

# photobiologySensors Version 0.1.8

## Catalogue of Sensors

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### 1 Introduction

We will plot the spectral response of the different sensors for which data is provided in the package. We plot side-by-side the response to energy (i.e. the electrical output that would be expected at each wavelength with a source emitting equal spectral energy irradiance at all wavelengths) and the response to photons (i.e. as above but with a source emitting equal spectral photon irradiance at all wavelengths). All responses are normalized to an area of one under the whole curve.

```
library(ggplot2)
library(photobiologygg)
library(photobiology)
library(photobiologySensors)
```

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

```
sensor.plotter <-
function(sensor.name, w.low=250.0, w.high=900.0, scaled="peak"){
  w.length.out <-
    seq(from=w.low, to=w.high, length.out=300)
  e.spectrum.data <-
    calc_sensor_multipliers(w.length.out=w.length.out,
                           sensor.name=sensor.name,
                           unit.out="energy", scaled=scaled)

  q.spectrum.data <-
    calc_sensor_multipliers(w.length.out=w.length.out,
                           sensor.name=sensor.name,
                           unit.out="photon", scaled=scaled)

  e.spectrum.data <-
    na.omit(e.spectrum.data)
  q.spectrum.data <-
    na.omit(q.spectrum.data)
  fig_energy <-
    ggplot(aes(x=w.length, y=response), data=e.spectrum.data) +
    xlim(w.low, w.high) + ylim(0.0, 1.2) +
    labs(x="Wavelength (nm)", y="Spectral response (energy)",
```

```

    title=sensor.name) +
    geom_line() +
    stat_peaks(hjust=-0.5, angle=90, span=5,
              ignore_threshold=0.1)
fig_photon <-
  ggplot(aes(x=w.length, y=response), data=q.spectrum.data) +
  xlim(w.low, w.high) + ylim(0.0, 1.2) +
  labs(x="Wavelength (nm)", y="Spectral response (photon)",
       title=sensor.name) +
  geom_line() +
  stat_peaks(hjust=-0.5, angle=90, span=5,
            ignore_threshold=0.1)
print(fig_energy)
print(fig_photon)
}

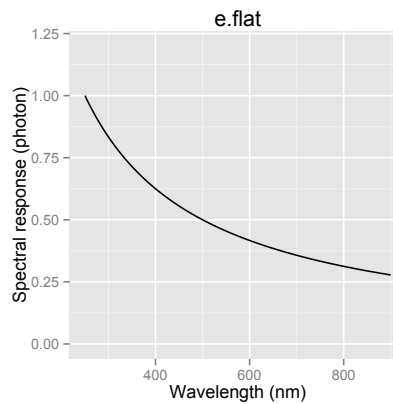
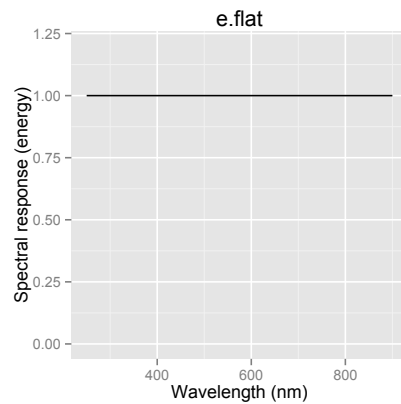
```

