The ultimate aim of this assignment is tracking the position of the over a period of time at a given time range in the csv file. The position of the sun and all other extra information are given in the csv file. We need to individually assign a variable as list to row in the csv file.

So all the columns in the csv file are assigned to a variable as follows,

station, GMT_offset, latitude, longitude, altitude = np.genfromtxt(fname, max_rows=1, delimiter=",", usecols=(0, 3, 4, 5, 6))

location_name, location_state = np.genfromtxt(fname, max_rows=1, delimiter=",", usecols=(1,2), dtype= np.str)

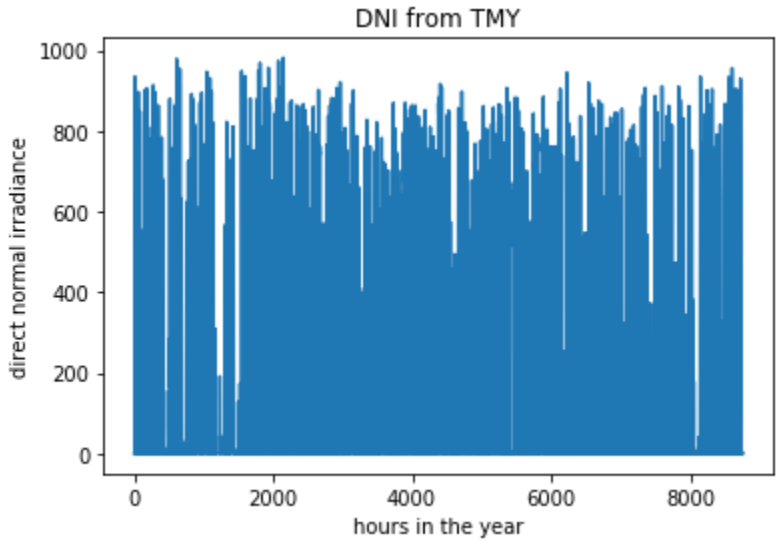
ETR, GHI, DNI, DHI, ambient_temperature = np.genfromtxt(fname, skip_header=2, delimiter=",", usecols=(2,4,7, 10,31), unpack=True)

From the above code, only few variables are assigned, so not all the columns are called.

