

### Lab 1: The Geographic Grid

- Cartographers have devised a grid system to cover the entire earth
- The earth is spherical, therefore the grid must be able to follow a curved path (not rectilinear)
- Maps are flat representations of the spherical earth, therefore they are always skewed in some way
- Parallels of Latitude: run East-West, vary in length – longer at Equator, narrower at poles
- Meridians of Longitude: run North-South, same length, pass through both poles
- We use coordinate pairs (coordinates) to locate places, measured in degrees (ex. 43°30'N, 10°E)
- Know: Equator, Prime Meridian, International Date Line, North and South Poles
- Calculate distances in angular degrees (N-S and E-W)
  - Convert angular degrees into miles and kilometers

### Lab 2: Temperature

- Weather vs. climate
- Understanding weather data
- Extreme/record data in order to better understand limits of weather for a place
- Structure of the atmosphere (temperature)
  - Troposphere, Stratosphere (ozone+UV), Mesosphere and Thermosphere
- Environmental Lapse Rate

### Lab 3 prep: Earth-Sun Relationships

- The earth's orbit around the sun is elliptical (perihelion & aphelion)
- The earth is tilted 23.5° off the orbital plane
- The tilt is always pointed in the same direction resulting in:
  - Different heating/cooling patterns (seasons) because of different sun angles & lengths of day
- Arctic and Antarctic Circles (degrees & importance)
- Tropic of Cancer and Tropic of Capricorn (degrees & importance)
- Winter and summer solstices (dates & sun location)
- Spring and fall equinoxes (dates & sun location)

### Lab 3a: Hypothesis development and testing procedures

- Hypothesis development
- Developing a testing procedure for a hypothesis

### Lab 3b: Sun Angle, Surface Area of Radiation (SAR) and Beam Intensity (BI%) Calculations

- The sun angle (or altitude angle) is the angular distance from the ground to the sun
- The zenith angle is the angular distance from the sun to a point exactly overhead (90°)
- These are complementary angles (add up to 90°)
- You can determine the sun angle by knowing the observation latitude and the latitude of 90° sun
- DIST = Zenith Angle!!
- Salem gets higher sun angles in the summer, lower in the winter
- The sun is always 90° between the: Tropic of Cancer (23.5°N) & Tropic of Capricorn (23.5°S)
- SAR = 1 / sin (sun angle)
- BI% = sin (sun angle) ← written as a percentage!

### GPS Lab

- Know what a GPS is and what it stands for (global positioning system)
- Understand how it “knows” where it is... hint... think satellites and TRILATERATION
- Consider some of the ways in which a GPS can be useful
- Be able to describe how the latitude and longitude values changed (around campus)

You will be allowed **one sheet of 8.5” x 11” paper with any notes you choose to write on it. You may write on one side only.** Only the four basic math functions (addition, subtraction, multiplication and division) will be required. **You should bring a calculator – cell phones may not be used.** You may choose which questions to answer (4 of 6 for example) and you should expect problem sets of a similar type as we have done in these labs with short essay questions to examine the concepts.