Block GOH

Warning: The explicit usage of this block is deprecated, because it uses a west-positive convention for longitudes.

Please use GOH2 instead, with east-positive longitudes. GOH is still used internally by GOH2.

The GOH block returns the radiation outside atmosphere on a horizontal surface.



Name	GOH
Function	em0012
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Parameters	3
Strings	0
Group	S

Inputs

1	Year a (for example 2001)
2	Month $M \in [1, 12]$
3	Day $d \in [1, 31]$
4	Hour $h \in [0, 23]$
5	Minute $m \in [0, 59]$
6	Second $s \in [0, 60)$
7	Daylight saving time (0 no, 1 yes)

Outputs

1	Radiation outside the atmosphere on a horizontal surface G_{oh} / $\mathrm{W\,m^{-2}}$

Parameters

1	Latitude $\varphi \in [-90°, +90°]$, northern hemisphere positive
2	Longitude $\lambda \in [0°, 360°)$, Greenwich $= 0°$, west positive

	3	Time zone $Z \in [0, 23]$, e. g., Central European Time: $Z = 23$
Strings		
		None

Description The radiation outside the atmosphere on a horizontal surface G_{oh} is given by

$$G_{oh} = \epsilon_0 G_{sc} \cos\theta_z$$

where

ϵ_0	Excentricity factor $(r_0/r)^2$, with mean distance between Sun and Earth r_0 $(1.496 \times 10^{11}\ \mathrm{m})$ and time dependent distance between Sun and Earth r
G_{sc}	Solar constant $(1367\ \mathrm{W/m^2})$
θ_z	Zenith angle

The excentricity factor is calculated by Spencer's Fourier series

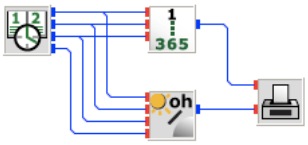
$$\begin{aligned}\epsilon_0 \quad = \quad & 1.00010 + 0.034221\cos\Gamma + 0.001280\sin\Gamma \\ & + 0.000719\cos 2\Gamma + 0.000077\sin 2\Gamma\end{aligned}$$

where

Γ	day angle $(2\pi\ (\mathrm{doy} - 1)/365)$, with the day of year $\mathrm{doy} \in [1, 365]$; leap years are not considered

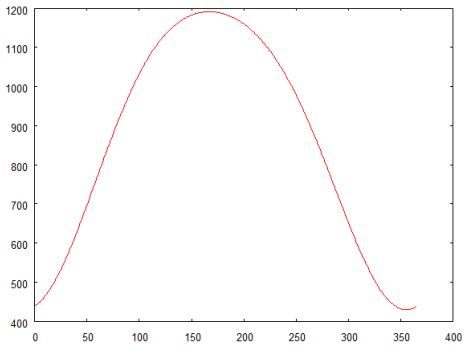
The zenith angle θ_z is calculated by an internal call to block SUNAE (using the Hollands/Maier model) and block INANG ($\beta = 0°, \gamma = 180°$).

goh.vseit



A CLOCK block delivers year, month, day, and hour data for one year in steps of one day. The hour is fixed to 12. The block GOH calculates the correspondig value of the extraterrestrial radiation for the location of Stuttgart, Germany. The DOY block converts the outputs of the CLOCK block to the day of the year.

The PLOT block plots the time series.



See also Block GON, block SUNAE.