Agron508\_Week4

Anabelle

1/30/2018

## reading and plotting the data from our class on January 29th

library(readr)  
tab<-read\_csv("https://raw.githubusercontent.com/Agron508/Homework/master/SS-110\_1010\_12918noon.csv")

## Warning: Duplicated column names deduplicated: '11:57:36 2018/01/29  
## SS-110\_1010' => '11:57:36 2018/01/29 SS-110\_1010\_1' [4], '11:57:37  
## 2018/01/29 SS-110\_1010' => '11:57:37 2018/01/29 SS-110\_1010\_1' [6],  
## '11:57:37 2018/01/29 SS-110\_1010' => '11:57:37 2018/01/29  
## SS-110\_1010\_2' [7], '11:57:38 2018/01/29 SS-110\_1010' => '11:57:38  
## 2018/01/29 SS-110\_1010\_1' [9], '11:57:38 2018/01/29 SS-110\_1010' =>  
## '11:57:38 2018/01/29 SS-110\_1010\_2' [10], '11:57:39 2018/01/29 SS-110\_1010'  
## => '11:57:39 2018/01/29 SS-110\_1010\_1' [12], '11:57:39 2018/01/29  
## SS-110\_1010' => '11:57:39 2018/01/29 SS-110\_1010\_2' [13], '11:57:40  
## 2018/01/29 SS-110\_1010' => '11:57:40 2018/01/29 SS-110\_1010\_1' [15],  
## '11:57:41 2018/01/29 SS-110\_1010' => '11:57:41 2018/01/29  
## SS-110\_1010\_1' [17], '11:57:41 2018/01/29 SS-110\_1010' => '11:57:41  
## 2018/01/29 SS-110\_1010\_2' [18], '11:57:42 2018/01/29 SS-110\_1010' =>  
## '11:57:42 2018/01/29 SS-110\_1010\_1' [20], '11:57:42 2018/01/29 SS-110\_1010'  
## => '11:57:42 2018/01/29 SS-110\_1010\_2' [21], '11:57:43 2018/01/29  
## SS-110\_1010' => '11:57:43 2018/01/29 SS-110\_1010\_1' [23], '11:57:43  
## 2018/01/29 SS-110\_1010' => '11:57:43 2018/01/29 SS-110\_1010\_2' [24],  
## '11:57:44 2018/01/29 SS-110\_1010' => '11:57:44 2018/01/29  
## SS-110\_1010\_1' [26], '11:57:44 2018/01/29 SS-110\_1010' => '11:57:44  
## 2018/01/29 SS-110\_1010\_2' [27], '11:57:45 2018/01/29 SS-110\_1010' =>  
## '11:57:45 2018/01/29 SS-110\_1010\_1' [29], '11:57:46 2018/01/29 SS-110\_1010'  
## => '11:57:46 2018/01/29 SS-110\_1010\_1' [31], '11:57:46 2018/01/29  
## SS-110\_1010' => '11:57:46 2018/01/29 SS-110\_1010\_2' [32], '11:57:47  
## 2018/01/29 SS-110\_1010' => '11:57:47 2018/01/29 SS-110\_1010\_1' [34],  
## '11:57:48 2018/01/29 SS-110\_1010' => '11:57:48 2018/01/29  
## SS-110\_1010\_1' [36], '11:57:48 2018/01/29 SS-110\_1010' => '11:57:48  
## 2018/01/29 SS-110\_1010\_2' [37], '11:57:49 2018/01/29 SS-110\_1010' =>  
## '11:57:49 2018/01/29 SS-110\_1010\_1' [39], '11:57:50 2018/01/29 SS-110\_1010'  
## => '11:57:50 2018/01/29 SS-110\_1010\_1' [41], '11:57:51 2018/01/29  
## SS-110\_1010' => '11:57:51 2018/01/29 SS-110\_1010\_1' [43], '11:57:51  
## 2018/01/29 SS-110\_1010' => '11:57:51 2018/01/29 SS-110\_1010\_2' [44],  
## '11:57:52 2018/01/29 SS-110\_1010' => '11:57:52 2018/01/29  
## SS-110\_1010\_1' [46], '11:57:53 2018/01/29 SS-110\_1010' => '11:57:53  
## 2018/01/29 SS-110\_1010\_1' [48], '11:57:53 2018/01/29 SS-110\_1010' =>  
## '11:57:53 2018/01/29 SS-110\_1010\_2' [49], '11:57:54 2018/01/29 SS-110\_1010'  
## => '11:57:54 2018/01/29 SS-110\_1010\_1' [51], '11:57:55 2018/01/29  
## SS-110\_1010' => '11:57:55 2018/01/29 SS-110\_1010\_1' [53], '11:57:55  
## 2018/01/29 SS-110\_1010' => '11:57:55 2018/01/29 SS-110\_1010\_2' [54],  
## '11:57:56 2018/01/29 