

The popular atmospheric heat balances, K-T diagram et. al., model the earth as a ball suspended in an averaged bucket of warm poo evenly heated over the entire ToA. This is not at all how the earth actually warms and cools. The attached PowerPoint shows how the atmosphere actually heats and cools. The solar irradiation fluctuations from the elliptical orbit and tilted axis and seasons control the weather/climate and overwhelm by hundreds of times the insignificant contributions of GHGs.

Elliptical Orbit

Sun Radius	695,700	km
Sun Spherical Area	6.082E+12	km ²
Luminosity	3.846E+26	W
Power flux	6.323E+07	W/m ²
S-B σ	5.670E-08	W/m ² - K ⁴
Surface Temp.	5,778.87	K

Δ far to near = 91 W/m²

Orbital Radius Average	1.4960E+08	km
Orbital Spherical Area	2.8124E+17	km ²
Power Flux Average	1,368	W/m ²

Orbital radius aphelion	1.521E+08	km
Orbital Spherical Area	2.9072E+17	km ²
Power Flux Farthest	1,323	W/m ²

Orbital radius perihelion	1.471E+08	km
Orbital Spherical Area	2.7192E+17	km ²
Power Flux Closest	1,414	W/m ²

The sun's irradiation arrives as a parallel beam striking the discular cross section of the earth. A common approach is to take this total $1,368 \text{ W/m}^2$ power flux and “average” it by spreading it evenly over the entire spherical top of the atmosphere, T_{oA} .

A sphere of radius r has four times the area of a disc of radius r so simply divide $1,368$ by $4 = 342 \text{ W/m}^2$.

The albedo reflects away about 30% of the incoming solar energy leaving 70% or about 240 W/m^2 to be absorbed **ON AVERAGE by the atmosphere and surface.**

Average Orbit

Earth radius	6,371.00	km
Earth cross sectional area	1.2752E+08	km ²
Power	1.7438E+17	W
Earth spherical area	5.1006E+14	m ²
Spherical power flux	342	W/m ²

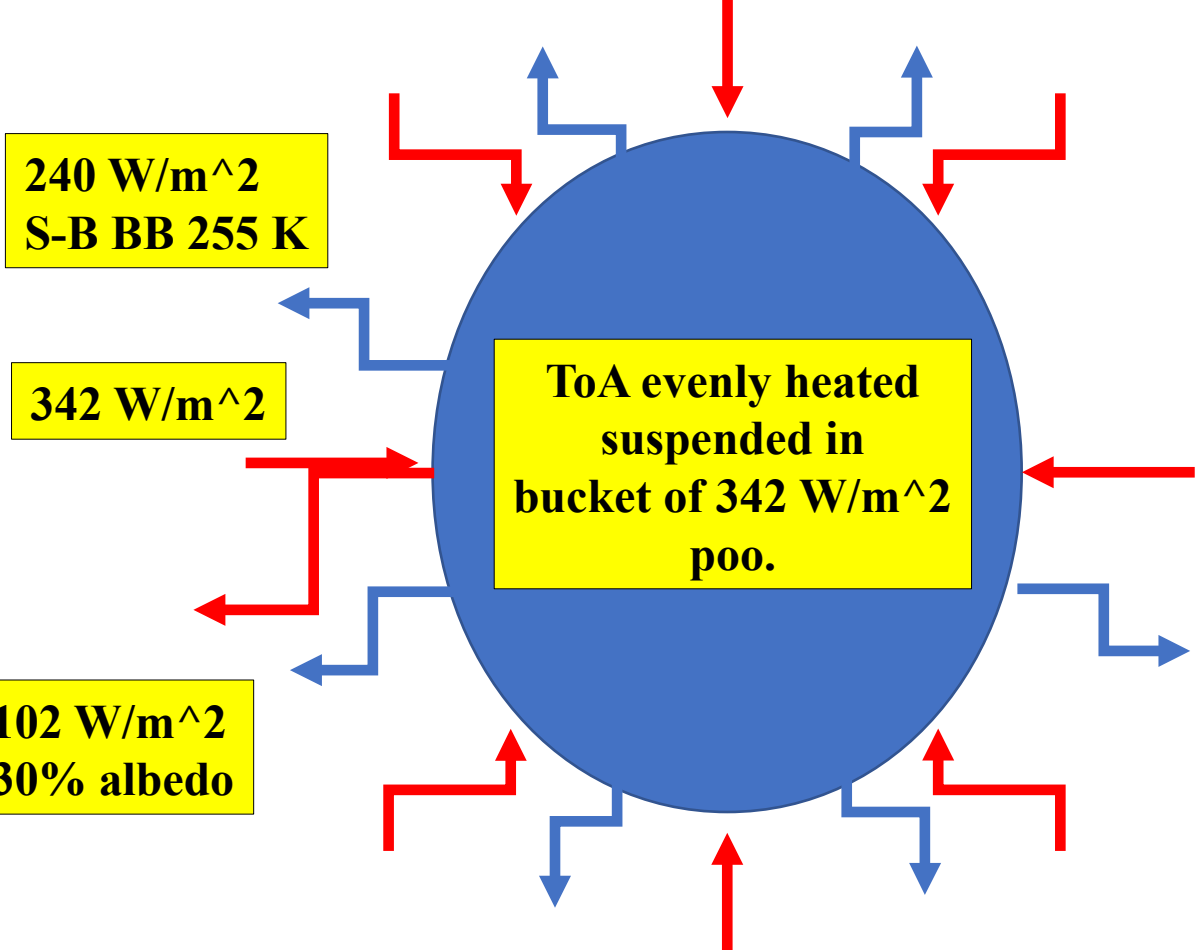
Disc area = $\pi * r^2$
Spherical area = $4 * \pi * r^2$

Perihelion (closer)

Earth radius	6,371.00	km
Earth cross sectional area	1.2752E+08	km ²
Power	1.8036E+17	W
Earth spherical area	5.1006E+14	m ²
Spherical power flux	353.60	W/m ²

Aphelion (farther)

Earth radius	6,371.00	km
Earth cross sectional area	1.2752E+08	km ²
Power	1.6870E+17	W
Earth spherical area	5.1006E+14	m ²
Spherical power flux	330.74	W/m ²



