The Equatorial Coordinate System

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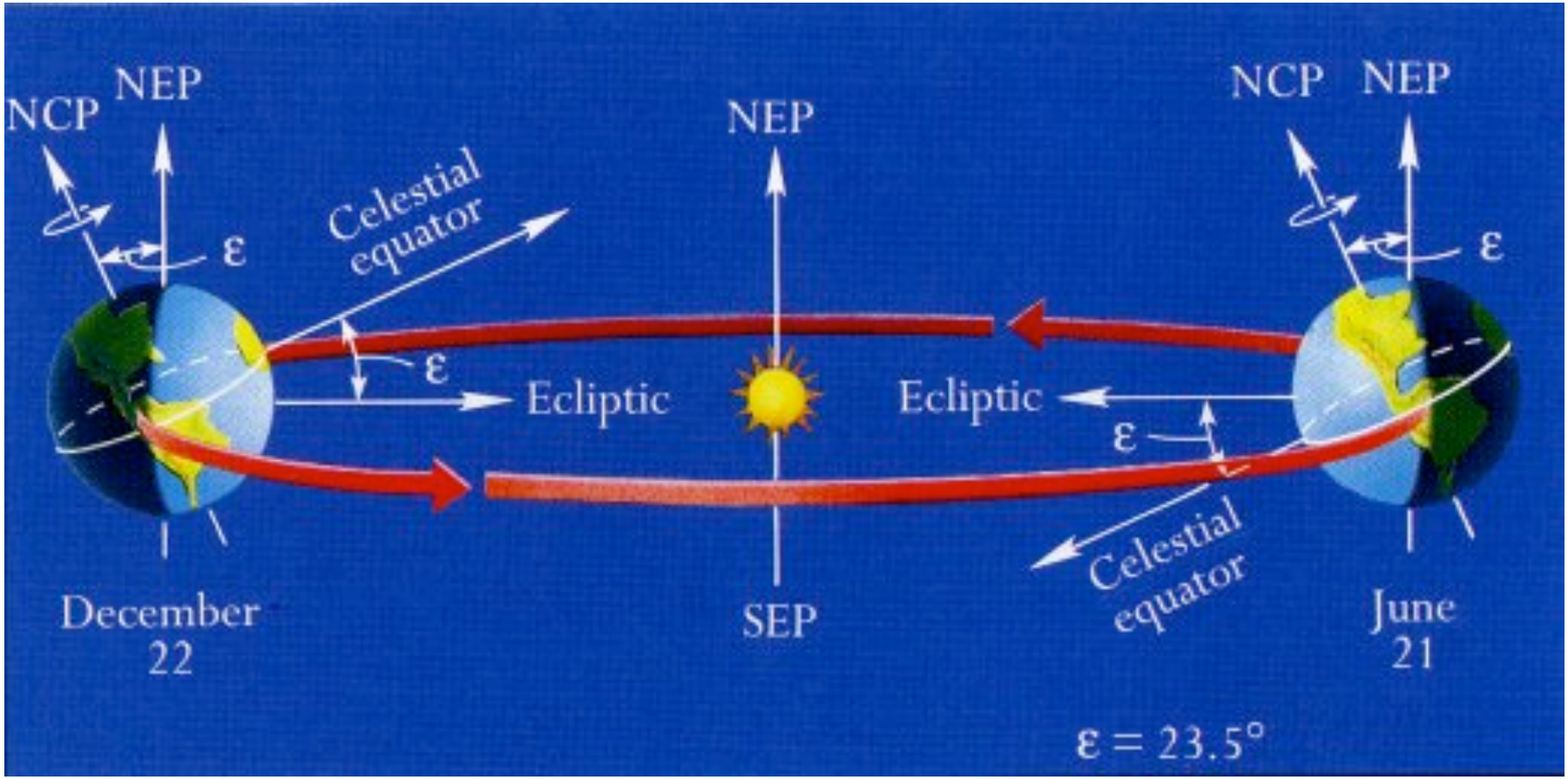
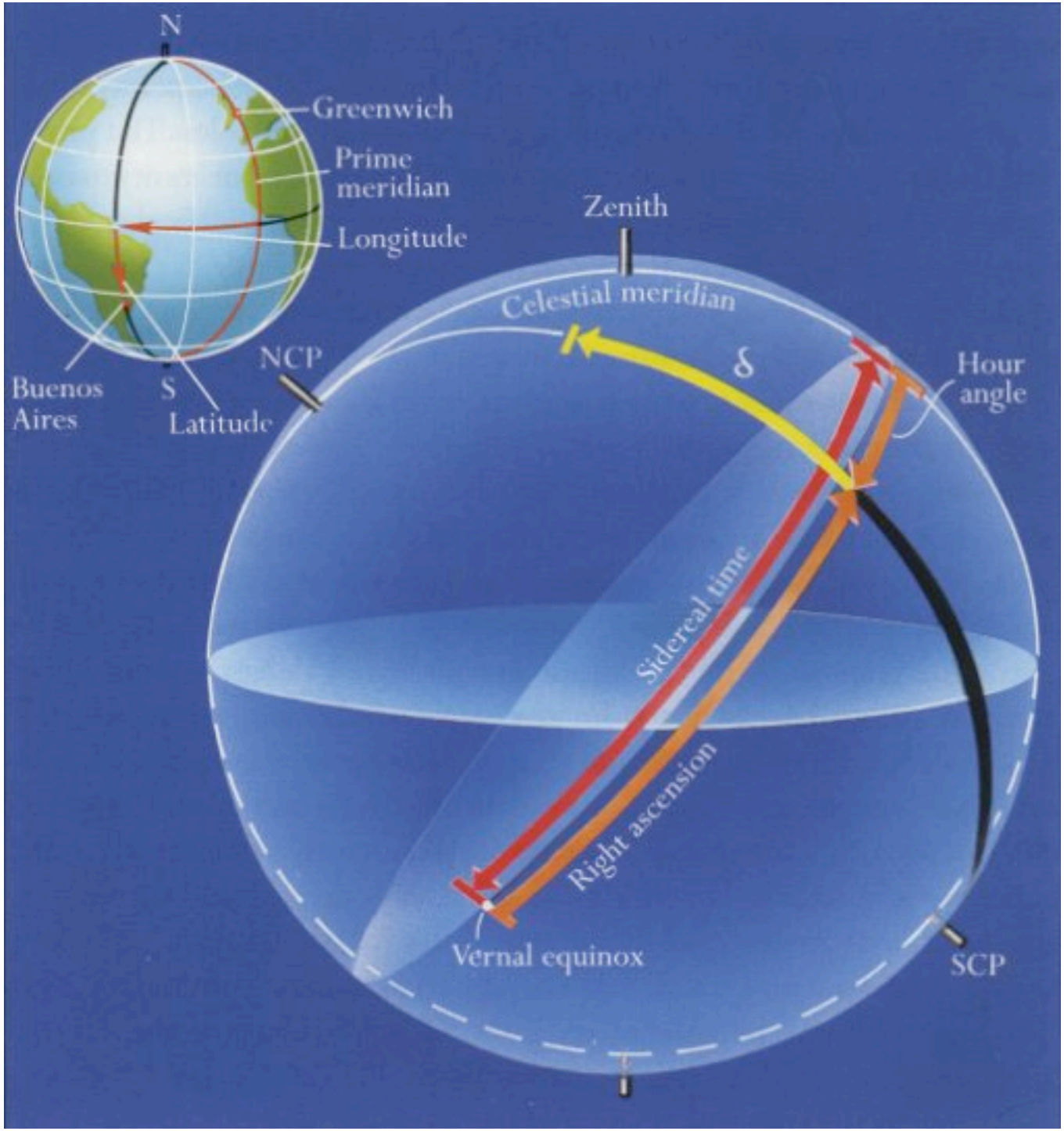
Equatorial Coordinate System