SS-110\_1010' => '11:57:56 2018/01/29  
## SS-110\_1010\_1' [56], '11:57:57 2018/01/29 SS-110\_1010' => '11:57:57  
## 2018/01/29 SS-110\_1010\_1' [58], '11:57:57 2018/01/29 SS-110\_1010' =>  
## '11:57:57 2018/01/29 SS-110\_1010\_2' [59], '11:57:58 2018/01/29 SS-110\_1010'  
## => '11:57:58 2018/01/29 SS-110\_1010\_1' [61], '11:57:59 2018/01/29  
## SS-110\_1010' => '11:57:59 2018/01/29 SS-110\_1010\_1' [63], '11:58:00  
## 2018/01/29 SS-110\_1010' => '11:58:00 2018/01/29 SS-110\_1010\_1' [65],  
## '11:58:00 2018/01/29 SS-110\_1010' => '11:58:00 2018/01/29  
## SS-110\_1010\_2' [66], '11:58:01 2018/01/29 SS-110\_1010' => '11:58:01  
## 2018/01/29 SS-110\_1010\_1' [68], '11:58:02 2018/01/29 SS-110\_1010' =>  
## '11:58:02 2018/01/29 SS-110\_1010\_1' [70], '11:58:02 2018/01/29 SS-110\_1010'  
## => '11:58:02 2018/01/29 SS-110\_1010\_2' [71], '11:58:03 2018/01/29  
## SS-110\_1010' => '11:58:03 2018/01/29 SS-110\_1010\_1' [73], '11:58:03  
## 2018/01/29 SS-110\_1010' => '11:58:03 2018/01/29 SS-110\_1010\_2' [74],  
## '11:58:04 2018/01/29 SS-110\_1010' => '11:58:04 2018/01/29  
## SS-110\_1010\_1' [76], '11:58:05 2018/01/29 SS-110\_1010' => '11:58:05  
## 2018/01/29 SS-110\_1010\_1' [78], '11:58:05 2018/01/29 SS-110\_1010' =>  
## '11:58:05 2018/01/29 SS-110\_1010\_2' [79], '11:58:06 2018/01/29 SS-110\_1010'  
## => '11:58:06 2018/01/29 SS-110\_1010\_1' [81], '11:58:06 2018/01/29  
## SS-110\_1010' => '11:58:06 2018/01/29 SS-110\_1010\_2' [82], '11:58:07  
## 2018/01/29 SS-110\_1010' => '11:58:07 2018/01/29 SS-110\_1010\_1' [84],  
## '11:58:08 2018/01/29 SS-110\_1010' => '11:58:08 2018/01/29  
## SS-110\_1010\_1' [86], '11:58:08 2018/01/29 SS-110\_1010' => '11:58:08  
## 2018/01/29 SS-110\_1010\_2' [87], '11:58:09 2018/01/29 SS-110\_1010' =>  
## '11:58:09 2018/01/29 SS-110\_1010\_1' [89], '11:58:09 2018/01/29 SS-110\_1010'  
## => '11:58:09 2018/01/29 SS-110\_1010\_2' [90], '11:58:10 2018/01/29  
## SS-110\_1010' => '11:58:10 2018/01/29 SS-110\_1010\_1' [92], '11:58:10  
## 2018/01/29 SS-110\_1010' => '11:58:10 2018/01/29 SS-110\_1010\_2' [93],  
## '11:58:11 2018/01/29 SS-110\_1010' => '11:58:11 2018/01/29  
## SS-110\_1010\_1' [95], '11:58:12 2018/01/29 SS-110\_1010' => '11:58:12  
## 2018/01/29 SS-110\_1010\_1' [97], '11:58:12 2018/01/29 SS-110\_1010' =>  
## '11:58:12 2018/01/29 SS-110\_1010\_2' [98], '11:58:13 2018/01/29 SS-110\_1010'  
## => '11:58:13 2018/01/29 SS-110\_1010\_1' [100], '11:58:13 2018/01/29  
## SS-110\_1010' => '11:58:13 2018/01/29 SS-110\_1010\_2' [101], '11:58:14  
## 2018/01/29 SS-110\_1010' => '11:58:14 2018/01/29 SS-110\_1010\_1' [103],  
## '11:58:15 2018/01/29 SS-110\_1010' => '11:58:15 2018/01/29  
## SS-110\_1010\_1' [105], '11:58:15 2018/01/29 SS-110\_1010' => '11:58:15  
## 2018/01/29 SS-110\_1010\_2' [106], '11:58:16 2018/01/29 SS-110\_1010'  
## => '11:58:16 2018/01/29 SS-110\_1010\_1' [108], '11:58:17 2018/01/29  
## SS-110\_1010' => '11:58:17 2018/01/29 SS-110\_1010\_1' [110], '11:58:17  
## 2018/01/29 SS-110\_1010' => '11:58:17 2018/01/29 SS-110\_1010\_2' [111],  
## '11:58:18 2018/01/29 SS-110\_1010' => '11:58:18 2018/01/29  
