



# Bird Simple Spectral Model: spectrl2

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## DOCUMENTATION for V.2

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### • INPUTS:

#### ○ UNITS:

- int **units** -- output units:
  - 1 = irradiance (W/sq m/micron) per wavelength (microns)
  - 2 = photon flux (10.0E+16 /sq cm/s/micron) per wavelength (microns)
  - 3 = photon flux density (10.0E+16 /sq cm/s/eV) per energy (eV)

#### ○ SITE LOCATION:

- float **latitude** -- the latitude of the site, in decimal degrees NORTH. This means that a site located at 27° 36' 18" S latitude has latitude = -27.605
- float **longitude** -- the longitude of the site, in decimal degrees EAST. This means that a site located at 102° 54' 36" W longitude has longitude = -102.91
- float **timezone** -- the Standard time zone number of the site, decimal EAST. For example, Eastern Standard Time in the United States has timezone = -5.0

#### ○ DATE:

- int **year** -- the 4-digit year. If this is unspecified, the default is year = 2001
- int **month** -- the 2-digit month; e.g., April has month = 4
- int **day** -- the 2-digit day of month; e.g., April 21 has day = 21

#### ○ TIME (Standard time only; do NOT correct for Daylight Savings Time):

- int **hour** -- the 2-digit hour, ranging from 0 to 23. If this is unspecified, the default is hour = 12. Example: at 5:44:12 PM, hour = 17
- int **minute** -- the 2-digit minute of the hour. If this is unspecified, the default is minute = 0. Example: at 5:44:12 PM, minute = 44
- int **second** -- the 2-digit second of the minute. If this is unspecified, the default is second = 0. Example: at 5:44:12 PM, second = 12

#### ○ ATMOSPHERIC TEMPERATURE & PRESSURE (optional, used to correct for atmospheric refraction and to calculate the pressure-corrected airmass):

- float **temp** -- the ambient temperature in °C. If this is unspecified, the default is temp = 10.0 °C
- float **press** -- the barometric pressure in millibars (mb). If this is unspecified, the default is press = 1013.0 mb

#### ○ COLLECTOR ORIENTATION (optional; assumption is a horizontal collector):

- float **tilt** -- the degrees of tilt from the horizontal. If this is unspecified, the default is tilt = 0.0 (horizontal). tilt > 180.0 means a sun-tracking collector.
- float **aspect** -- the azimuth angle (horizontal orientation), in degrees, that the surface faces. NORTH = 0°, EAST = 90°, SOUTH = 180°, and WEST = 270°. If this is unspecified, the default is aspect = 180.0 (South-facing; note that if tilt = 0.0, the value of aspect is irrelevant). Example: Southwest has aspect = 225.0

#### ○ GROUND REFLECTIVITY (optional, used to determine the spectral properties of the ground cover):

- float **sprfl[6]** -- ground reflectivities divided into 6 spectral bands. A reflectivity of 0 is black and a reflectivity of 1 is white. If this is unspecified, all reflectivities are assumed to be 0.2.
- float **spewvr[6]** -- the 6 spectral bands for which sprfl[6] applies. If this is unspecified, the default upper end of each band is { 0.3, 0.7, 0.8, 1.3, 2.5, 4.0 } respectively, in microns.

#### ○ ATMOSPHERIC PROPERTIES (used to specify the composition of the atmosphere):

- float **alpha** -- the power on Angstrom turbidity (read the [documentation](#)). If this is unspecified, alpha is assumed to be 1.14.
- float **assym]** -- the aerosol assymetry factor (read the [documentation](#)). If this is unspecified, assym is assumed to be 0.65.

- float **ozone** -- the ozone amount (atmospheric cm). If this is unspecified, the algorithm will assume an (in) appropriate value.
- float **tau500** -- the aerosol optical depth at 0.5 microns, base e (see  $\beta_n$  in the [documentation](#)).
- float **watvap** -- precipitable water vapor (cm).

• **OUTPUTS:**

- float **specdif[122]** -- Diffuse spectrum on panel (see units).
- float **specdir[122]** -- Direct normal spectrum (see units).
- float **specetr[122]** -- Extraterrestrial spectrum (W/sq m/micron).
- float **specglo[122]** -- Global spectrum on panel (see units).
- float **specx[122]** -- X-coordinate (wavelength or energy; see units).



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