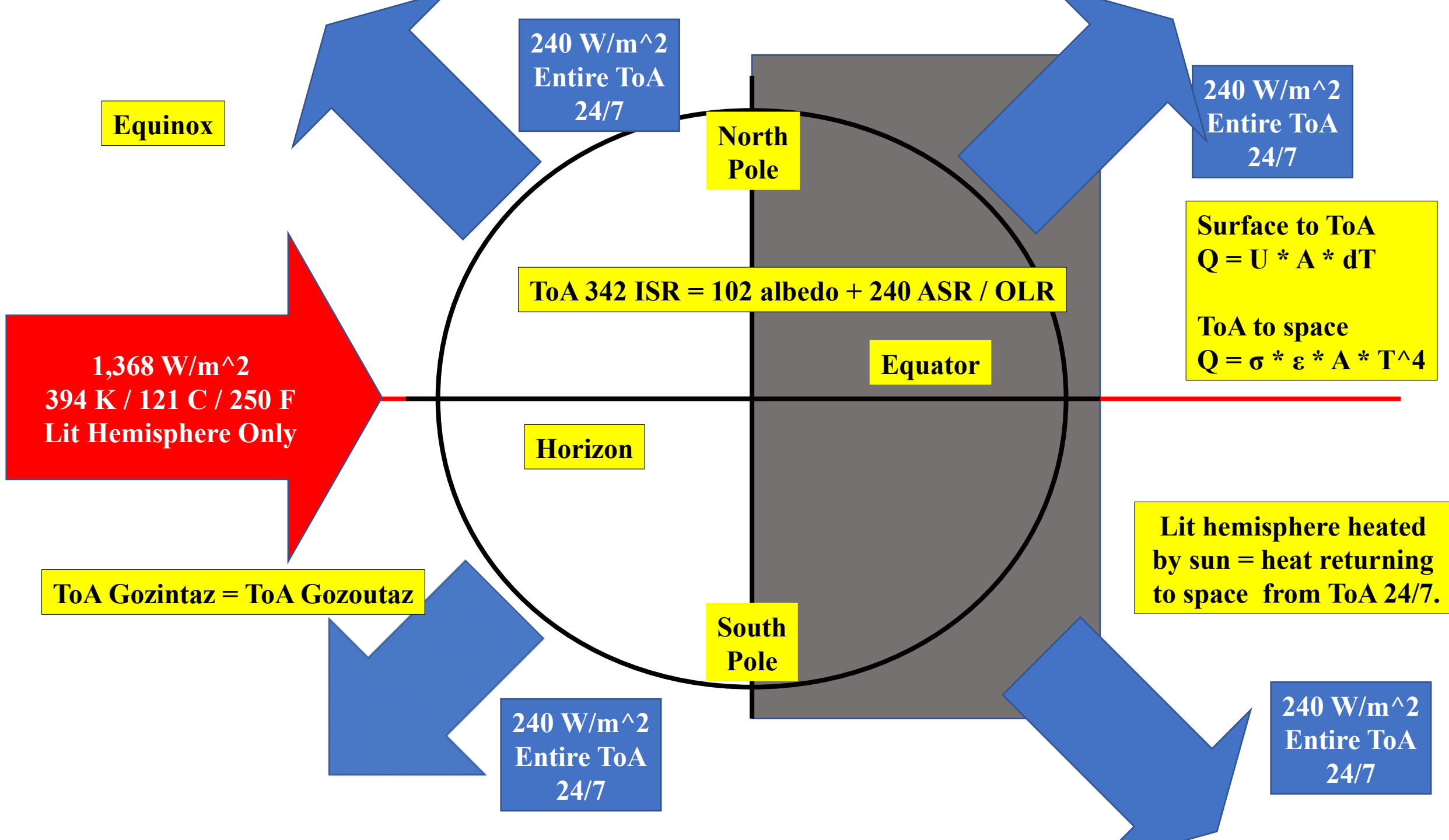
***Average* Δ far to near = 22.86 W/m² *Orbital* Δ far to near = 91 W/m²**

1750 to 2011 +RF = 2 W/m²

IPCC AR5 worst⁴ scenario = RCP 8.5 W/m² at 1,000 ppm CO₂

CO₂'s contribution little more than a rounding error.

The reality: Earth is heated by the sun only on the lit side while heat returns to space through the atmosphere 24/7 per $Q = U A dT$ until T_{oA} where S-B radiation takes over.



The heat moving from the ground up through the atmospheric thermal resistance to ToA is a complex mix of conduction, convection, advection, latent heat and radiation all of it influenced by clouds, winds, albedo, vegetation, storms, etc.

An electrical resistance requires a voltage difference.

An hydraulic resistance requires a pressure difference.

A thermal resistance requires a temperature difference.

Heat Flow
By
Conduction

Heat Flow
By
Convection

Heat Flow
By
Latent

Heat Flow
By
Radiation

$$Q_{rad} = \epsilon * \sigma * A * T^4$$

$$Q_{cond} = (k/x \text{ aka } U) * A * (T_{hot} - T_{cold})$$

$$Q_{conv} = h_{conv} * A * (T_{hot} - T_{cold})$$

$$h_{conv} = C * (1/d)^{0.2} * (1/T_{avg})^{0.181} * (\Delta T^{0.266}) * SQR(T(1+1.277 * Wind))$$

For latent heat see psychrometric properties of moist air.
Water vapor adds/subtracts 1,000 Btu/lb - Δ°F

$$Q_{rad} = h_{rad} * A * (T_{hot} - T_{cold})$$
$$h_{rad} = \epsilon * \sigma * A * (T_{hot}^4 - T_{cold}^4) / (T_{hot} - T_{cold})$$

Because of participating media, ε about 0.15.