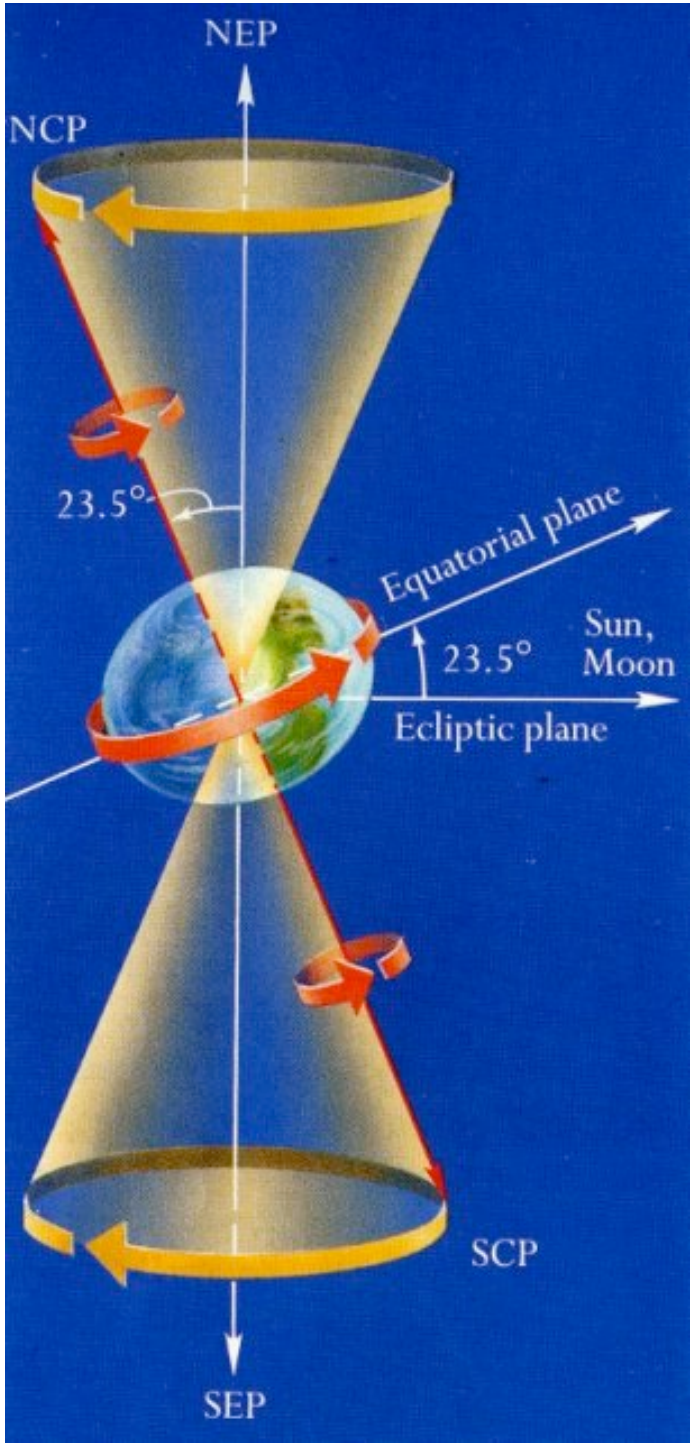
- Defined by
  - an origin at the center of the Earth
  - a plane defined by the Earth's equator
  - a primary direction toward the vernal equinox
  - a right-handed convention

