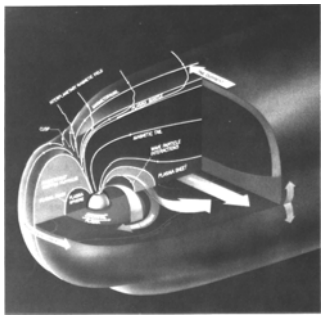
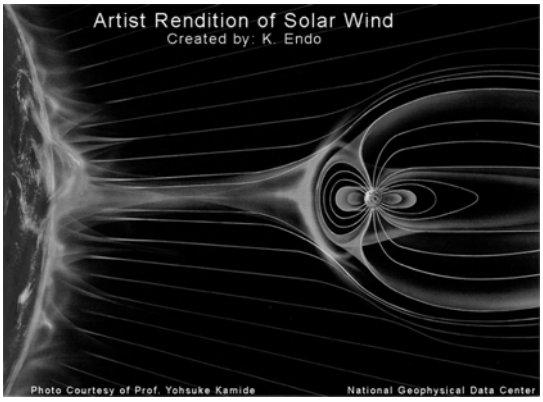
{04} The Compass

Map Interpretation & GPS
Spring 2010
M. Pesses

Direction

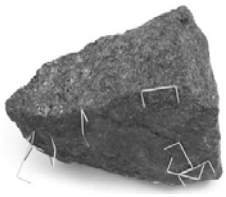
The Magnetosphere





Lodestone

Naturally occurring ore
- Not only magnetic, but can magnetize iron
- Exhibits polarity



Lodestone

- A.D. 1157, English monk recorded magnetizing a needle for navigation
- Chinese records of navigational use around same time

The Compass

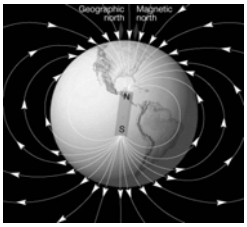
- One of the most important inventions ever

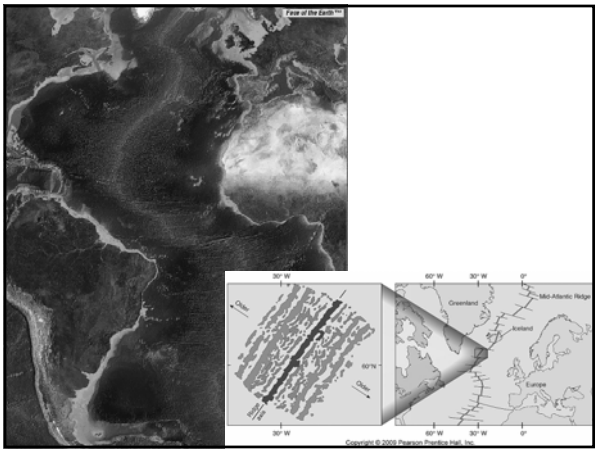
The Compass

- Even good compasses never consistently pointed north

The Magnetic Poles

- Magnetic field exhibits polarity
- **Geomagnetic reversal**
  - 9 times in Earth's history





Isn't North North?

Three types of north

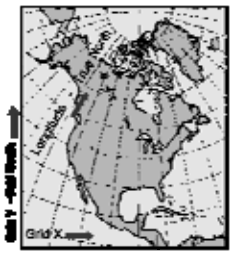
1. **True north**
2. **Grid north**
3. **Magnetic north**

True North

- Also called "**geographic north**"
  - The north of **Polaris**, follows lines of longitude
- A **gyrocompass** points to true north

Grid North

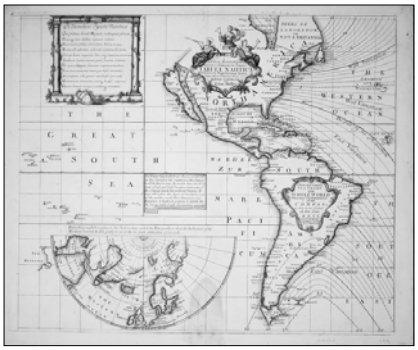
- Follows direction of a coordinate system's grid lines
  - UTM, State Plane, etc.