32 km: the end of molecules

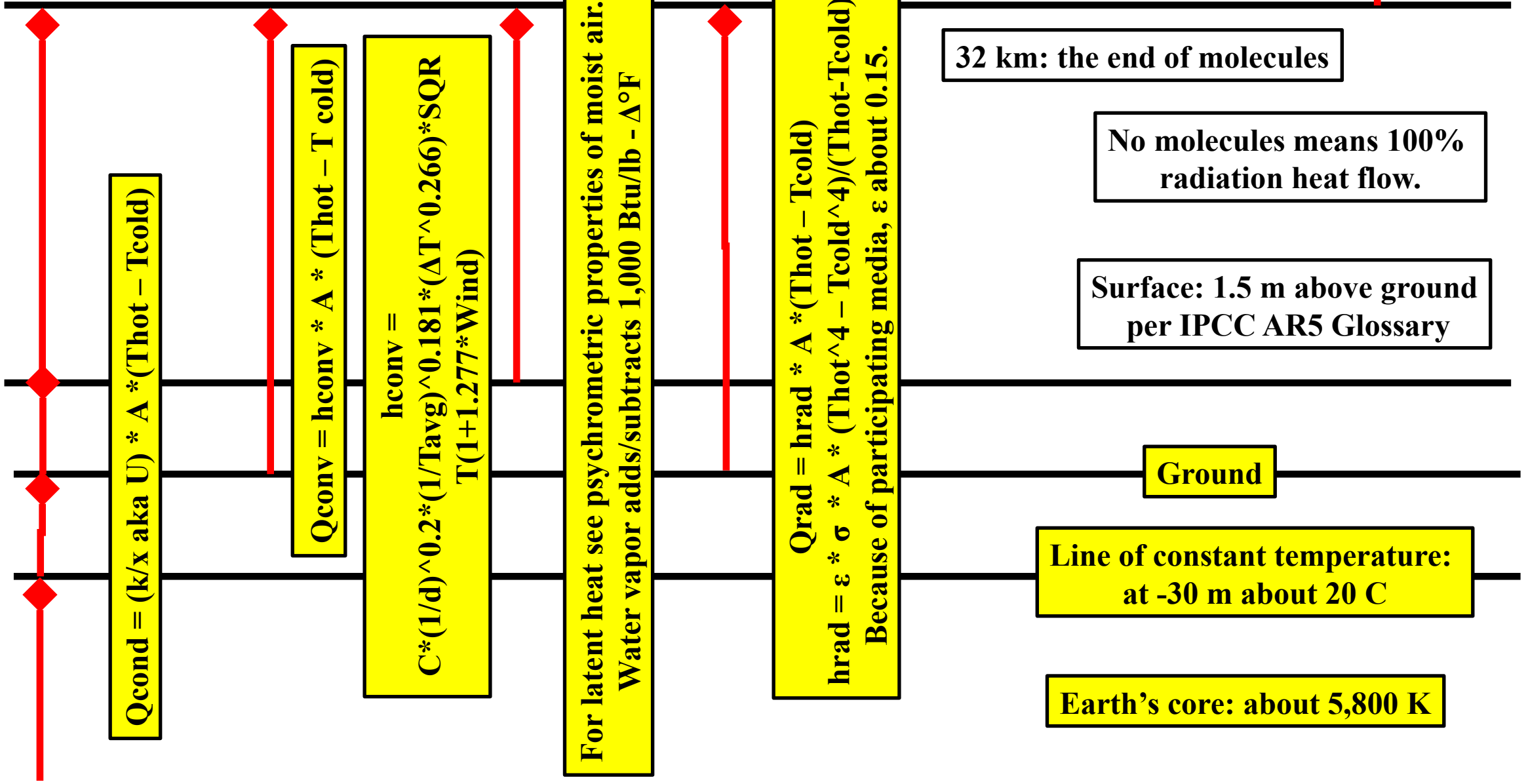
No molecules means 100% radiation heat flow.

Surface: 1.5 m above ground per IPCC AR5 Glossary

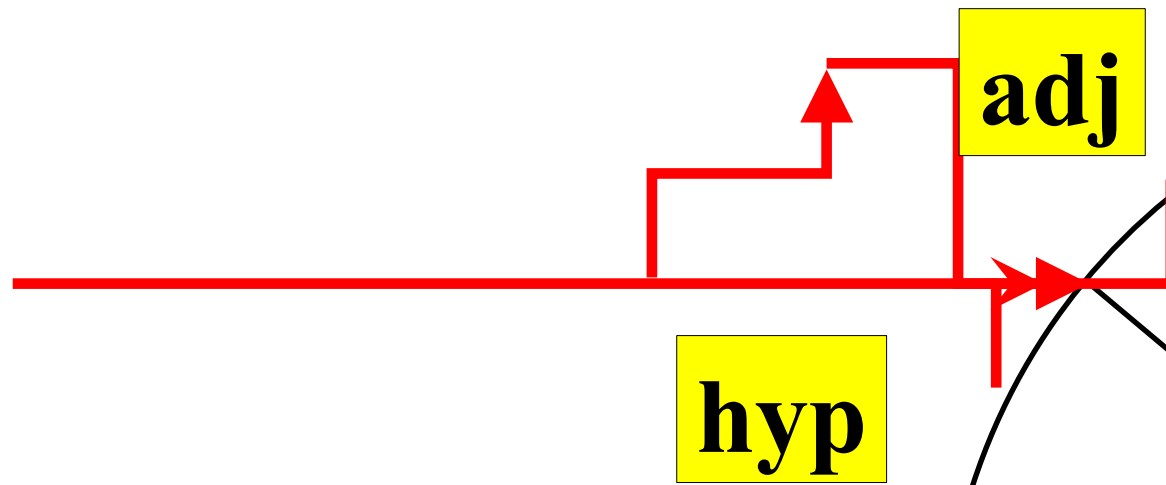
Ground

Line of constant temperature: at -30 m about 20 C

Earth's core: about 5,800 K



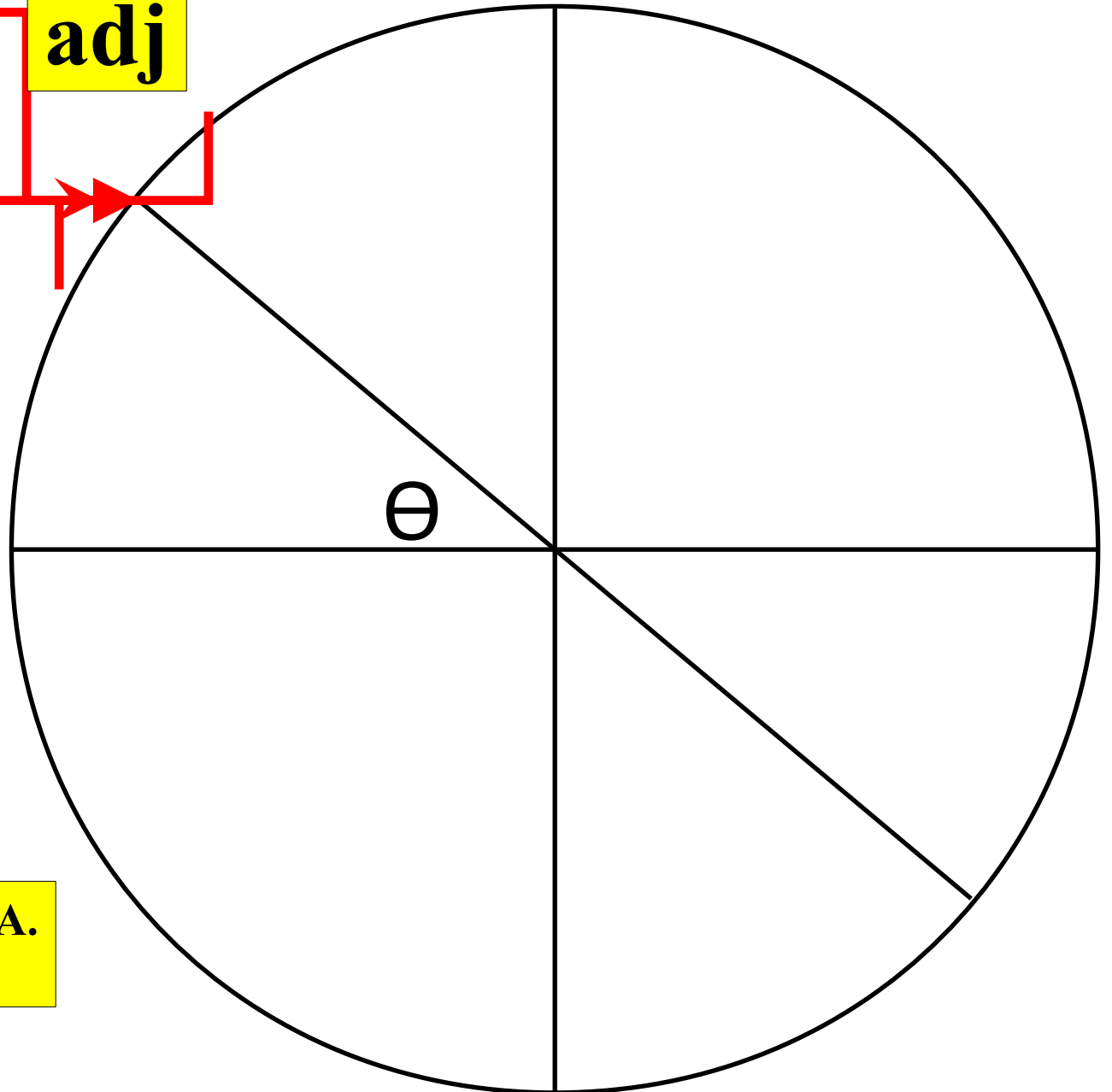
Because of the tilted axis ToA insolation at any given point fluctuates as much as 700 W/m^2 . This variation in heating and cooling affects the surface and atmosphere in random, chaotic, non-linear and unpredictable ways.



