Phys 102 Astronomy Name Solution

A Navigation Problem

The goal of celestial navigation is to find your position on the Earth (your latitude and longitude).

A) FINDING YOUR LATITUDE: You need a sextant

You should be able to say ***VERY QUICKLY*** how you find your latitude from the stars, particularly in the northern hemisphere.

B) FINDING YOUR LONGITUDE: You need a sextant, a clock, and an ephemeris

An ephemeris will allow you to find out the difference in longitude between the longitude (time zone) of your clock, and your current longitude, using the same logic as you did for finding the difference between solar noon and civil noon for various locations.

DETERMINE YOUR POSITION FROM THE FOLLOWING DATA:

a) With your sextant you sight Polaris at an altitude of 32º 17' above your northern horizon.

b) You observe the transit of Procyon at 9:19 PM on February 11, according to a clock set for New York.

c) You look up the transit time of Procyon on February 11 on p. 13 of the battered old *Field Guide to the Stars and Planets* that you've carried since your astronomy days at St. Lawrence, and use it to figure out your position east or west of 75°W (the center of the Eastern Time Zone).

WHERE ARE YOU? SHOW THE STEPS FOR FIGURING IT OUT.

Polaris at altitude of 32° ⇒ Latitude = 32° N

Procyon should transit at 10 pm EST on February 11

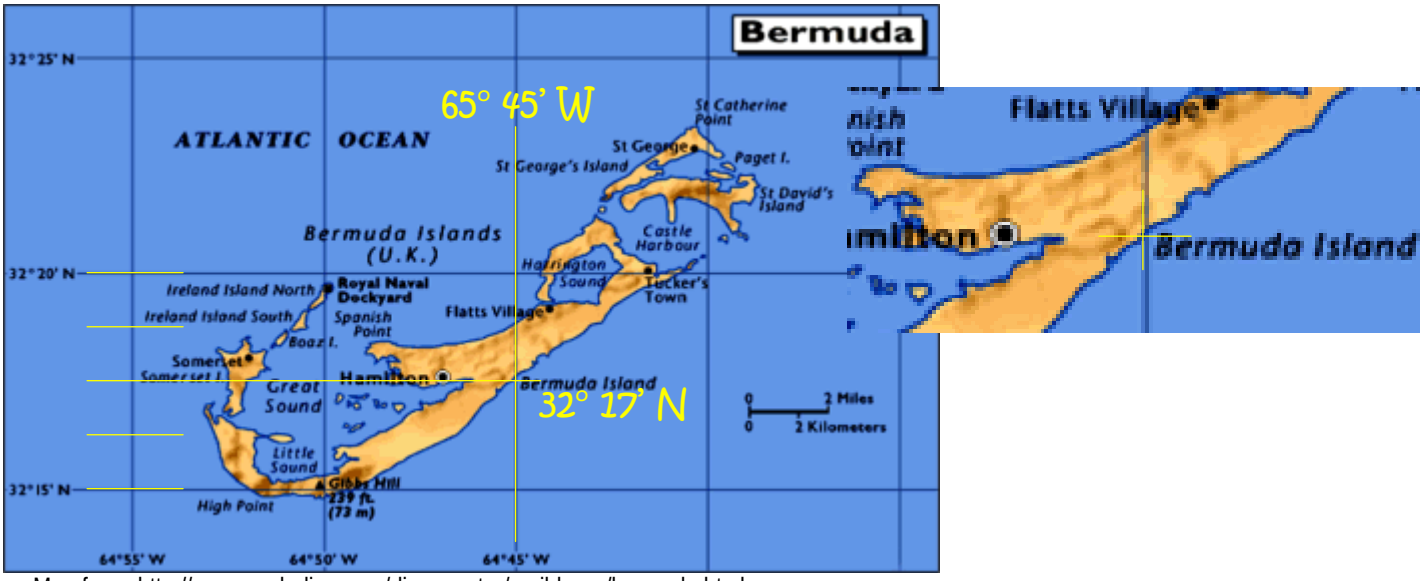
Observed to transit at 9:20 pm ⇒ 41 minutes early

$$41 \text{ minutes} \times \frac{1 \text{ degree}}{4 \text{ minutes}} = 10.25 \text{ degrees}$$

Early ⇒ east of time zone center (75° W)

longitude = 75° - 10.25° = 64.75° W = 64° 45' W

We're in Bermuda!



Map from http://www.scubalinx.com/dive_center/caribbean/bermuda.html