



ConfidentCaptain  
oceanpros

# Magnetic Compass

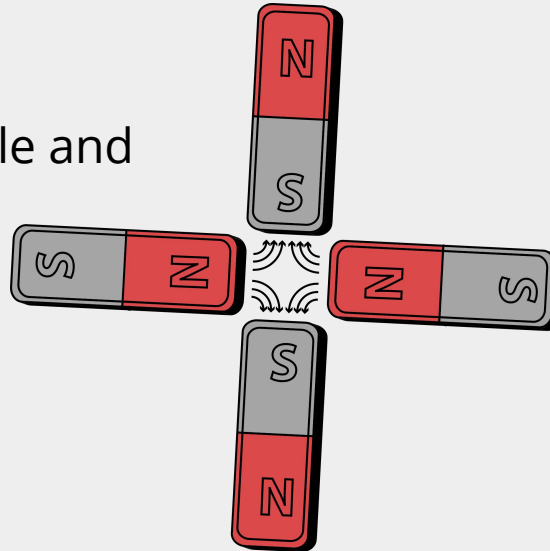




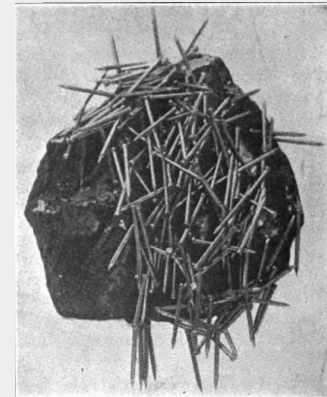
## Magnetism

Law of Magnetism - North Pole and South Pole

- Like poles repel
- Unlike poles attract



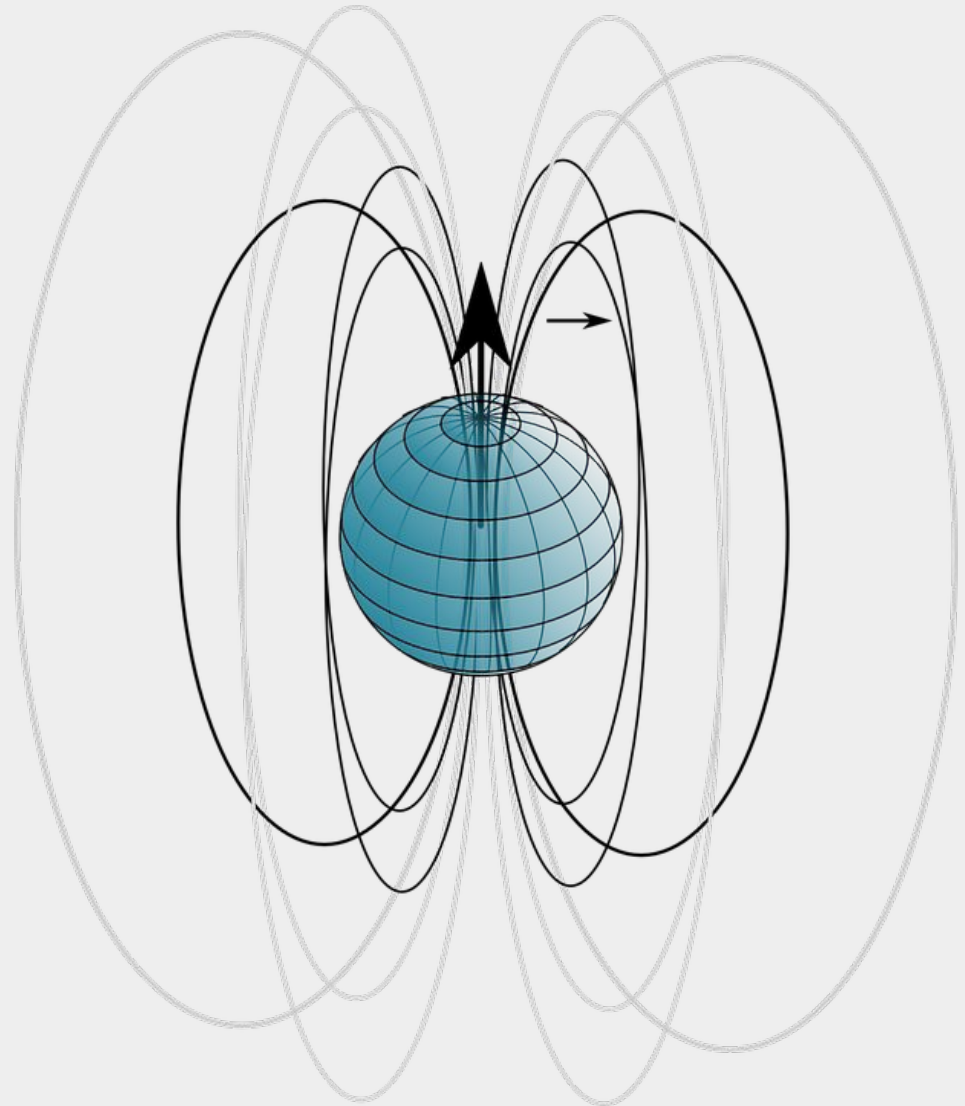
Magnetic Materials =  
lodestone and  
magnetic oxide in iron





## Earth's Magnetism

- ▶ Location of true north and south pole.
- ▶ Magnetic lines of force - magnetic medians.
- ▶ These medians are not great circles.



## Compass Nomenclature

- Magnets
- Compass end
- Compass Bowl
- Fluid - Ethyl alcohol and water; Varsol
- Float
- Expansion Bellows
- Lubber's line - aligned with the ship's fore and aft axis.
- Gimbals - Allows compass to stay horizontal regardless of ship's movement.
- Binnacle





## Compass Limitations

- Magnetic Disturbances
- Unreliable in areas near the poles.  
Reliable only from 0° to 70° N/S.
- Deviation changes as a ship's magnetic properties change and with heading.
- Must be adjusted frequently.
- Does not point to true north.





## Precautions in vicinity of magnetic compass

- ▶ Magnetic Compass must be properly installed and protected from disturbing Magnetic influences.
- ▶ Magnetic influences:
  - metal objects around the compass,
  - electrical motors,
  - and the boat itself





## Standard and steering compasses

- Standard Compasses - Located topside - low levels of deviation.
- Steering Compasses - Located in pilothouse - High levels of deviation.
- Abbreviations:
  - PSC = Per Standard compass
  - PSTGC = Per Steering Compass
  - PGC = Per Gyrocompass





## Magnetic compass error

- Compass error = algebraic sum of deviation and variation
  
- **Variation** is shown on the compass rose of the chart for the particular locality, together with the amount of annual increase or decrease.
  - Variation remains the same for any heading of the ship at a given locality.
  
- **Deviation** is the amount a magnetic compass needle is deflected by magnetic material in the ship around it.
  - Methods of determining deviation.
    - Checking the compass against the gyrocompass.
    - Comparison with a magnetic compass of known deviation.
    - Reciprocal bearings.
    - Ranges.
    - Azimuths of the Sun or other celestial body.
    - Distant Objects.

*CORRECTING COMPASS ERROR:  
How to calculate Variation and  
Deviation will be reviewed in future  
Modules.*