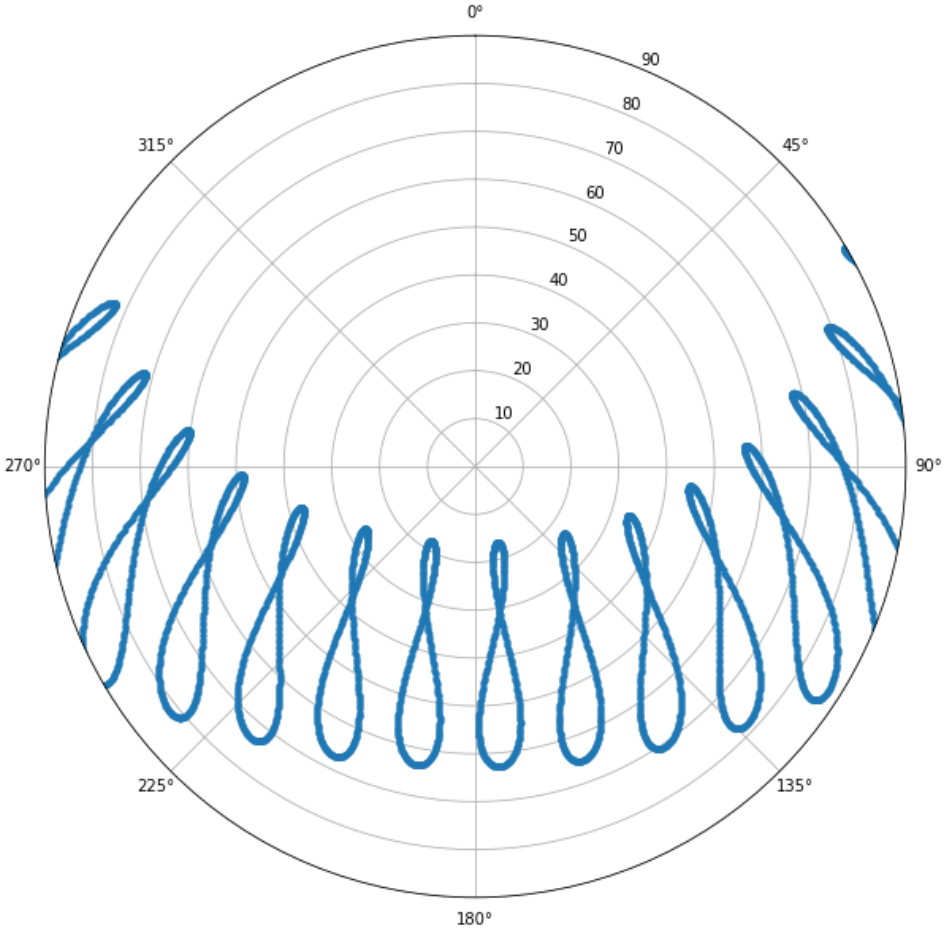
Date, Time, ETR, ETRN, GHI, GHI_source, GHI_uncert, DNI, DNI_source, DNI_uncert, DHI, DHI_source, DHI_uncert, GH_illum, GH_illum_source, Global_illum_uncert, DN_illum, DN_illum_source, DN_illum_uncert, DH_illum, DH_illum_source, DH_illum_uncert, Zenith_lum, Zenith_lum_source, Zenith_lum_uncert, TotCld, TotCld_source, TotCld_uncert, OpqCld, OpqCld_source, OpqCld_uncert, Dry_bulb, Dry_bulb_source, Dry_bulb_uncert, Dew_point, Dew_point_source, Dew_point_uncert, RHum, RHum_source, RHum_uncert, Pressure, Pressure_source, Pressure_uncert, Wdir, Wdir_source, Wdir_uncert, Wspd, Wspd_source, Wspd_uncert, Hvis, Hvis_source, Hvis_uncert, CeilHgt, CeilHgt_source, CeilHgt_uncert, Pwat, Pwat_source, Pwat_uncert, AOD, AOD_source, AOD_uncert ,Alb ,Alb_source, Alb_uncert, Lprecip_depth, Lprecip_quantity, Lprecip_source, Lprecip_uncert, PresWth, PresWth_source, PresWth_uncert = np.genfromtxt(fname, skip_header=2, delimiter=",", unpack=True)

All the columns are called and assigned to unique variable.