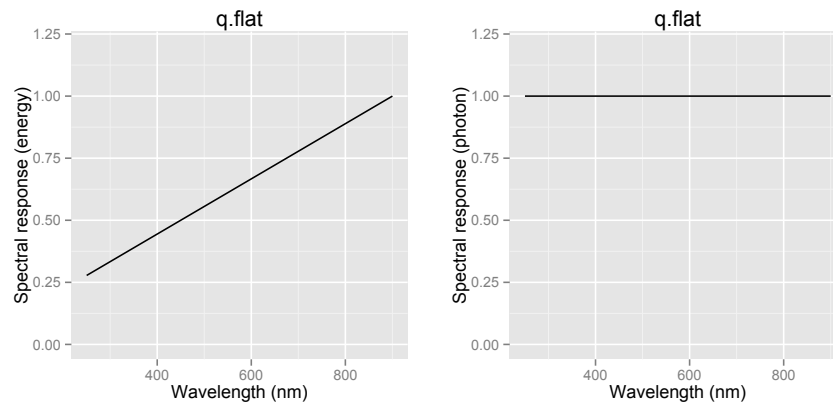
## 2 Flat responses

```

sensor.plotter("e.flat")
sensor.plotter("q.flat")

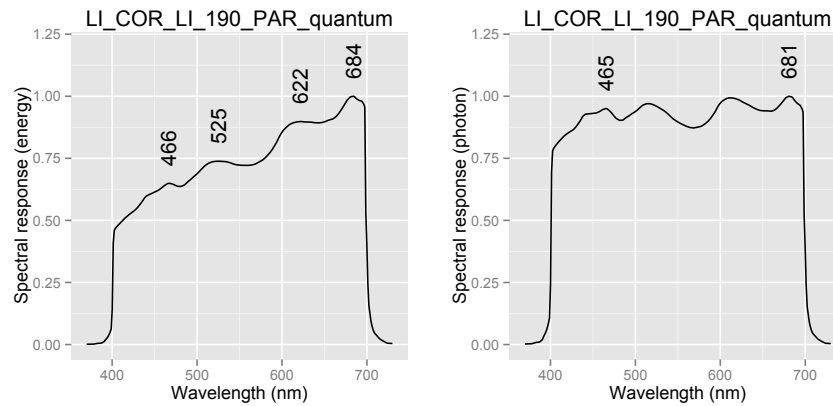
```

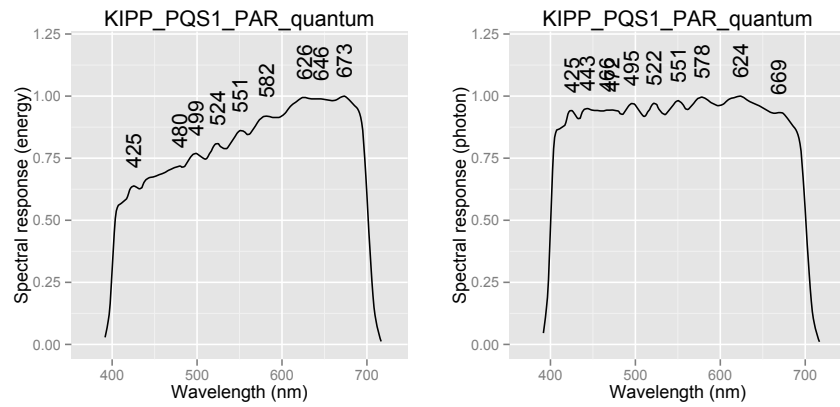




### 3 Quantum PAR sensors

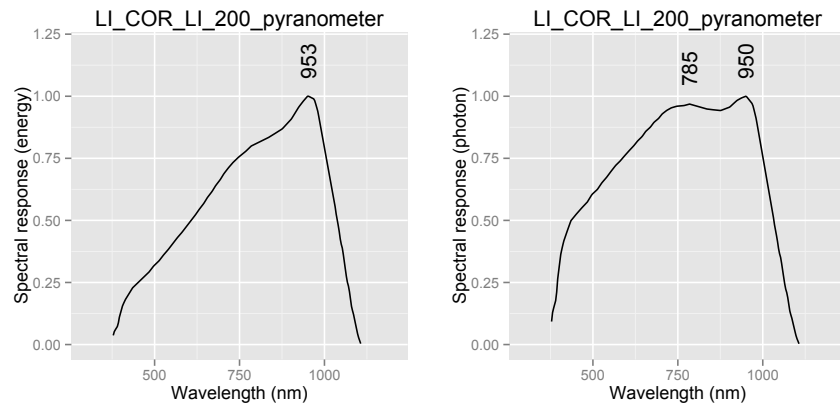
```
par.sensors <- c("LI_COR_LI_190_PAR_quantum", "KIPP_PQS1_PAR_quantum")
for (sensor in par.sensors) {
  sensor.plotter(sensor.name=sensor, w.low=370.0, w.high=730.0)
}
```