Right ascension: measured eastward along the equator from the vernal equinox

Declination: measured positive northward


NCP
NEP
ε
Celestial equator
ε
Ecliptic
NEP
Ecliptic
ε
NCP
NEP
ε
Celestial equator
December 22
SEP
June 21
ε = 23.5°


N
Greenwich
Prime meridian
Longitude
Zenith
Celestial meridian
NCP
δ
Hour angle
Buenos Aires
S
Latitude
Sidereal time
Right ascension
Vernal equinox
SCP



EQUINOXES AND SOLSTICES

Point	Usual Date	Right Ascension	Declination	Constellation
Vernal Equinox	March 20	0 hours	0°	Pisces
Summer Solstice	June 21	6 hours	23.5°N	Gemini*
Autumnal Equinox	September 23	12 hours	0°	Virgo
Winter Solstice	December 22	18 hours	23.5°S	Sagittarius

RA: hh:mm:ss.ss

Decl: dd:mm:ss.ss

Probability Distribution of Functions of Random Variables

- If x and y both follow a Gaussian distribution, what is the probability distribution function of d = sqrt(x^2+y^2)? (d can be considered to be the distance to the origin from (x,y)).
- Which will you choose to estimate the true distance d, mean(d), mode(d), or media(d)?
- Are the estimator biased? How will you apply a correction so that the bias will be removed?