## SS-110\_1010\_1' [113], '11:58:19 2018/01/29 SS-110\_1010' => '11:58:19  
## 2018/01/29 SS-110\_1010\_1' [115], '11:58:19 2018/01/29 SS-110\_1010'  
## => '11:58:19 2018/01/29 SS-110\_1010\_2' [116], '11:58:20 2018/01/29  
## SS-110\_1010' => '11:58:20 2018/01/29 SS-110\_1010\_1' [118], '11:58:20  
## 2018/01/29 SS-110\_1010' => '11:58:20 2018/01/29 SS-110\_1010\_2' [119],  
## '11:58:21 2018/01/29 SS-110\_1010' => '11:58:21 2018/01/29  
## SS-110\_1010\_1' [121], '11:58:22 2018/01/29 SS-110\_1010' => '11:58:22  
## 2018/01/29 SS-110\_1010\_1' [123], '11:58:22 2018/01/29 SS-110\_1010'  
## => '11:58:22 2018/01/29 SS-110\_1010\_2' [124], '11:58:23 2018/01/29  
## SS-110\_1010' => '11:58:23 2018/01/29 SS-110\_1010\_1' [126], '11:58:23  
## 2018/01/29 SS-110\_1010' => '11:58:23 2018/01/29 SS-110\_1010\_2' [127],  
## '11:58:24 2018/01/29 SS-110\_1010' => '11:58:24 2018/01/29  
## SS-110\_1010\_1' [129], '11:58:25 2018/01/29 SS-110\_1010' => '11:58:25  
## 2018/01/29 SS-110\_1010\_1' [131], '11:58:25 2018/01/29 SS-110\_1010'  
## => '11:58:25 2018/01/29 SS-110\_1010\_2' [132], '11:58:26 2018/01/29  
## SS-110\_1010' => '11:58:26 2018/01/29 SS-110\_1010\_1' [134], '11:58:27  
## 2018/01/29 SS-110\_1010' => '11:58:27 2018/01/29 SS-110\_1010\_1' [136],  
## '11:58:27 2018/01/29 SS-110\_1010' => '11:58:27 2018/01/29  
## SS-110\_1010\_2' [137], '11:58:28 2018/01/29 SS-110\_1010' => '11:58:28  
## 2018/01/29 SS-110\_1010\_1' [139], '11:58:29 2018/01/29 SS-110\_1010'  
## => '11:58:29 2018/01/29 SS-110\_1010\_1' [141], '11:58:29 2018/01/29  
## SS-110\_1010' => '11:58:29 2018/01/29 SS-110\_1010\_2' [142], '11:58:30  
## 2018/01/29 SS-110\_1010' => '11:58:30 2018/01/29 SS-110\_1010\_1' [144],  
## '11:58:30 2018/01/29 SS-110\_1010' => '11:58:30 2018/01/29  
## SS-110\_1010\_2' [145], '11:58:31 2018/01/29 SS-110\_1010' => '11:58:31  
## 2018/01/29 SS-110\_1010\_1' [147], '11:58:32 2018/01/29 SS-110\_1010'  
## => '11:58:32 2018/01/29 SS-110\_1010\_1' [149], '11:58:32 2018/01/29  
## SS-110\_1010' => '11:58:32 2018/01/29 SS-110\_1010\_2' [150], '11:58:33  
## 2018/01/29 SS-110\_1010' => '11:58:33 2018/01/29 SS-110\_1010\_1' [152],  
## '11:58:34 2018/01/29 SS-110\_1010' => '11:58:34 2018/01/29  
## SS-110\_1010\_1' [154], '11:58:34 2018/01/29 SS-110\_1010' => '11:58:34  
## 2018/01/29 SS-110\_1010\_2' [155], '11:58:35 2018/01/29 SS-110\_1010'  
## => '11:58:35 2018/01/29 SS-110\_1010\_1' [157], '11:58:36 2018/01/29  
## SS-110\_1010' => '11:58:36 2018/01/29 SS-110\_1010\_1' [159], '11:58:36  
## 2018/01/29 SS-110\_1010' => '11:58:36 2018/01/29 SS-110\_1010\_2' [160],  
## '11:58:37 2018/01/29 SS-110\_1010' => '11:58:37 2018/01/29  
## SS-110\_1010\_1' [162], '11:58:38 2018/01/29 SS-110\_1010' => '11:58:38  
## 2018/01/29 SS-110\_1010\_1' [164], '11:58:38 2018/01/29 SS-110\_1010'  
## => '11:58:38 2018/01/29 SS-110\_1010\_2' [165], '11:58:39 2018/01/29  
## SS-110\_1010' => '11:58:39 2018/01/29 SS-110\_1010\_1' [167], '11:58:40  
## 2018/01/29 SS-110\_1010' => '11:58:40 2018/01/29 SS-110\_1010\_1' [169],  
## '11:58:40 2018/01/29 SS-110\_1010' => '11:58:40 2018/01/