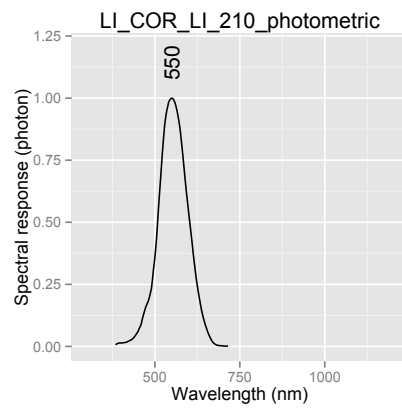
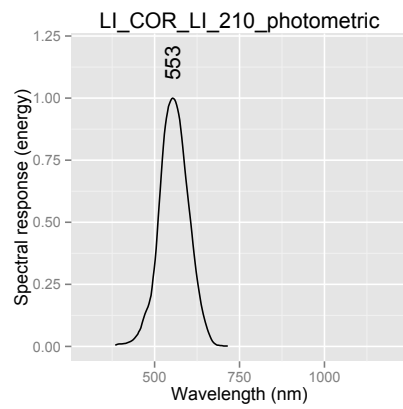




## 4 Other sensors

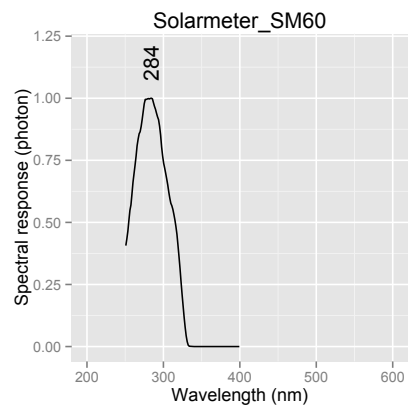
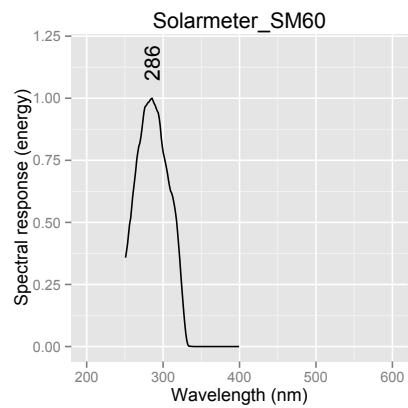
```
other.sensors <- c("LI_COR_LI_200_pyranometer", "LI_COR_LI_210_photometric")
for (sensor in other.sensors) {
  sensor.plotter(sensor.name=sensor, w.low=300.0, w.high=1200.0)
}
```