Suggested Reading: http://adsabs.harvard.edu/abs/1985A%26A...142..100S

Rice distribution for polarization, *viz.*,

$$F(p, p_0) = pe^{-\frac{(p^2 + p_0^2)}{2}} J_0(ipp_0),$$

where J_0 is the zeroth order Bessel function.

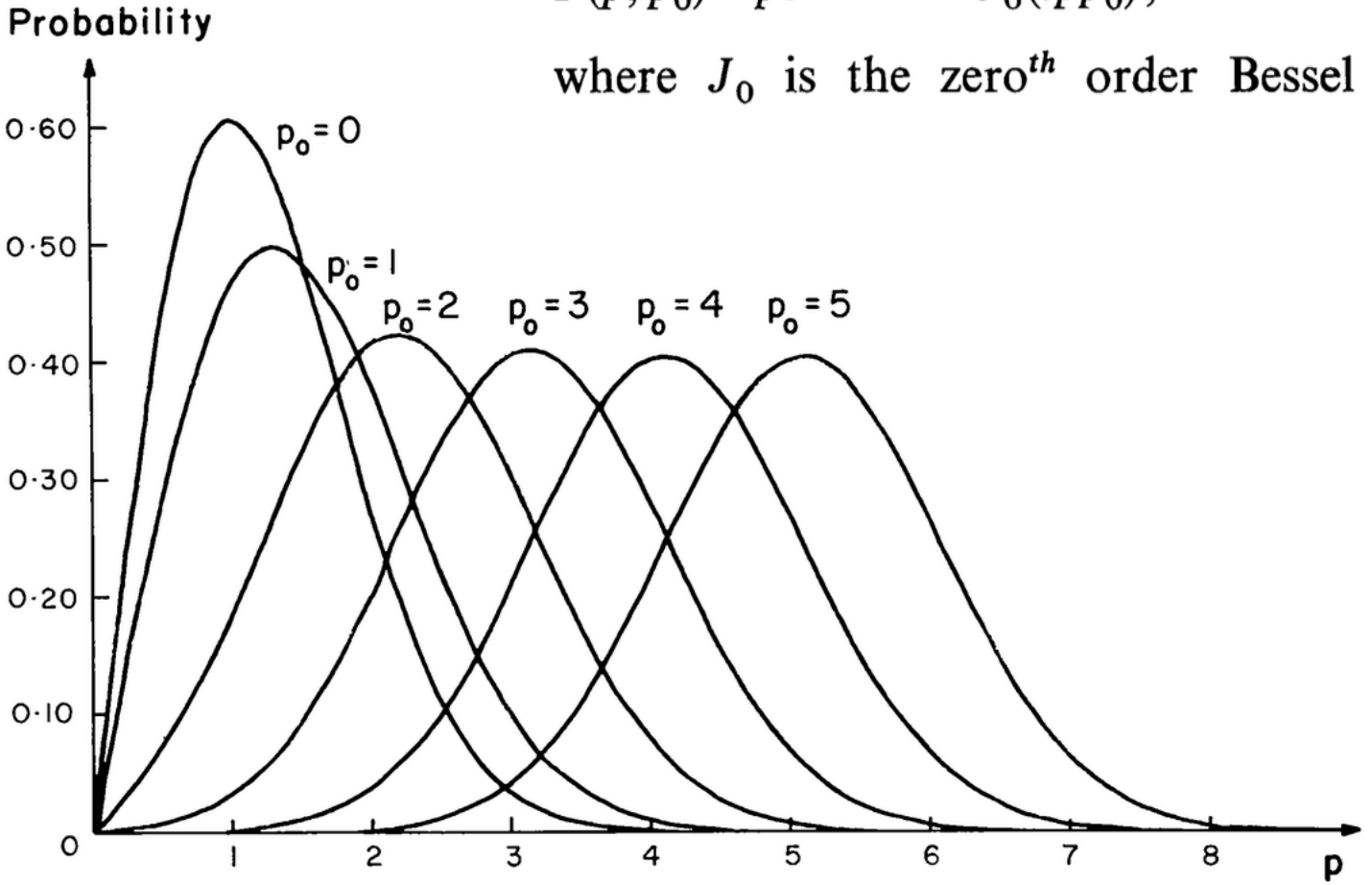


Fig. 1. The Rice distribution $F(p, p_0)$ as a function of p displayed for values of $p_0 = 1, 2, 3, 4$ and 5