APPENDIX B
NON-LOCAL-NOON OBSERVING

OVERVIEW: The following summarizes the procedure for using observations not taken at Local Noon:

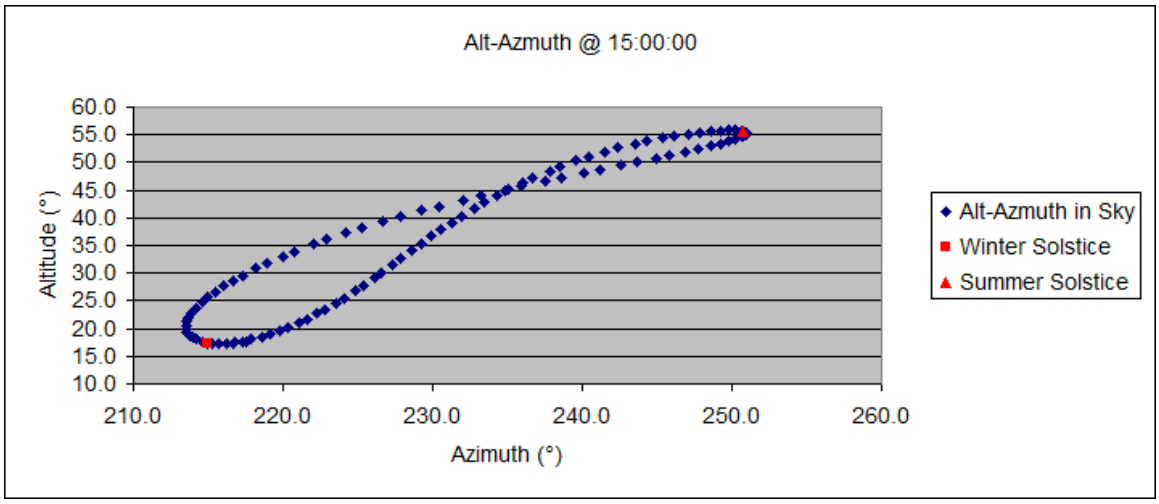
- Select an observing time within three hours of Local Noon (the "non-Local-Noon" observing time).
- Generate the analemma at this "non-Local-Noon" observing time.
- With reference *only* to the non-Local-Noon analemma and measured dimensions of the observing apparatus, calculate the alt-azimuth coordinates for all points of the analemma.
- Using the published value for the Observer's Latitude, convert these alt-azimuth coordinates to Declination and Hour Angle.
- Subtract the Hour Angle of the Sun at the non-Local-Noon observing time from the Hour Angles calculated above.
- Using the published value for the Observer's Latitude, convert the Declination and Hour Angle values to alt-azimuth coordinates; the result is a close approximation to the alt-azimuth coordinates that would have been observed at Local Noon.
- Using these calculated alt-azimuth coordinates, proceed with the four Activities in their prescribed order.

STEP 1: Specify the observing conditions; in this example, we will be using the airport in Kearney, Nebraska:

> Latitude: 40° 43' 42.0" N ; Longitude: 98° 59' 56.0" W
> Local Noon, based on Longitude, calculates as 12:36:00 CST
>
> Returning to the Observing Site at Local Noon during the year is impractical for the Observer; however, the Observer can reliably return at 15:00:00 CST (Local Noon plus 2:24:00).

STEP 2: Generate the Analemma at 15:00:00 CST / 16:00:00 CDT.

STEP 3: With reference *only* to the analemma and measured dimensions of the observing apparatus, calculate the altitude and azimuth of the Sun for all points of the analemma.



