photobiologySun Version 0.1.2
Catalogue of Solar Spectra

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1 Introduction

We will plot the emission spectra of the different lamps for which data is provided in the pacakge. We plot side-by-side the lamp output as spectral energy irradiance and as spectral photon irradiance. All spectra are normalized to an area of one under the whole curve.

```
library(ggplot2)
library(photobiology)

## Loading required package:  lubridate

library(photobiologySun)
library(photobiologygg)

## Loading required package:  proto
## Loading required package:  splus2R
## Loading required package:  plyr
##
## Attaching package:  'plyr'
##
## The following object is masked from 'package:lubridate':
##
##    here
```

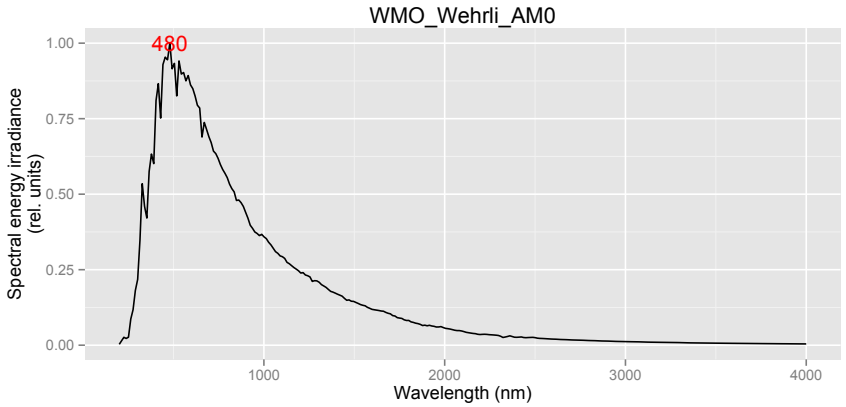
We define a function to do the actual plotting so as to not repeat code, and to make changes easier in the future.

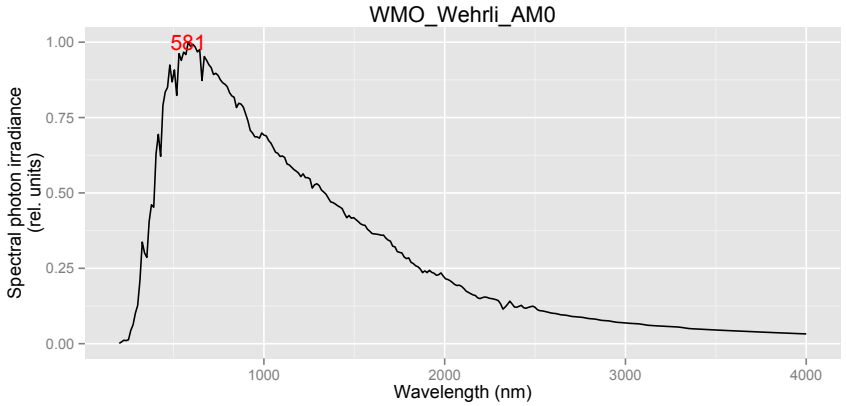
```
source.plotter <- function(source.name, w.low=250.0, w.high=900, scaled="peak"){
w.length.out <- seq(from=w.low, to=w.high, length.out=300)
spectrum.dt <- calc_source_output(w.length.out=w.length.out, source.name=source.name, scaled=scaled)
spectrum.dt <- na.omit(spectrum.dt)
fig_energy <- ggplot(aes(x=w.length, y=s.e.irrad), data=spectrum.dt) + xlim(w.low, w.high) +
  labs(x="Wavelength (nm)", y="Spectral energy irradiance\n(rel. units)", title=source.name) +
  geom_line() + stat_peaks(ignore_threshold=0.33, colour="red", span=21)
fig_photon <- ggplot(aes(x=w.length, y=s.q.irrad), data=spectrum.dt) + xlim(w.low, w.high) +
  labs(x="Wavelength (nm)", y="Spectral photon irradiance\n(rel. units)", title=source.name) +
  geom_line() + stat_peaks(ignore_threshold=0.33, colour="red", span=21)
print(fig_energy)
```

