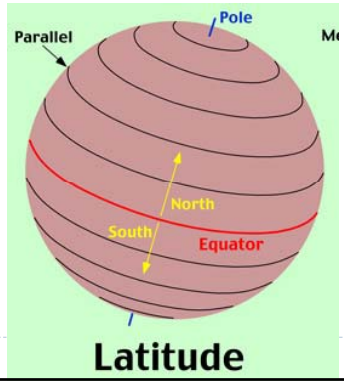
Navigation –
terms & equipment

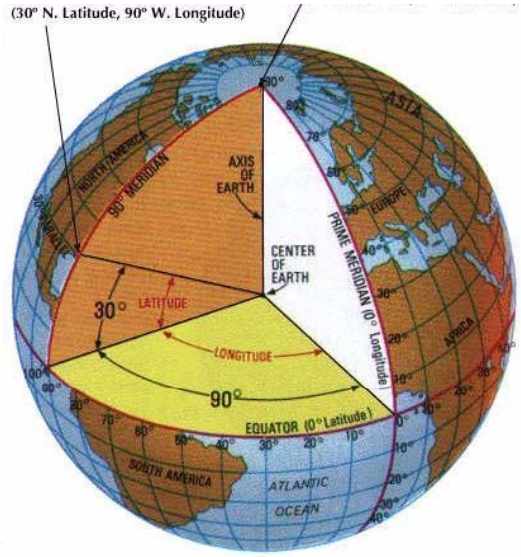
Objectives

- Define navigation
- Discuss the differences between latitude and longitude
- Convert latitude & longitude from one format to another
- List 3 navigation aids and explain their functions
- Choose the appropriate radio for various situations

Background

- Geographic structure of the earth
  - Lines of latitude

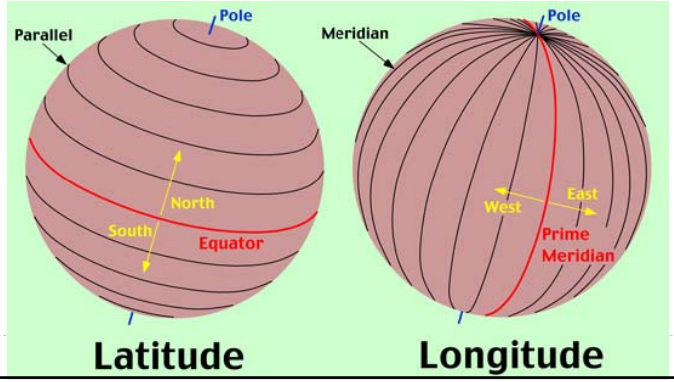


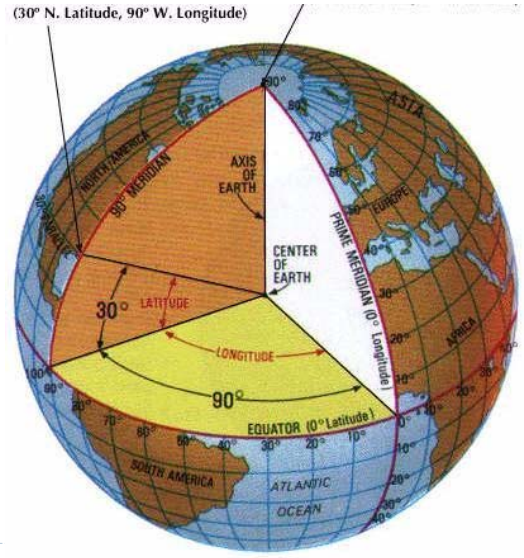


http://www.navis.gr/marinav/latlong.htm

Background

- Geographic structure of the earth
  - Lines of latitude
  - Lines of longitude

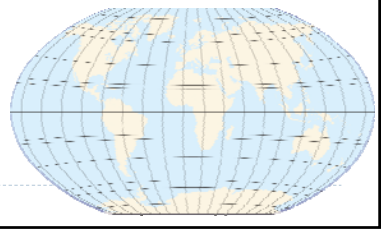




http://www.navis.gr/marinav/latlong.htm

Background

- Geographic structure of the earth
  - Lines of latitude
  - Lines of longitude
- Nautical measurements
  - 1 degree = 60 minutes (') & 1 minute = 60 seconds (")
- Distance & speeds
  - 1 nmi = 1,852 meters
  - 1 knot = 1 nmi / hour



Navigation terms

- Chart – map; reproduction of the earths surface in 2D
- Bearing - The direction (degrees) of an object expressed either as a true bearing as shown on the chart, or as a bearing relative to the heading of the boat
- Course – direction vessel is being steered
- Current – horizontal movement of water

