VSRT MEMO #048

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22 October, 2008

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To: VSRT Group
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Subject: Calculation of "Equinox" time for ozone diurnal variations

In order to study the chemical dynamics of the creation and destruction of ozone near the mesopause data needs to be averaged over many months. To avoid smearing the changes in ozone which occur at sunrise and sunset it is necessary to define a non-linear diurnal time scale which I propose to call "Local Equinox Time." Equinox time is 0^{hr} and 12^{hr} at 0^{hr} and 12^{hr} local solar time and is 6^{hr} and 18^{hr} at sunrise and sunset respectively.

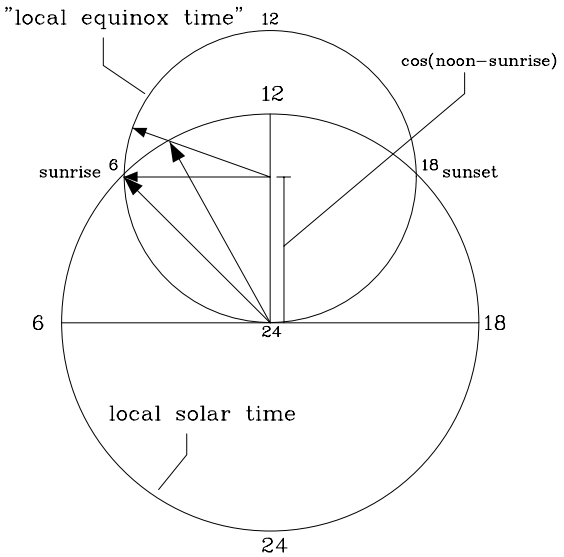
In order to make a smooth function I propose

$$\phi = \text{atan2}\left(\sin\theta, \cos\theta - \cos\left(noon - sunrise\right)\right)$$

where θ = local Solar time in radians - π

ϕ = local equinox time

Noon-sunrise = time difference between noon and sunrise in radians.



Geometrical relation between proposed "local equinox" and local solar time
(shown for winter solstice at 60 deg latitude)

Figure 1. Illustrates a geometrical model of the "local equinox" and solar times.