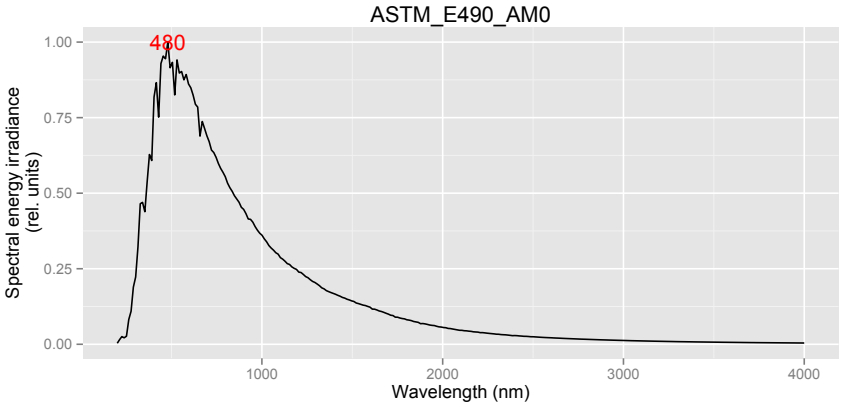
```
print(fig_photon)
}
```

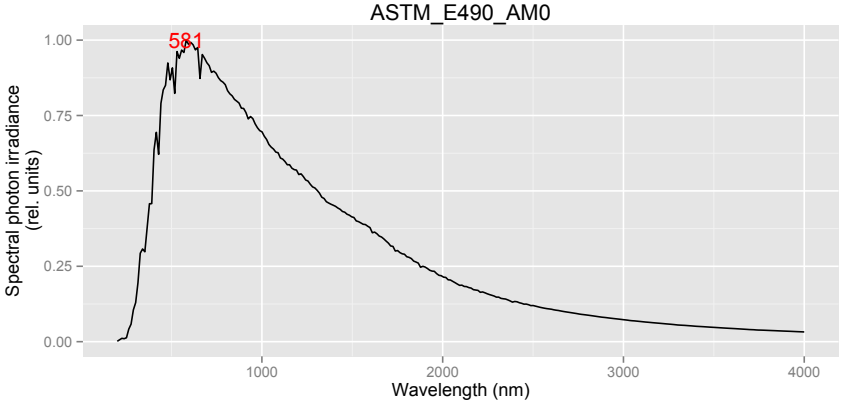
2 Extraterrestrial solar spectra

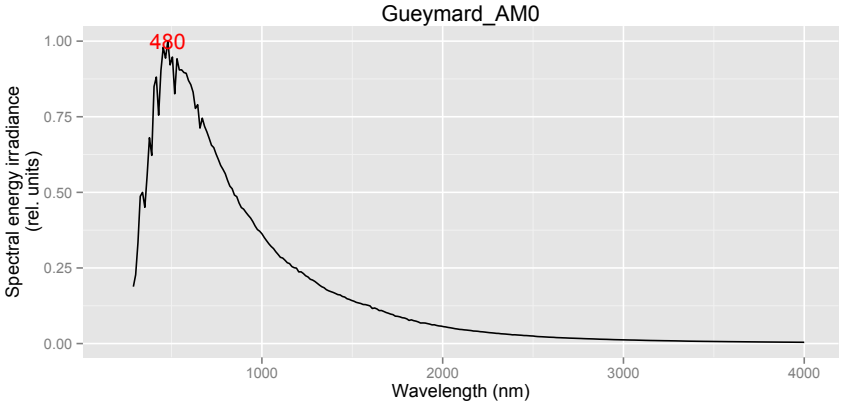
```
spectra <- c("WMO_Wehrli_AM0", "ASTM_E490_AM0", "Gueymard_AM0")
for (spc in spectra) {
  source.plotter(source.name=spc, w.low=200, w.high=4000)
}
```

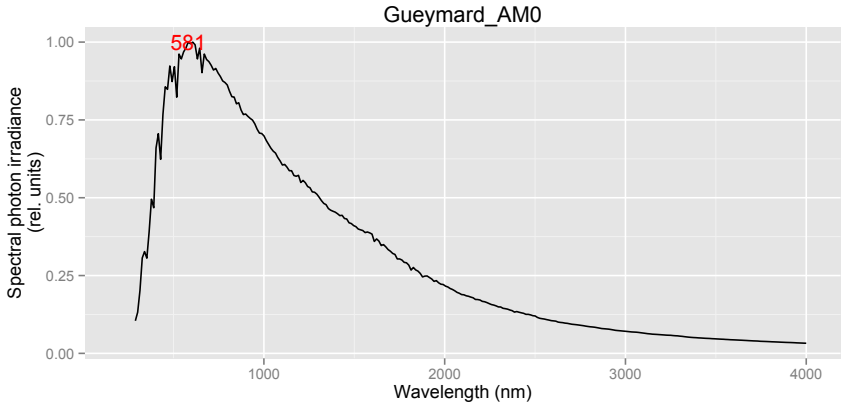





ASTM_E490_AM0
480
Spectral energy irradiance
(rel. units)
1.00
0.75
0.50
0.25
0.00
1000
2000
3000
4000
Wavelength (nm)