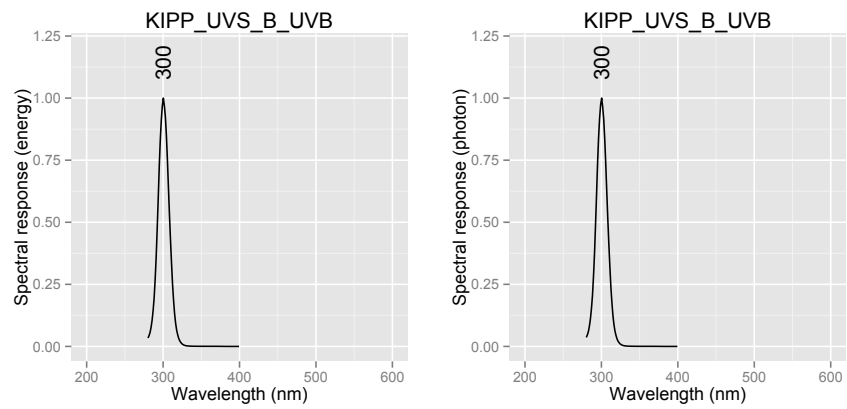




## 5 UVB sensors

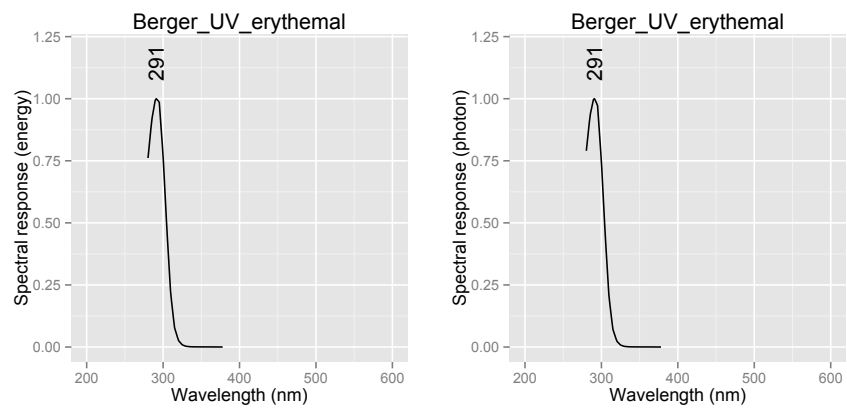
```
uvb.sensors <- c("Solarmeter_SM60", "KIPP_UVS_B_UVB")
for (sensor in uvb.sensors) {
  sensor.plotter(sensor, w.low=200, w.high=600)
}
```

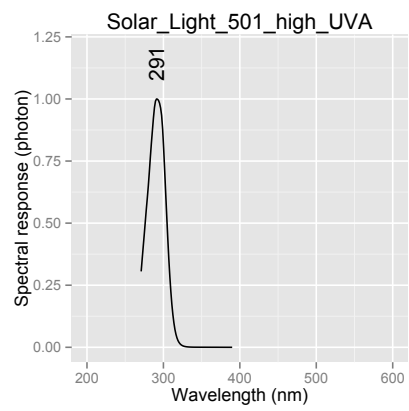
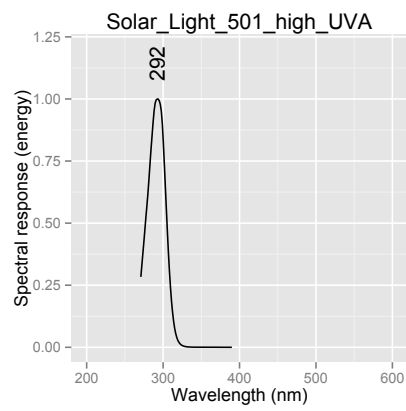
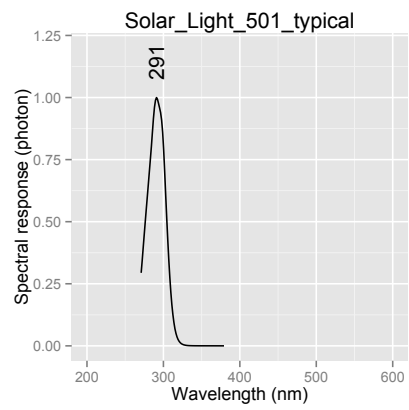
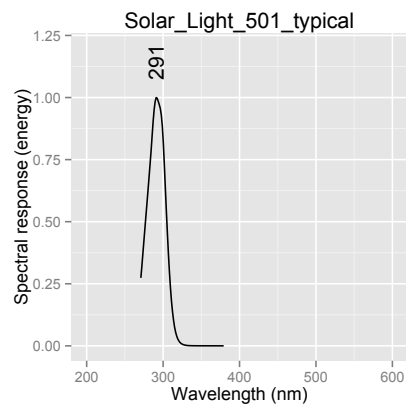
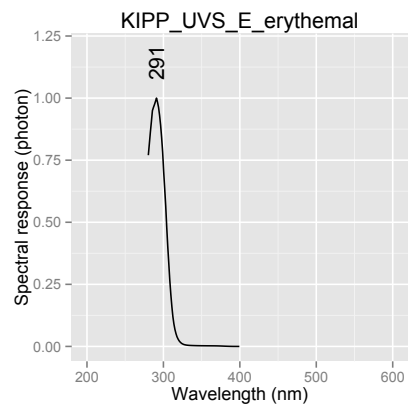
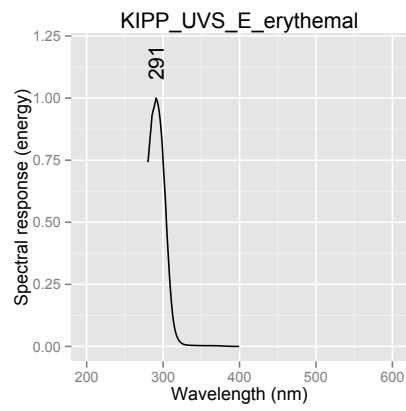


