

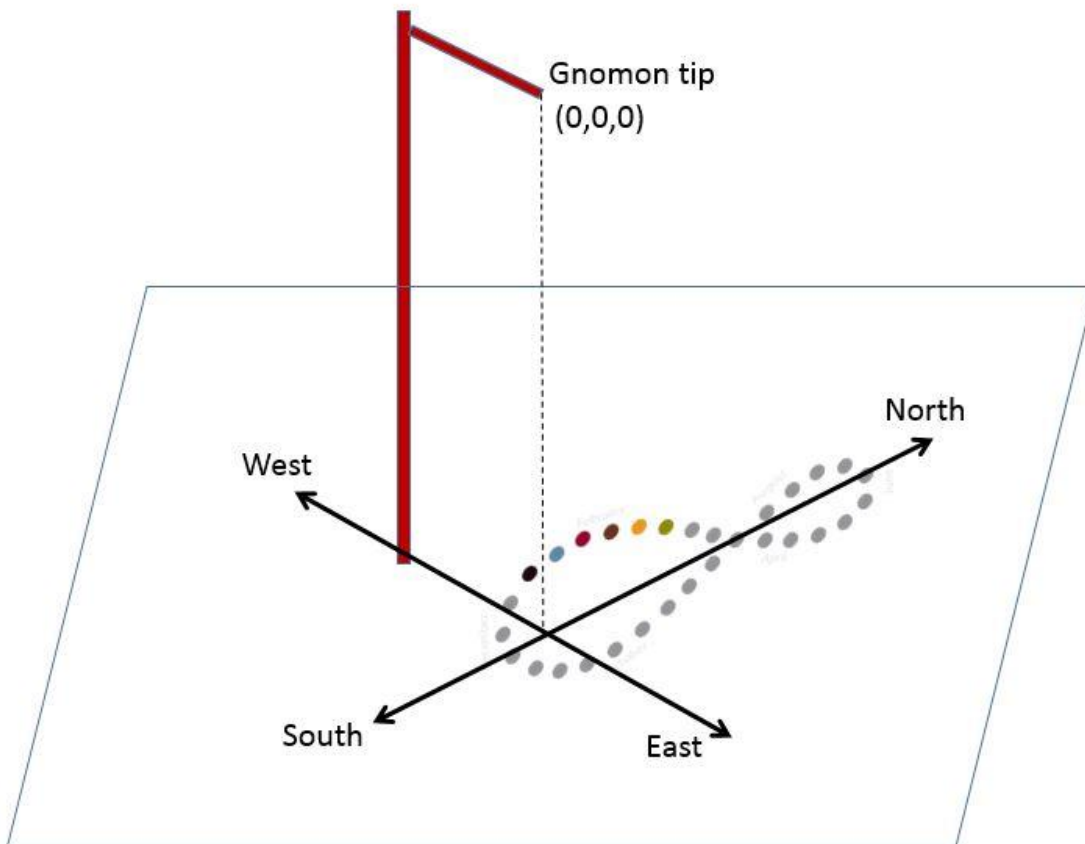
Analemma Observing Program - Appendix D

Corrections for Observers in Tropical Latitudes

The observer is located in a Tropical Latitude if the observer's location is between the Tropic of Cancer and the Tropic of Capricorn. If your location is Tropical then several corrections will need to be made to the various activities.

Construction of your apparatus

In tropical locations the Sun will appear on both the North side and the South side of the zenith at local noon, depending on the time of year. Therefore it will be necessary to construct your apparatus to allow for shadows to occur in both directions. A simple way to do this is to have a vertical rod with a second rod that is horizontal, whose tip is used as the gnomon. The vertical rod is 'offset' either E or W from the gnomon tip. See the figure below:



The (0,0,0) point is still defined as the gnomon tip with the point directly under the tip at (0,0,-h) where h is the height of the gnomon tip. Note how the analemma curve crosses the East/West axis.

This 'crossing' of the East/West axis also affects some of the terms used in Activity 1.

In activity 1 the Summer Solstice point is normally defined as follows:

Distance to the Summer Solstice point. This is the point on the analemma curve closest to the x-axis.

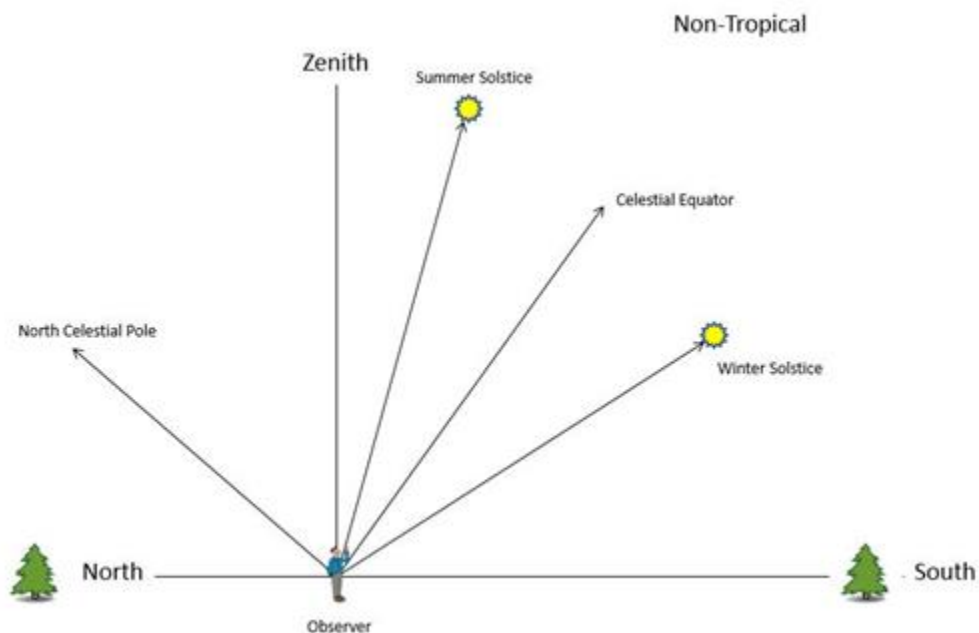
For tropical observers use this definition instead:

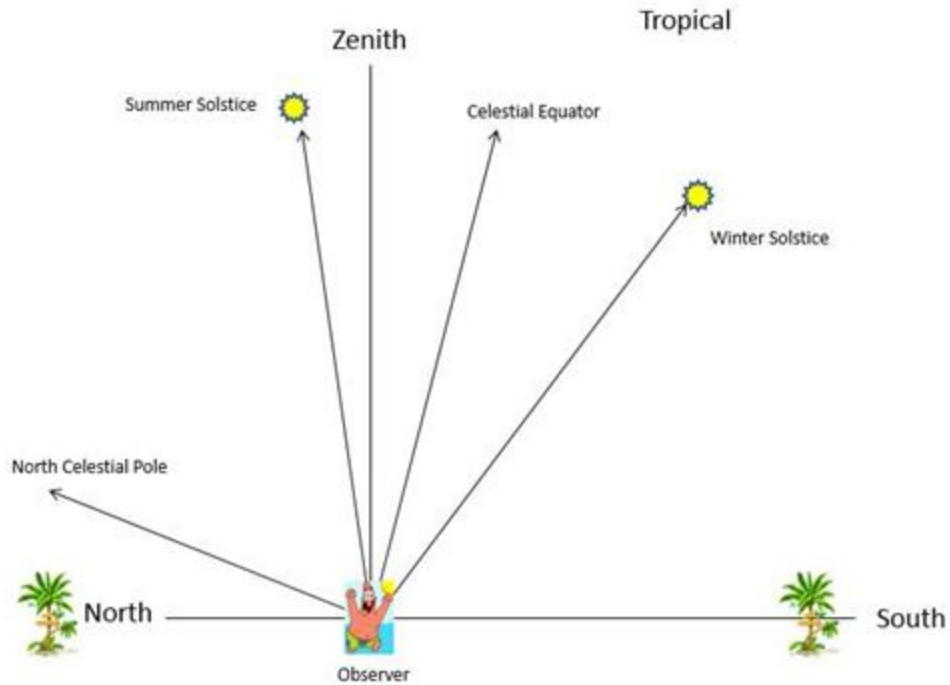
Distance to the Summer Solstice point. This is the point on the analemma curve farthest from the x-axis on the opposite side of the Y-axis from the Winter Solstice.

Unless you are on the equator the Winter Solstice altitude will be lower than the Summer Solstice point.

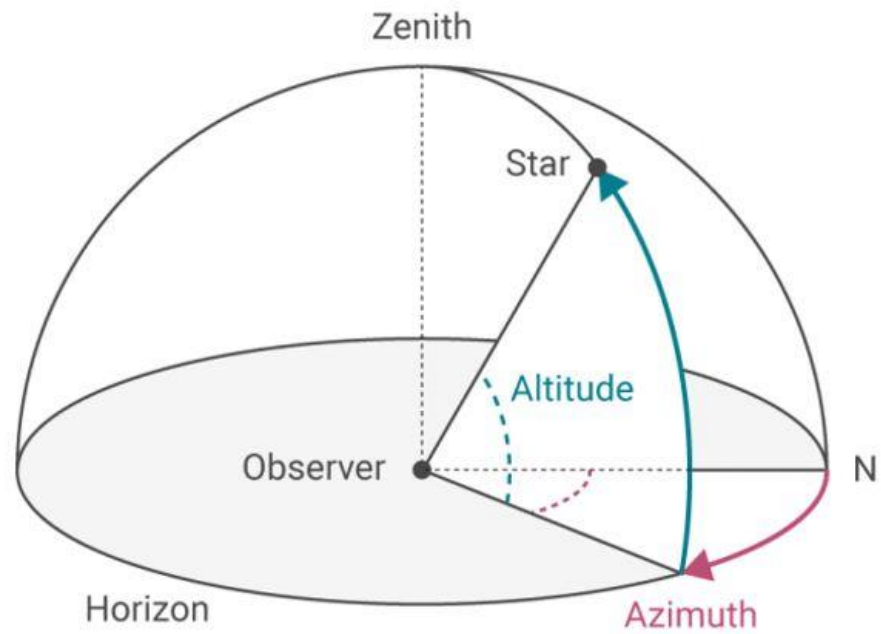
In activity 1, step 4 there is a note that says:

Note for Northern Hemisphere observers, both altitudes are measured with respect to the Southern horizon. For Southern hemisphere observers, both altitudes are measured with respect to the Northern horizon. For tropical observers this will give a summer solstice altitude greater than 90 degrees. The following figures illustrate this.





For tropical observers the altitude values computed during Activity 2, step 4 need to be corrected in the same way as the summer solstice altitude was corrected in Activity 1. That is to say measure ALL the altitudes from the same horizon. This will give you some values > 90 degrees. For points whose altitude is < 90 azimuth is determined by drawing a line from the zenith thru the point in question down to the horizon. For those points with an altitude > 90 the azimuth line is determined by drawing a line from the point in question thru the zenith down to the horizon. Where the azimuth line intersects the horizon is the azimuth angle as measured from true North with East being 90 degrees, South being 180, West being 270 (or -90). Altitude is the angle measured up from the horizon to the point in question along the azimuth line. See the following figure:



For the remainder of the activities no other correction should be required. Remember that the Y coordinates for those points on the other side of the X-axis are negative.