  - Make a waypoint
  - Locate a waypoint
  - Make tracks

GPS in Agriculture

- Precision Agriculture
  - sometimes called site-specific farming, allows a farmer to identify variability within a field and manage that variability to increase crop production & profits
  - merging of computers, GPS, GIS (geographic information systems), variable rate controllers (or VRT), in-field & remote sensing, & telecommunications

GPS in Agriculture

- Applications?
- Benefits?
- Drawbacks?



Review & Wrap-Up

- What did you find interesting about the GPS unit?
- How could GPS be used in your daily life?
- What could GPS be used for in today's world?
  - Measuring glacier speeds, keeping track of animal populations, boating, biking, hiking, airplanes, agriculture, tracking stolen vehicles, locating a cell phone of someone who is lost or injured, surveying land, guiding the blind, anything that uses positioning, time or navigation anywhere on Earth and in any type of weather.

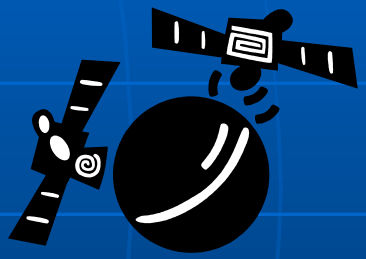
Review & Wrap-Up

- What is geocaching?
- What is precision agriculture?
  - Examples of how GPS is used in agriculture

Where we went…

- Latitude & Longitude
- GPS
- You do the navigating
- Impact on Agriculture

Where Exactly Are We?



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