Solar Coordinates

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Solar Coordinates

- Describe solar position in terms of latitude and longitude
- The position of a point projected onto the plane of the sky can be computed using coordinate transformations
- Solar ephemeris at:
  http://ssd.jpl.nasa.gov/horizons.cgi
  Gives heliocentric latitude (Obs sub-lng & sub-lat) and PA of spin axis (N. Pole Pos. Ang & Dis)
Solar Coordinates

\[
x = R_o \sin \theta \cos \phi \\
y = R_o \sin \theta \sin \phi \\
z = R_o \cos \theta
\]

\[
\dot{x} = -R_o \sin \theta \sin \phi \dot{\phi} \\
\dot{y} = R_o \sin \theta \cos \phi \dot{\phi} \\
\dot{z} = 0 \\
\dot{\phi} = \frac{2\pi}{T}
\]

The z-axis is the solar spin axis

\(T = \text{rotation period}\)
The solar spin axis is not perpendicular to the ecliptic — the center of the sun as viewed from earth is not $b=0$.

Rotate about the $y$-axis by the angle $\xi$
Tilt of the solar spin axis towards the earth
Coordinate Transformation #2

The projected solar spin axis is not oriented N/S

Rotate about the $x'$-axis by angle $\eta$
Orientation of the spin axis relative to north