## Parsed with column specification:  
## cols(  
## .default = col\_character()  
## )

## See spec(...) for full column specifications.

library(dplyr)

##   
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':  
##   
## filter, lag

## The following objects are masked from 'package:base':  
##   
## intersect, setdiff, setequal, union

library(ggplot2)

Some cleaning

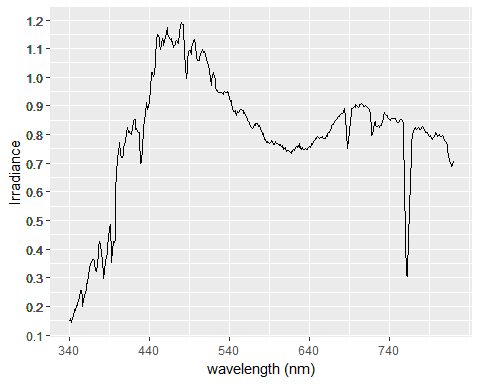
data<-tab[2:482,] # select rows  
data<-data %>% rename(waveL=Timestamp) # rename column   
data$waveL<-as.numeric(as.vector(data$waveL)) # to get a x\_continous scale, data need to be numeric not factor

Plot the Irradiance as a function of wavelenght (nm)

time<-data[,82]# here I just pick a column randomly  
class(time)

## [1] "tbl\_df" "tbl" "data.frame"

# time has to be converted into numeric   
time<-as.numeric(unlist(time)) # I used unlist to convert all the element to a single numeric vector  
ggplot(data=data,aes(x=waveL,y=time))+  
 geom\_line() +  
 scale\_x\_continuous(breaks = round(seq(min(data$waveL), max(data$waveL), by = 100),1)) +  
 scale\_y\_continuous(breaks = round(seq(min(time), max(time), by = 0.005),1)) +  
 xlab("wavelength (nm)") +  
 ylab("Irradiance")



PPFD <- function(time){  
 irr <- time ## our data set in W/m2  
 PAR <- 2.35\*10^5 ## solar constant waveband for PAR in J/mol  
   
 PPFD <- irr/PAR ## answer in mol/(m2 sec)  
   
 return(PPFD)  
}