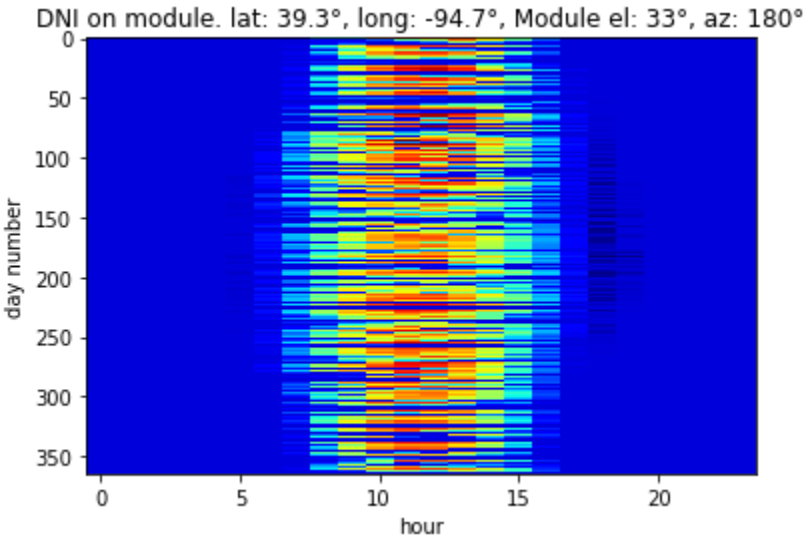
Simple graph of DNI from TMY



Solar path normal generated valued

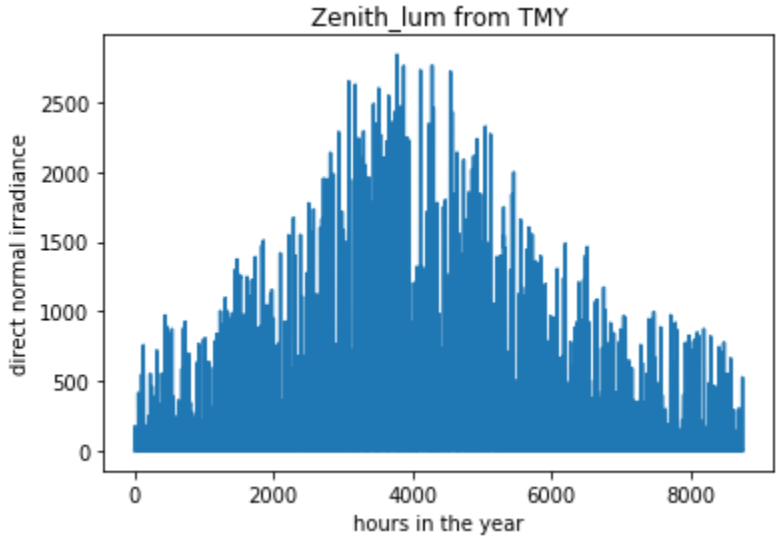


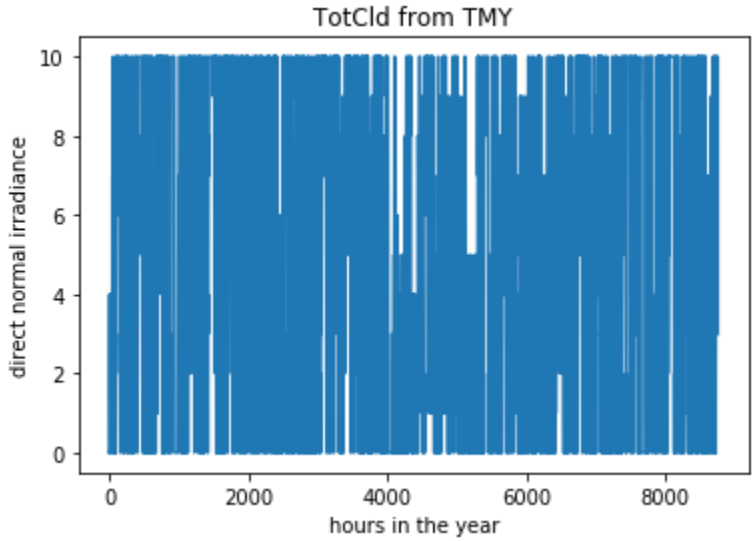

Heat map generated from the path of the sun observed from the above solar path

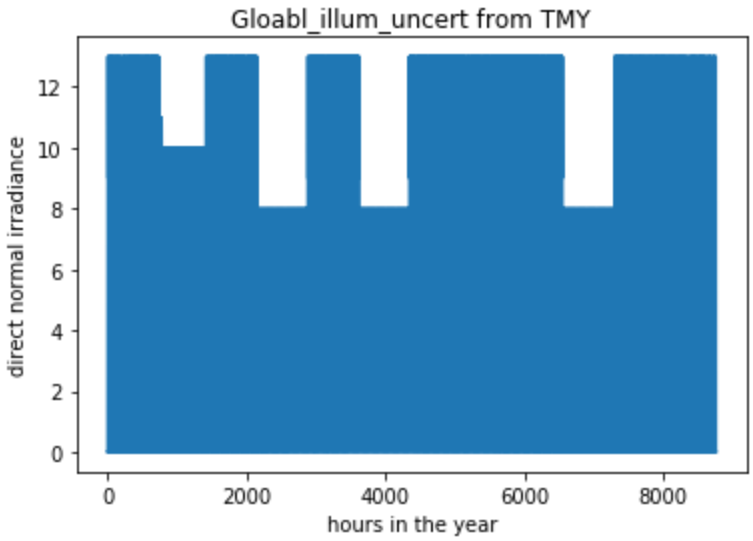