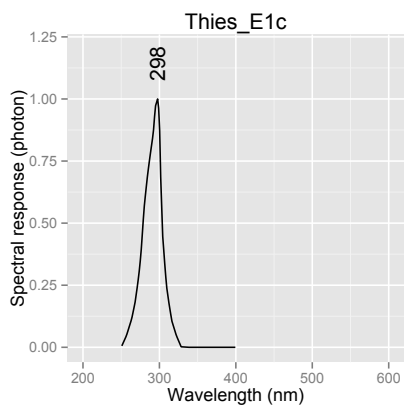
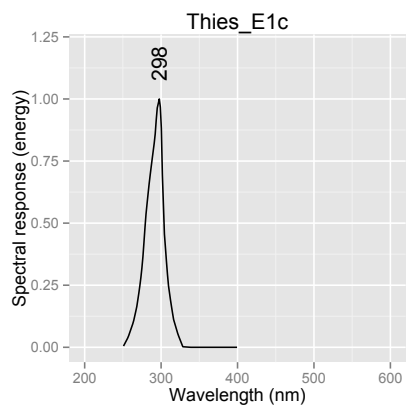
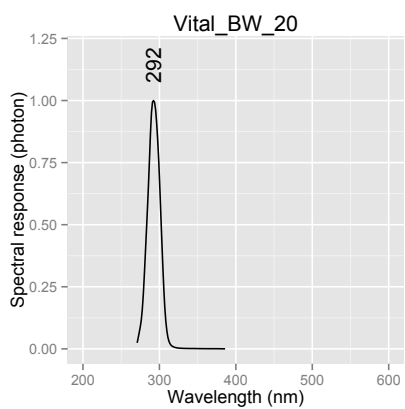
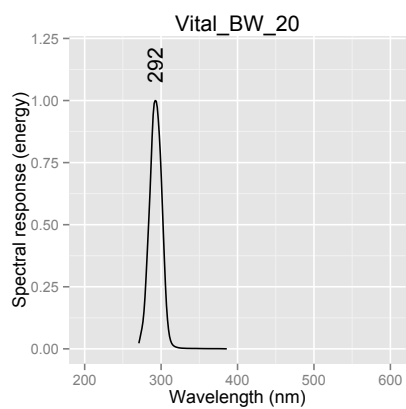
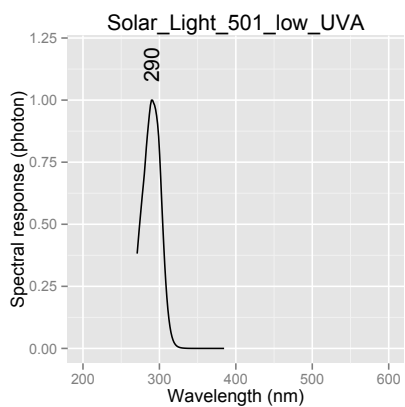
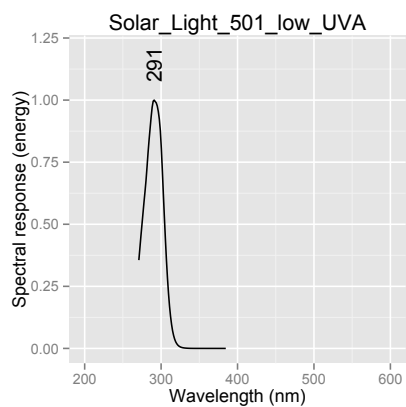


## 6 Erythema UV sensors

```
uv_ery.sensors <- c("Berger_UV_erythema", "KIPP_UVS_E_erythema",
                    "Solar_Light_501_typical", "Solar_Light_501_high_UVA", "Solar_Light_501_low_UVA",
                    "Vital_BW_20", "Thies_E1c")
for (sensor in uv_ery.sensors) {
  sensor.plotter(sensor, w.low=200, w.high=600)
}
```