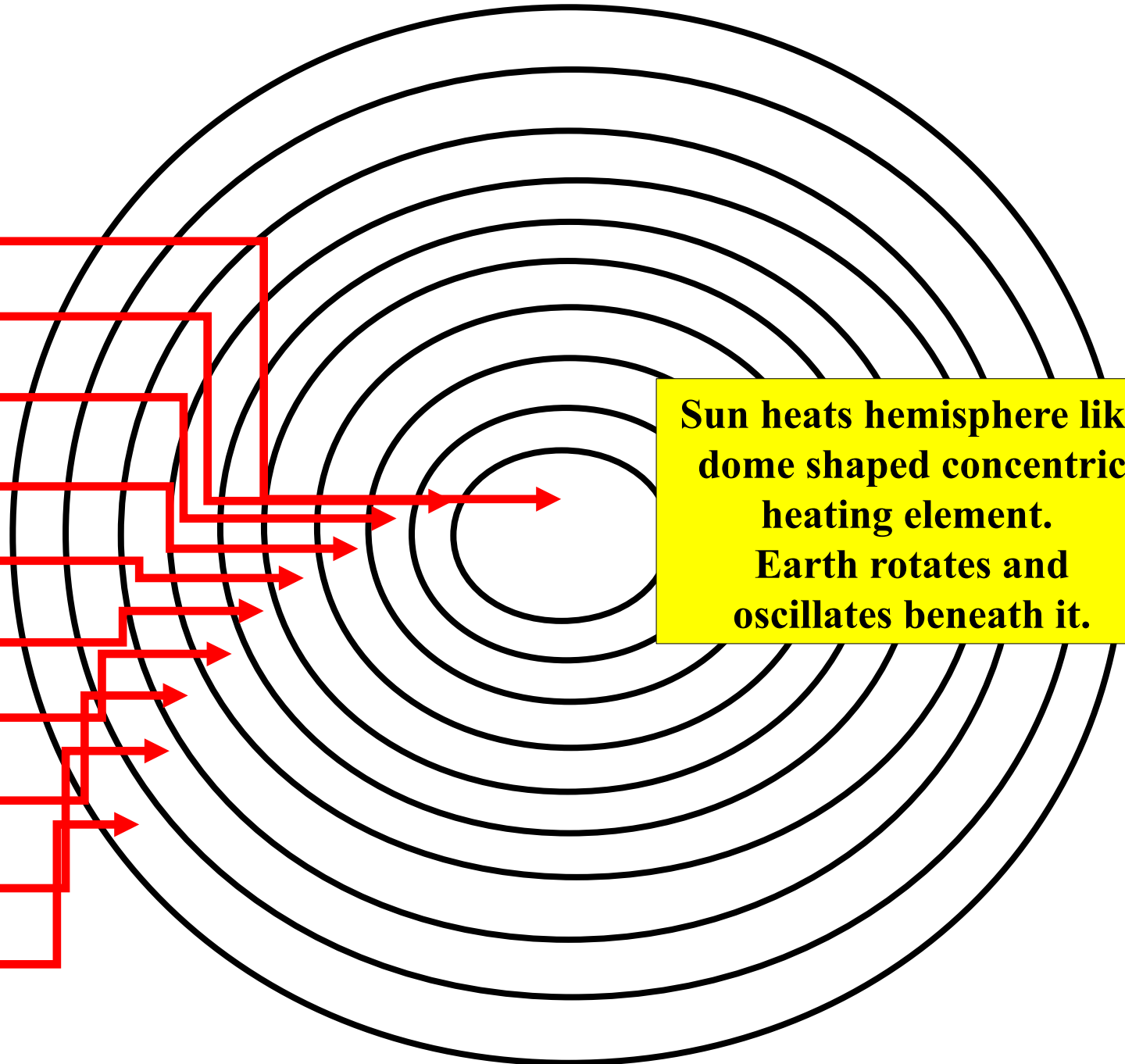
$$\cos \Theta = \text{adj} / \text{hyp}$$

$$\text{adj} = \cos \Theta * \text{hyp}$$

Actual energy entering perpendicular to ToA.
NOT the simple average 342 or 240.