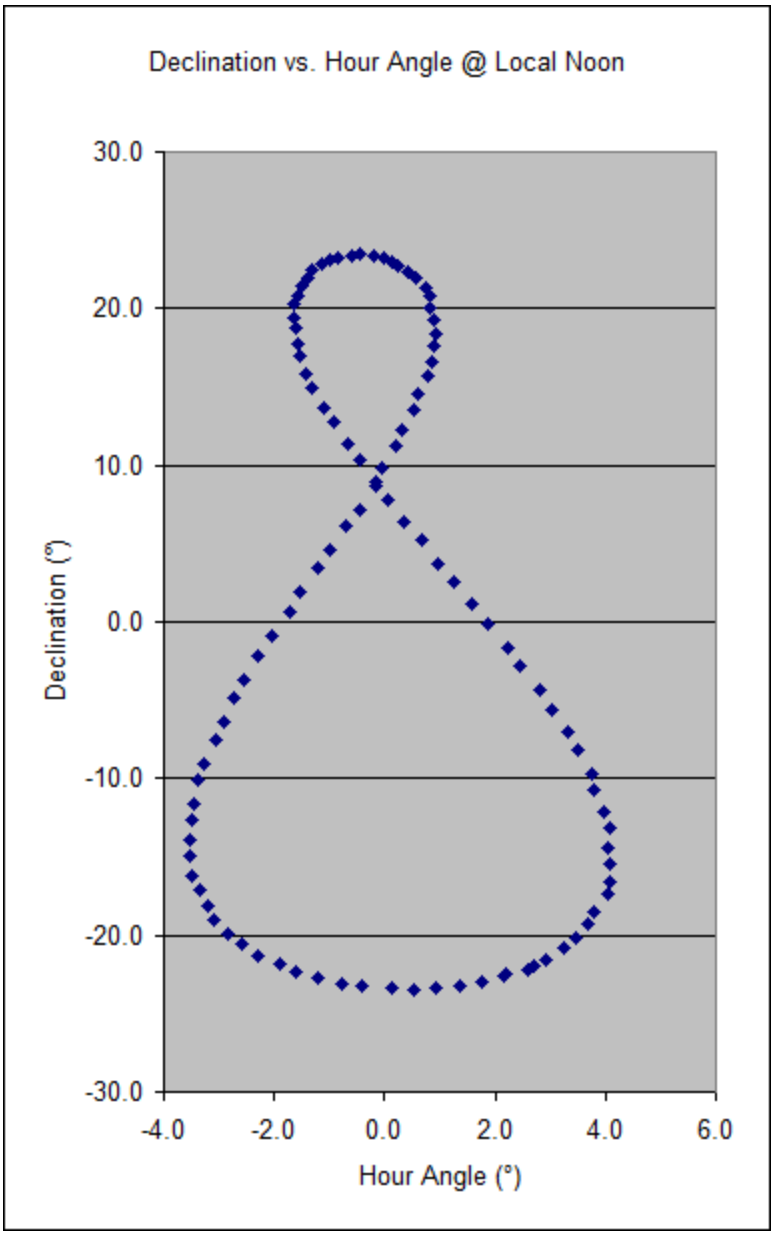
STEP 4: Using the equations for conversion of alt-azimuth coordinates to equatorial coordinates and the published latitude of the Observing Site (STEP 1), calculate the Declination and Hour Angle for all points of the analemma.

STEP 5: Approximate the readings at Local Noon by subtracting the difference between actual time of Observation and time of Local Noon (here, 2:24:00 * 15 ° / clock hour, or 36°) from the Hour Angle calculated in STEP 4 (varies between ~ 32½° and ~ 40°).

This step is an approximation because the Sun's apparent motion in the sky is attributable to two sources:

(a) the rotation of the Earth about its axis.

(b) the rotation of the Earth around the Sun, which is seen as motion along the ecliptic; this motion is small when compared to apparent motion due to the rotation of the Earth, and does not significantly effect the results when neglected.



STEP 6: Using equations for conversion of equatorial coordinates to alt-azimuth coordinates and the published latitude of the Observing Site (STEP 1), convert the calculated Local Noon points (Declination from STEP 4 and Hour Angle from STEP 5) to alt-azimuth coordinates.

The four Activities of the Observing Program may now be started in their prescribed order using these calculated Local Noon readings.

Additional Links

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