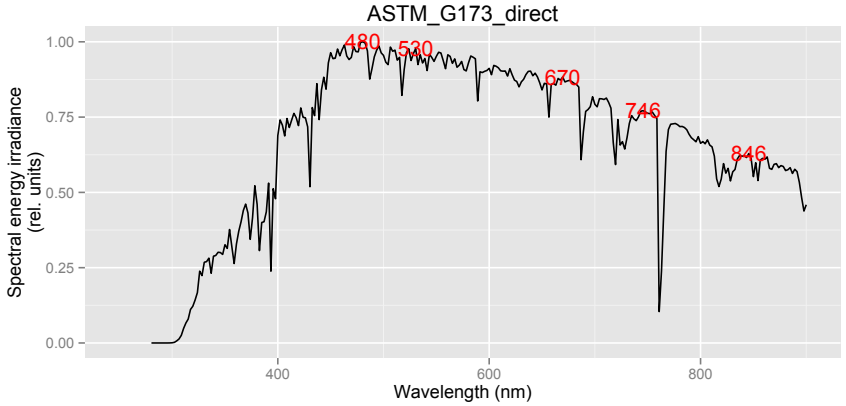

ASTM_E490_AM0
581
Spectral photon irradiance
(rel. units)
1.00
0.75
0.50
0.25
0.00
1000
2000
3000
4000
Wavelength (nm)

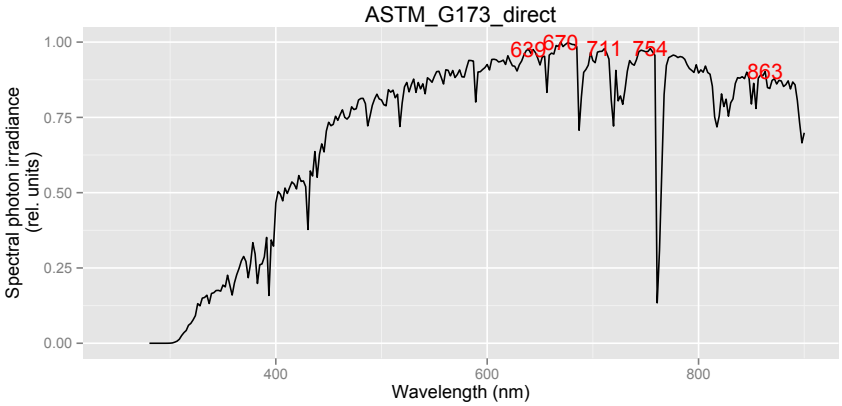

Gueymard_AM0
480
Spectral energy irradiance
(rel. units)
1.00
0.75
0.50
0.25
0.00
1000
2000
3000
4000
Wavelength (nm)

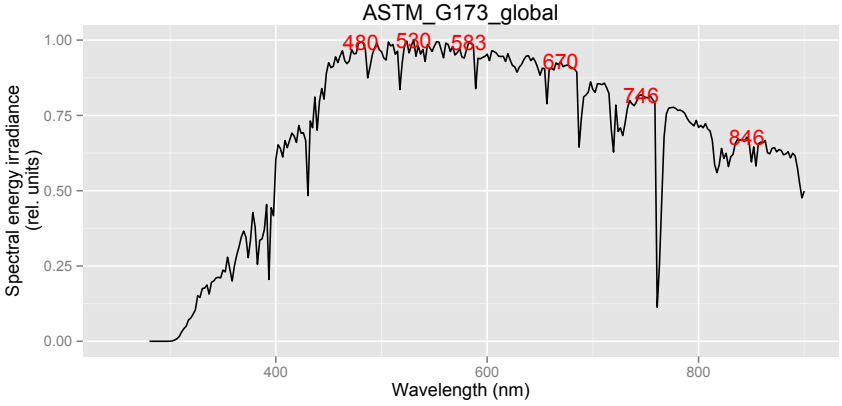


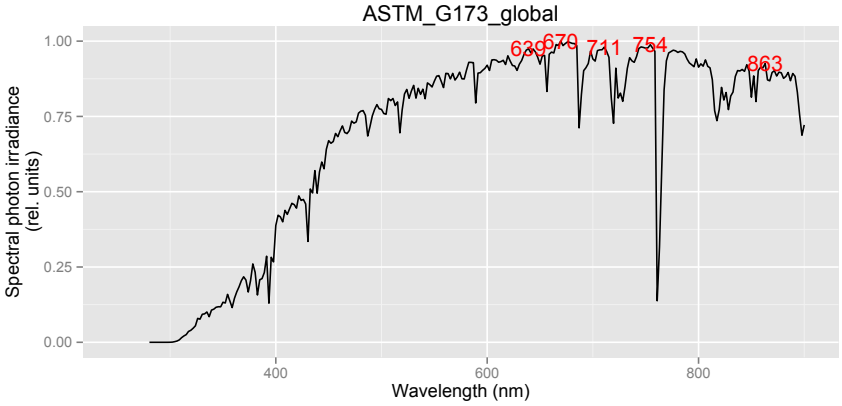
3 Standard terrestrial solar spectra

```
spectra <- c("ASTM_G173_direct", "ASTM_G173_global")
for (spc in spectra) {
  source.plotter(source.name=spc)
}
```









4 Measured dayligh spectra

```
spectra <- c("sun_May_morning")
for (spc in spectra) {
  source.plotter(source.name=spc)
}
```