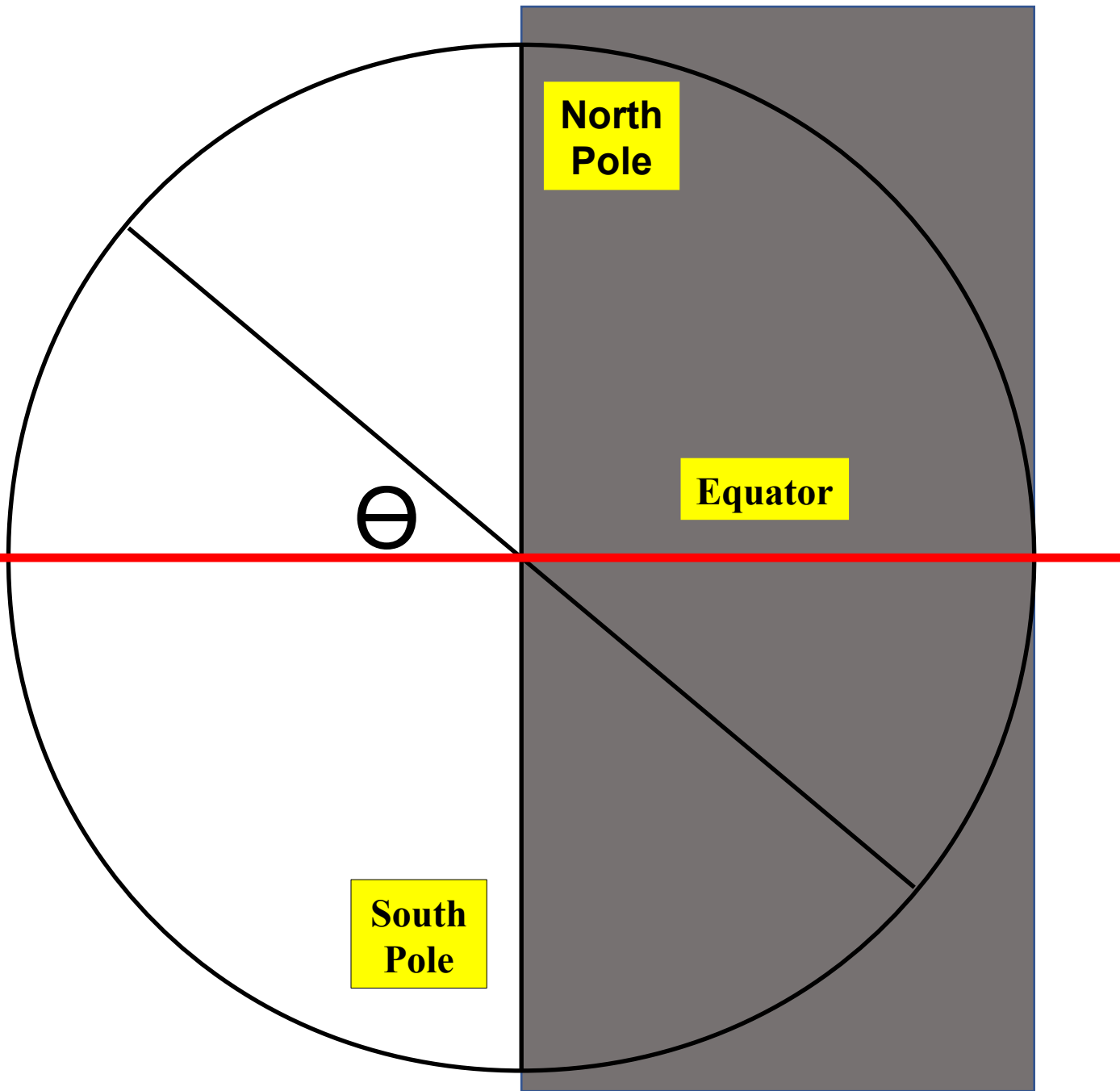
				W/m ²
		Asin(h/R)		1,368.0
J		90.0	12.9	1,333.4
I		64.2	31.4	1,168.2
H		53.1	41.2	1,029.0
G		44.4	49.4	891.1
F		36.9	56.6	753.8
E		30.0	63.2	616.6
D		23.6	69.5	479.5
C		17.5	75.5	342.5
B		11.5	81.4	205.5
A		5.7	87.1	68.5

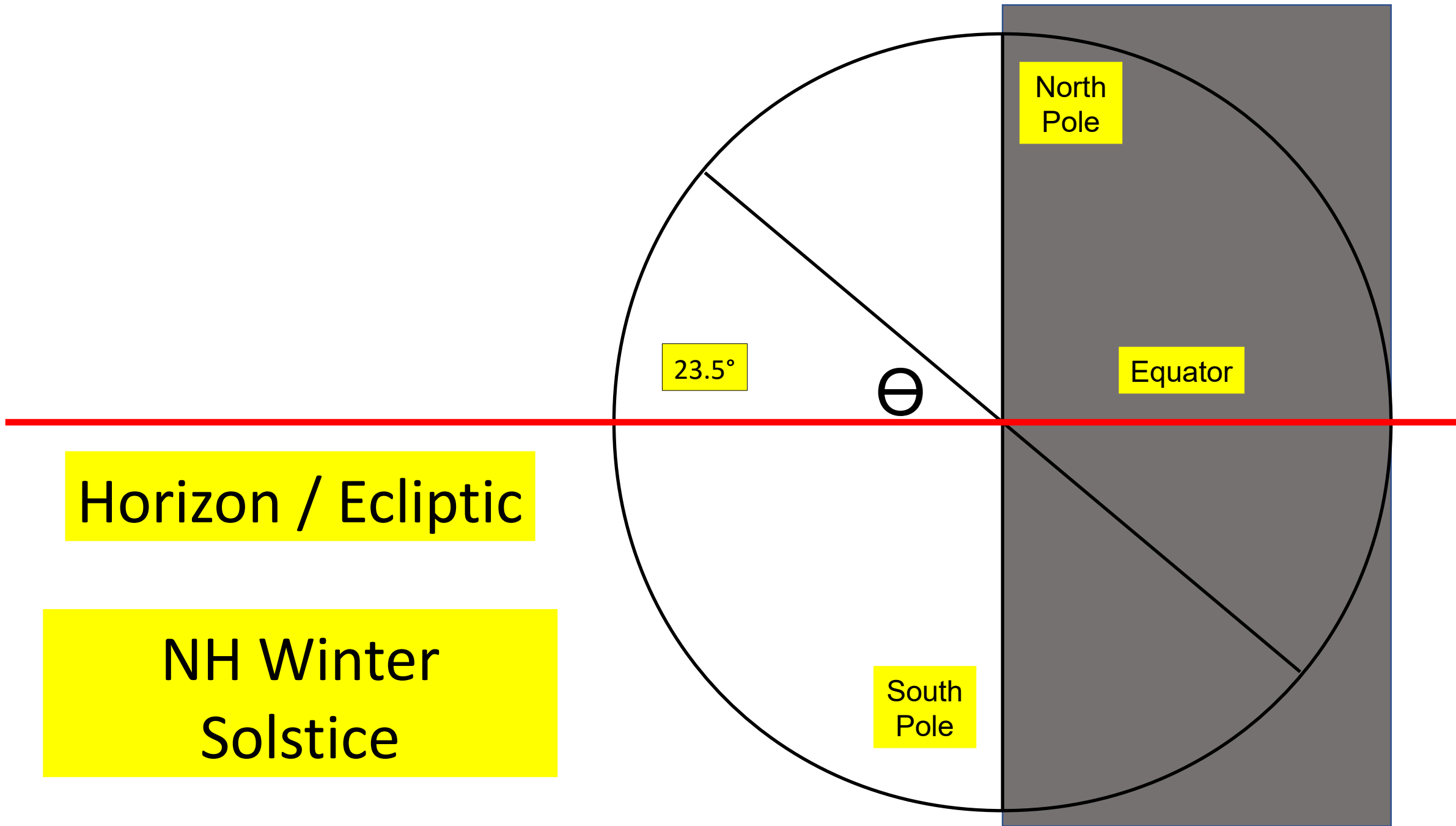


Sun heats hemisphere like dome shaped concentric heating element. Earth rotates and oscillates beneath it.