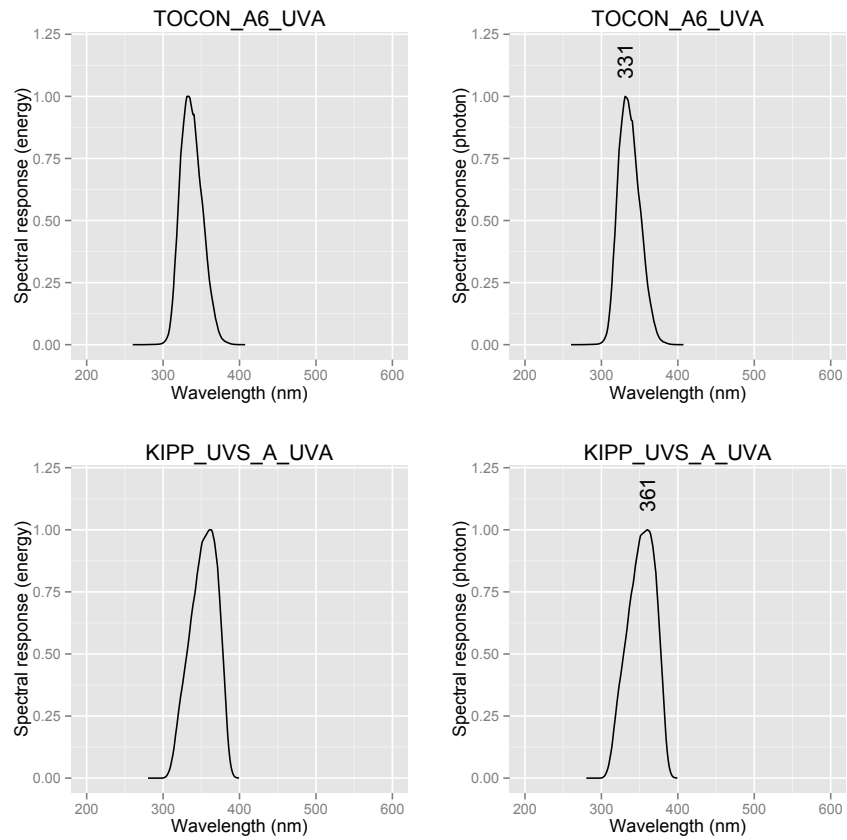




## 7 UVA sensors

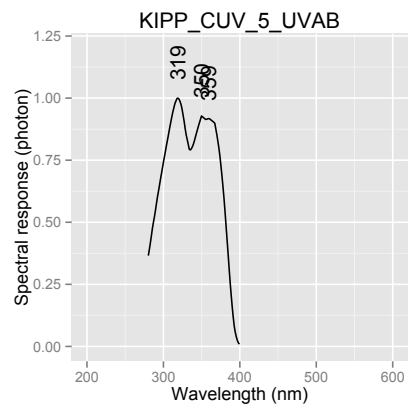
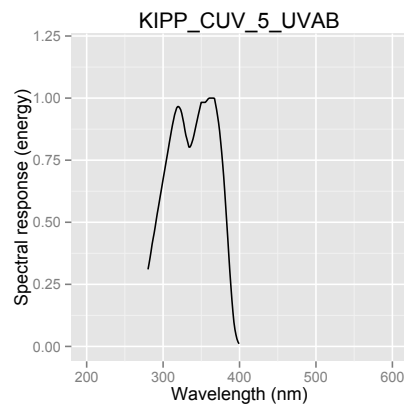


```
uva.sensors <- c("TOCON_A6_UVA", "KIPP_UVS_A_UVA")
for (sensor in uva.sensors) {
  sensor.plotter(sensor, w.low=200, w.high=600)
}
```



## 8 Broadband UV sensors

```
uvab.sensors <- c("KIPP_CUV_5_UVAB")
for (sensor in uvab.sensors) {
  sensor.plotter(sensor, w.low=200, w.high=600)
}
```



## 9 Blue sensors

```
b.sensors <- c("TOCON_blue4")
for (sensor in b.sensors) {
  sensor.plotter(sensor, w.low=200, w.high=600)
}
```