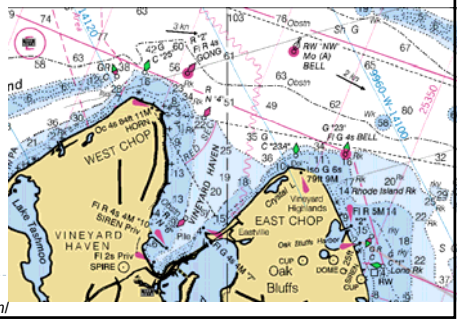
Navigation

- Bridge equipment
  - Compass

http://www.nauticexpo.com

Navigation

- Bridge equipment
  - Compass
  - GPS / Plotters



Images from *http://www.maptechnavigation.com/*

GPS - formats

- Output in multiple formats – be aware of the settings before writing down coordinates on your forms
  - degrees, minutes, seconds- N 03°25'30"
  - degrees, minutes and 10ths of minutes- N 03°25.5'
  - decimal degrees- N 03.425°
- Converting
  - Degrees, minutes, second >>> degrees, minutes &10ths of minutes
    - Divide seconds by 60 and add to minutes
  - Decimal degrees >>> degrees, minutes &10ths of minutes
    - Multiply the decimal value by 60

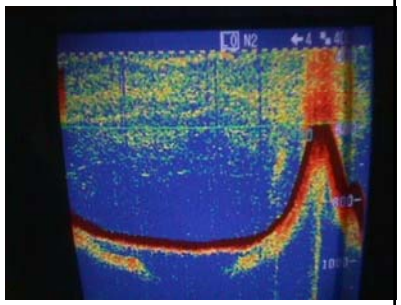
Navigation

- Bridge equipment
  - Compass
  - GPS / Plotters
  - Radar

Images from *http://fis.com/*

Navigation

- Bridge equipment
  - Compass
  - GPS / Plotters
  - Radar
  - Sonar / Echo sounder



Images from C. Heineken, CapFish

Navigation

- Bridge equipment
  - Compass
  - GPS / Plotters
  - Radar
  - Sonar / Echo sounder
  - Communications
    - Mobile phone – satellite, cell
    - Radios

Images from *http://www.satellitephonestore.com/*

Navigation

- Bridge equipment
  - Compass
  - GPS / Plotters
  - Radar
  - Sonar / Echo sounder
  - Communications
    - Mobile phone – satellite, cell
    - Radios

VHF: http://www.nauticexpo.com
SSB: http://www.davesmarineelectronics.com/

Radios - VHF

- Very High Frequency
- International Distress Channel – 16
- Transmission distance ~line of sight

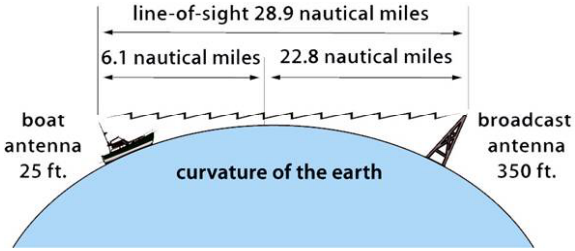


Image: USCG Auxiliary 2007

Radios - SSB

- Single Side Band
- International Distress Channel – 2183 kHz
- Transmission medium to long distances

SSB: http://www.davesmarineelectronics.com/

Radios – How to use

- One-way transmission
- Public - be mindful of what you say
- Speak slowly & distinctly into the microphone
- Switch to working channel if initial contact is on emergency channel/frequency
- Short & concise

Radios – General procedure

- Verify power & appropriate channel
- Verify not in use
- Adjust squelch
- Depress microphone button & call the vessel or group you are trying to contact 3x followed by your vessel name, call sign & station you're calling on
- Wait 2 minute before trying again.
- Switch to working channel
- Use terms like "over" and "copy" when you are done speaking or understand
- When finished, end call with vessel name, call sign and the word "out"

Summary

- What is navigation?
- What are the differences between latitude and longitude?
- How many minutes are in a degree of latitude? How about longitude?
- List 3 navigation aids and explain their functions
- Which radio would you use to call a vessel that you can see?
- Which radio would you use to call the observer program 100 nmi away?
- Homework – conversion practice

References

- United States Coast Guard Auxiliary. 2007. Boating Skills and Seamanship, 13th Edition. International Marine / McGraw-Hill, Camden, ME.
- Thank you to Chris Heineken, Capricorn Fisheries (CapFish), Cape Town South Africa for sharing his observer training materials.
- Calder, N. 2003. How to Read a Nautical Chart. International Marine / McGraw-Hill, Camden, ME.

Navigation – Homework

Name:

Complete the problems/conversions below given the following:

1 degree = 60 minutes (‘) 1 nmi = 1.15 miles = 1,852 meters
1 minute = 60 seconds (“) 1 knot = 1 nmi / hour

1 degree of latitude ≈ 60 nautical miles

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1. Convert N 06°49’23” to degrees, minutes & 10ths of minutes _____
2. Convert S 01.293° to degrees, minutes & 10ths of minutes _____
3. Convert W 24°17’01” to degrees, minutes & 10ths of minutes _____
4. How many miles are in 268 nmi? _____
5. What is the approximate distance between N 06°49’43”, E 00°03’10” and N 06°29’13”, E 00°03’10”?

   _____
6. How long would it take a vessel traveling 7.5 knots to travel 35 nmi? _____