Horizon / Ecliptic

Equinox





North Pole

23.5°

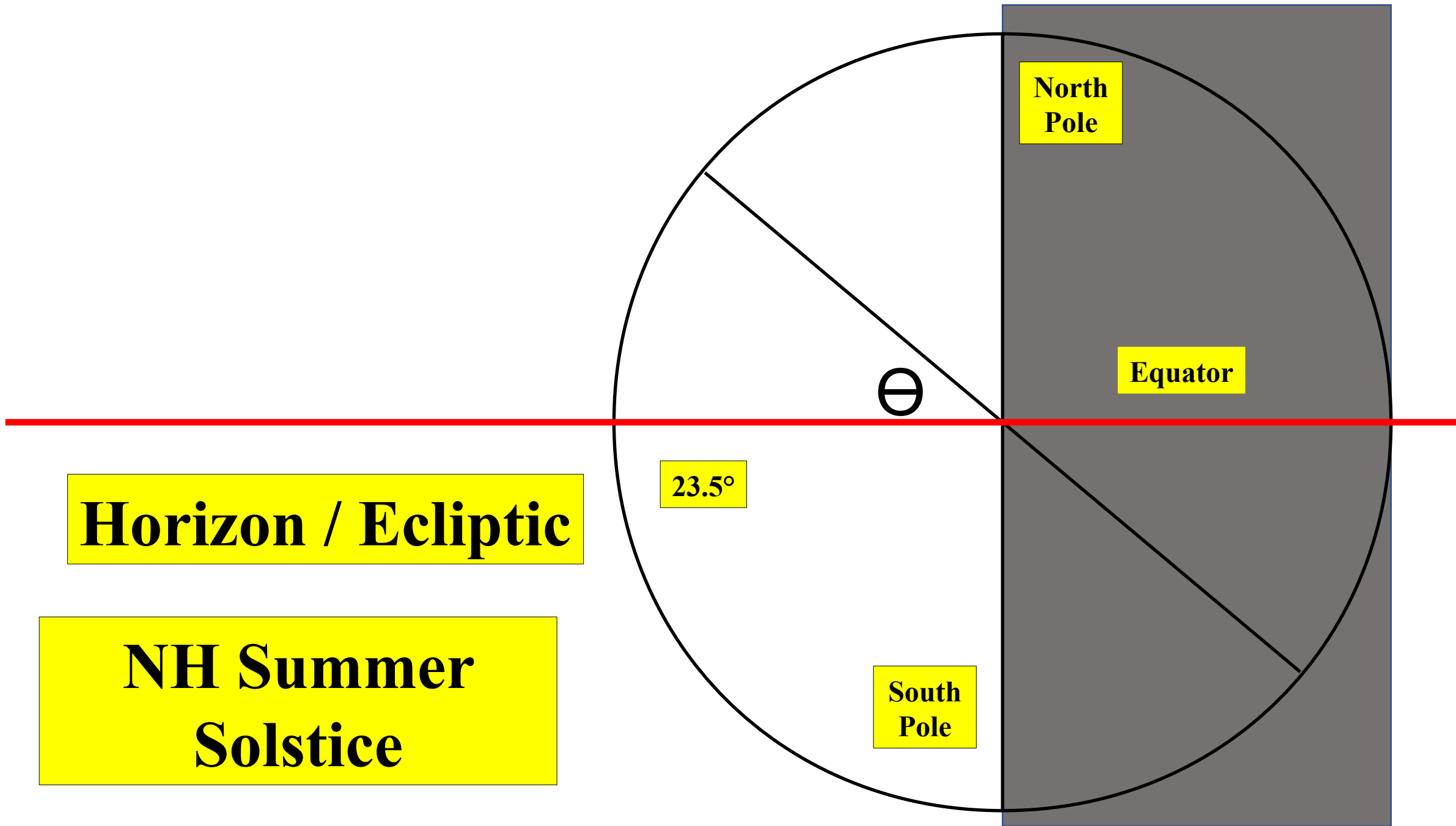
θ

Equator

Horizon / Ecliptic

NH Winter Solstice

South Pole



Horizon / Ecliptic

**NH Summer
Solstice**

**North
Pole**

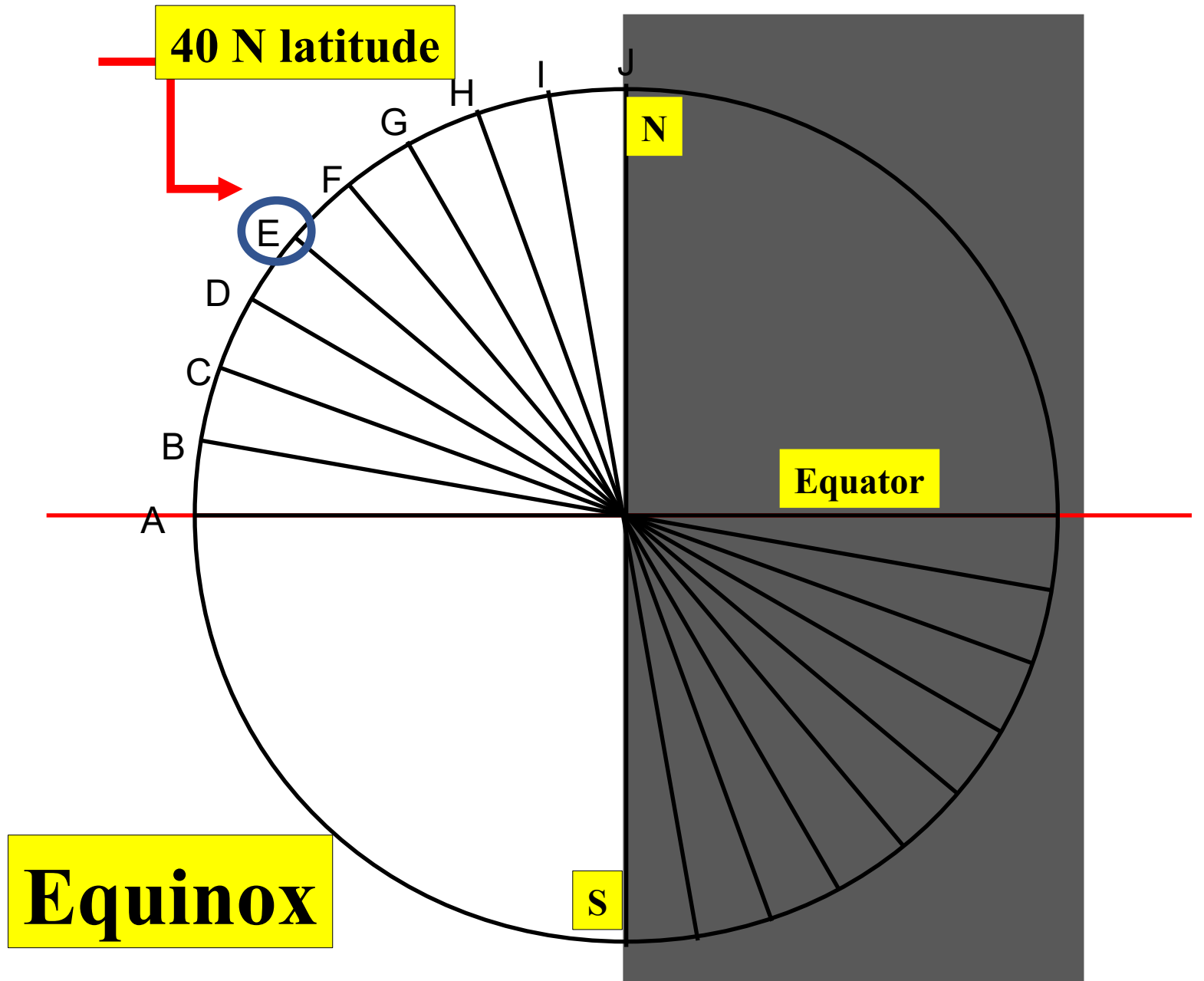
Equator