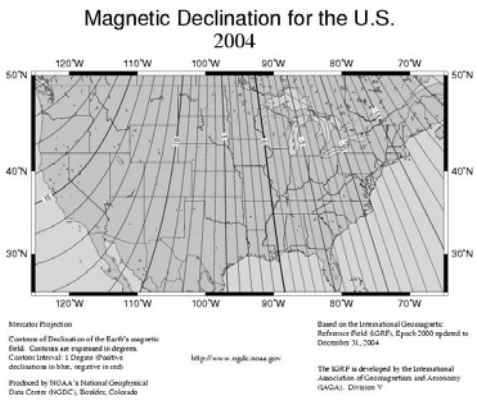


Magnetic North

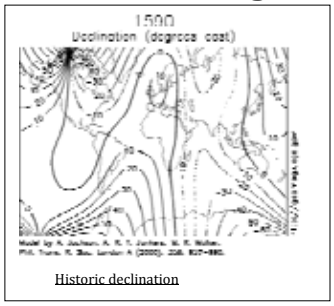
- Magnetic poles not aligned with geographic poles
  - Magnetic North = 83° N, 114° W
  - *This means a magnetic compass will not point to true north!*
  - **magnetic declination**

Declination



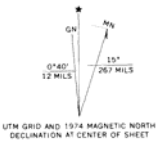


Historic Changes



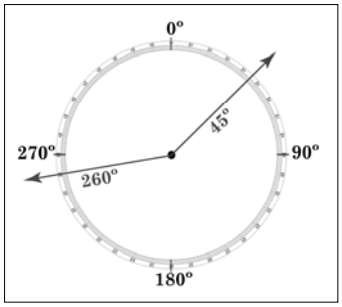
Historic declination

Declinated Compasses

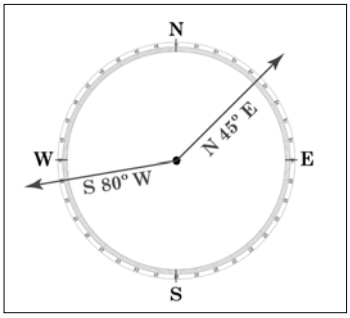


UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

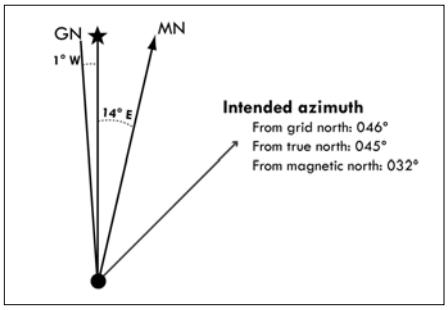
Azimuth



Bearing



Azimuth



Compass Deviation

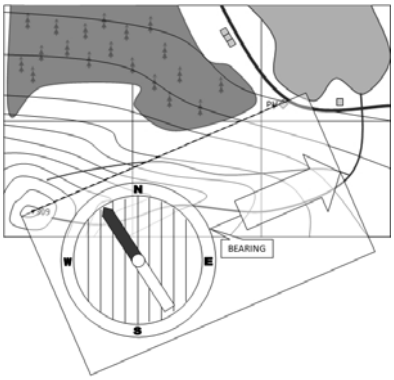
‡ Yet another factor with magnetic compasses

- Magnets are drawn to iron, so nearby metal can ruin an azimuth reading.
- *Be aware of your surroundings!*

Navigation

- Direction
- Distance
- Orienting map

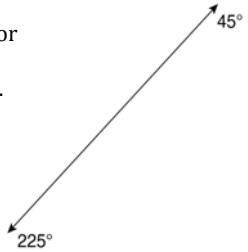
Taking an azimuth



Following an azimuth

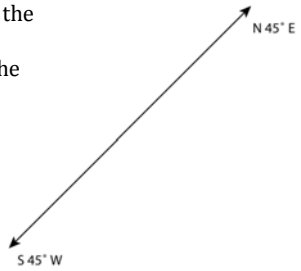
Back-azimuth

‡ To go back, you simply need to add or subtract 180° from your initial azimuth.



Back-bearings

‡ Simply change the two direction references in the initial bearing



Pacing distance

Orienting the Map