**South
Pole**

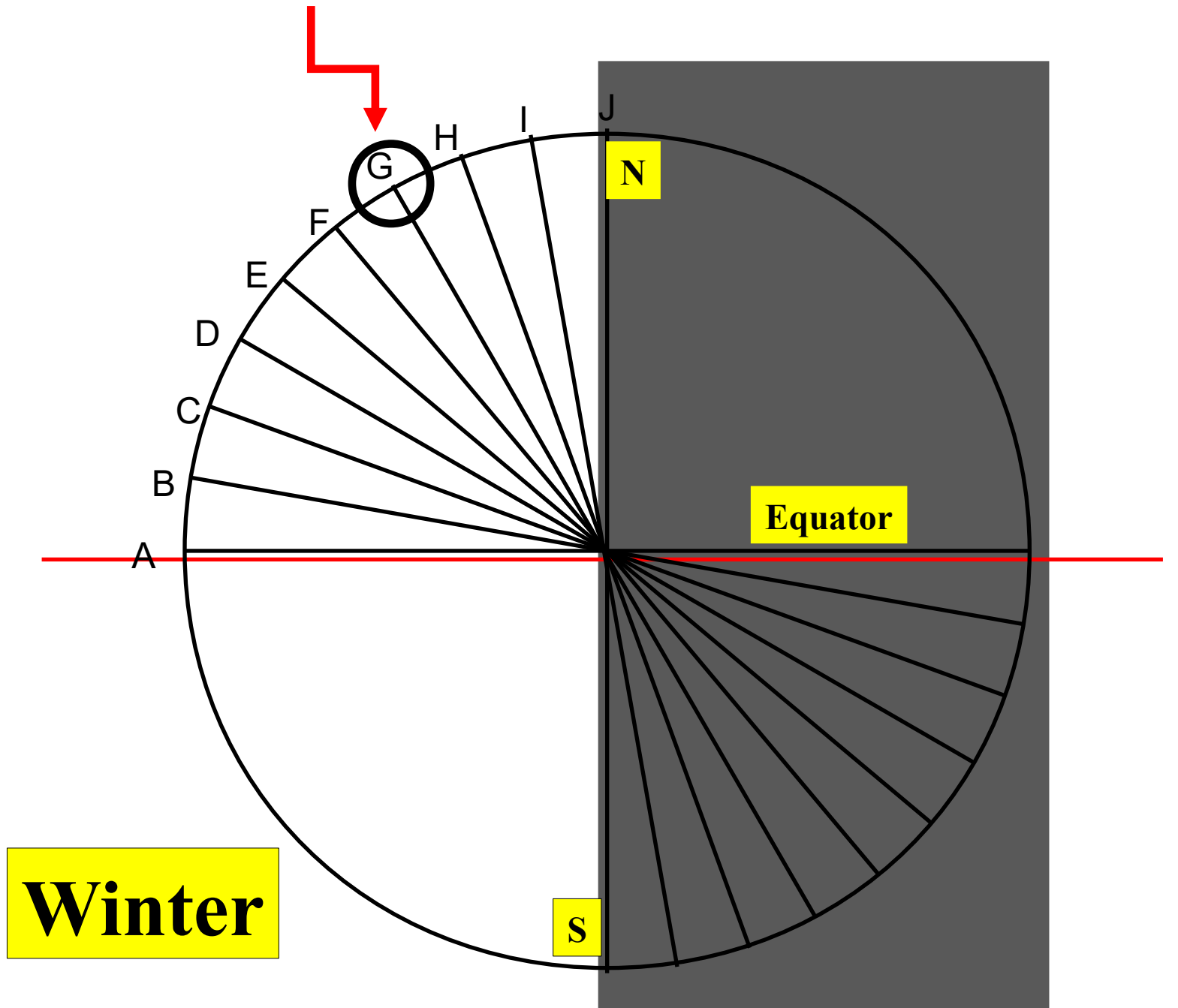
23.5°

Θ

	θ	$\text{Cos } \theta$	W/m^2
A	0	1.00	1,368.0
B	10	0.98	1,347.2
C	20	0.94	1,285.5
D	30	0.87	1,184.7
E	40	0.77	1,047.9
F	50	0.64	879.3
G	60	0.50	684.0
H	70	0.34	467.9
I	80	0.17	237.6
J	90	0.00	0.0
	Average		850.2

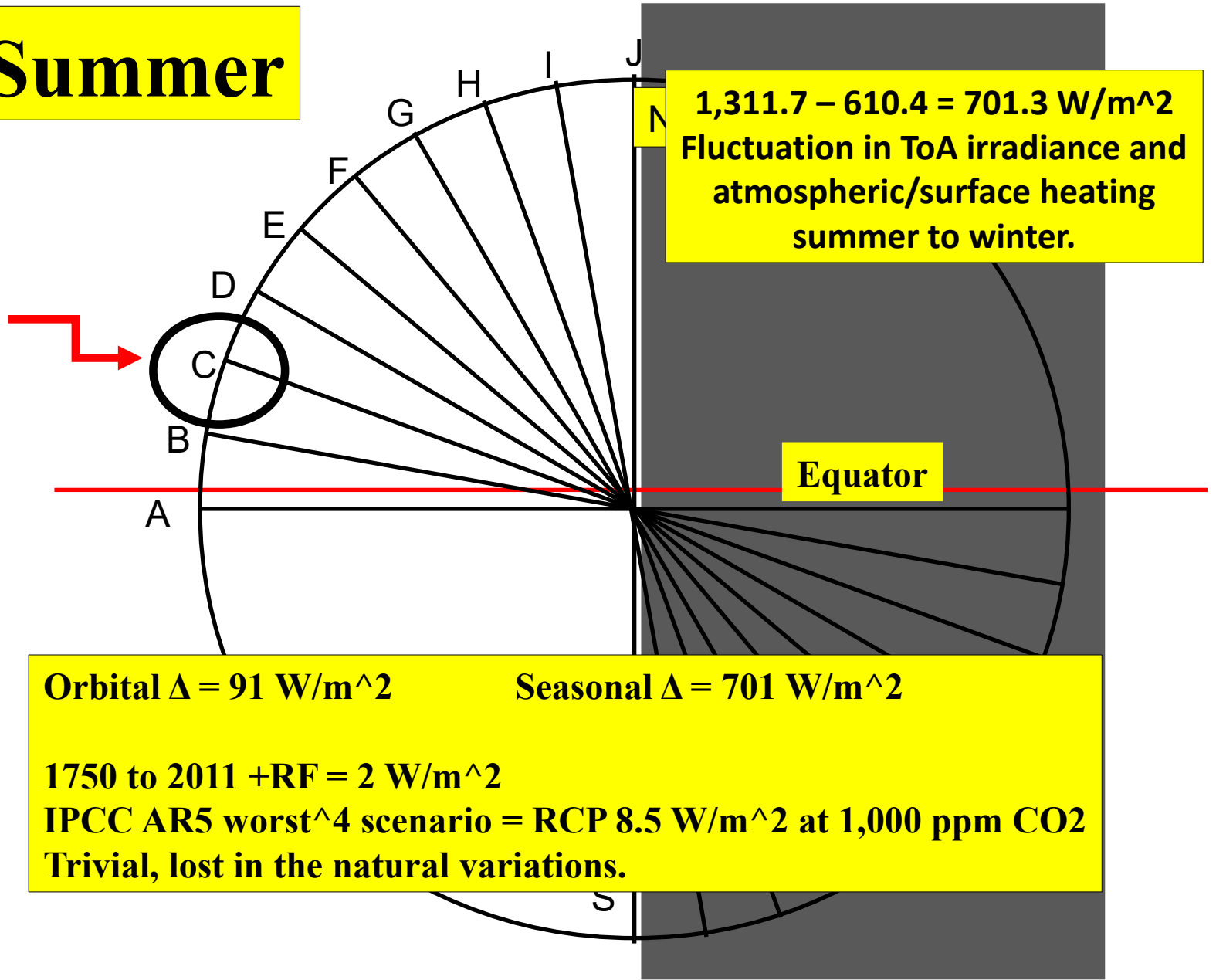


	θ	$\text{Cos } \theta$	W/m^2
A	23.5	0.92	1,254.5
B	33.5	0.83	1,140.8
C	43.5	0.73	992.3
D	53.5	0.59	813.7
E	63.5	0.45	610.4
F	73.5	0.28	388.5
G	83.5	0.11	154.9
H	93.5	(0.06)	(83.5)
I	103.5	(0.23)	(319.4)
J	113.5	(0.40)	(545.5)
	Average		440.7



	θ	$\text{Cos } \theta$	W/m^2
A	-23.5	0.92	1,254.5
B	-13.5	0.97	1,330.2
C	-3.5	1.00	1,365.4
D	6.5	0.99	1,359.2
E	16.5	0.96	1,311.7
F	26.5	0.89	1,224.3
G	36.5	0.80	1,099.7
H	46.5	0.69	941.7
I	56.5	0.55	755.0
J	66.5	0.40	545.5
	Average		1,118.7

Summer



1,311.7 – 610.4 = 701.3 W/m²
Fluctuation in ToA irradiance and atmospheric/surface heating summer to winter.

Equator

Orbital $\Delta = 91 \text{ W/m}^2$ Seasonal $\Delta = 701 \text{ W/m}^2$

1750 to 2011 +RF = 2 W/m²
IPCC AR5 worst⁴ scenario = RCP 8.5 W/m² at 1,000 ppm CO₂
Trivial, lost in the natural variations.

Over 8,600!! views on my WriterBeat papers which were also sent to the ME departments of several prestigious universities (As a BSME & PE felt some affinity.) and a long list of pro/con CAGW personalities and organizations.

NOBODY has responded explaining why my methods, calculations and conclusions in these papers are incorrect. BTW that is called SCIENCE!! (Well, I did get a lecture on water vapor which sort of misses the CO2 point.)

SOMEBODY needs to step up and ‘splain my errors, defend 33 C and “back” radiation, ‘cause if I’m correct ($Q=UAdT$ runs the atmospheric heat engine) – that’s a BIGLY problem for RGHE.

Step right up! Bring science.

Why space is hot not cold and you need an air conditioner – or two.

https://science.nasa.gov/science-news/science-at-nasa/2001/ast21mar_1/

Why the earth is hotter without an atmosphere not colder. (It's the albedo!)

<https://springerplus.springeropen.com/articles/10.1186/2193-1801-3-723>

Why RGHE theory is wrong part 1.

<http://writerbeat.com/articles/14306-Greenhouse---We-don-t-need-no-stinkin-greenhouse-Warning-science-ahead->

Why RGHE theory is wrong part 2.

<http://writerbeat.com/articles/15582-To-be-33C-or-not-to-be-33C>

Why RGHE theory is wrong part 3.

<http://writerbeat.com/articles/16255-Atmospheric-Layers-and-Thermodynamic-Ping-Pong>

<http://writerbeat.com/articles/19972-Space-Hot-or-Cold-and-RGHE>

<http://writerbeat.com/articles/15855-Venus-amp-RGHE-amp-UA-Delta-T>