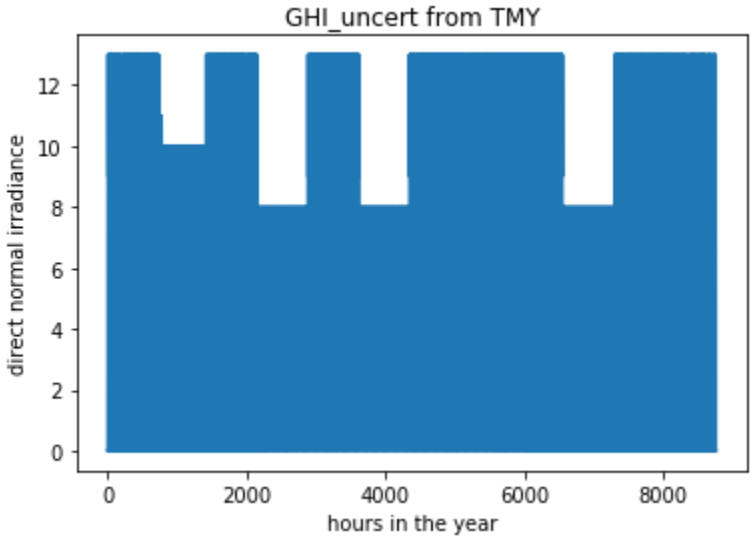
All these above graphs are generated with from csv file values combination with the auto generated random values using numpy

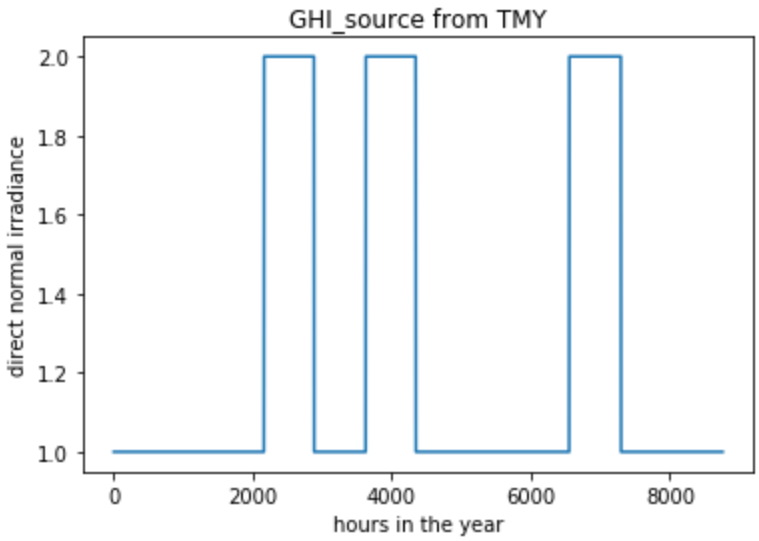
Following graphs are generated with the values from the csv file.

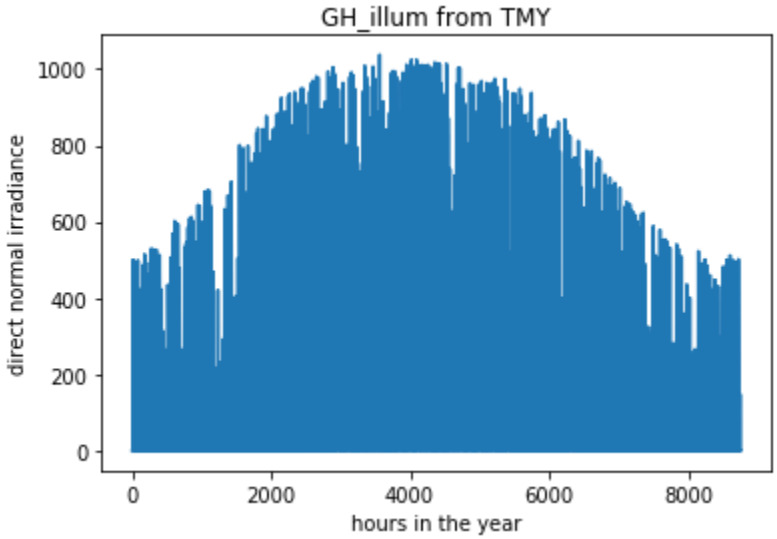


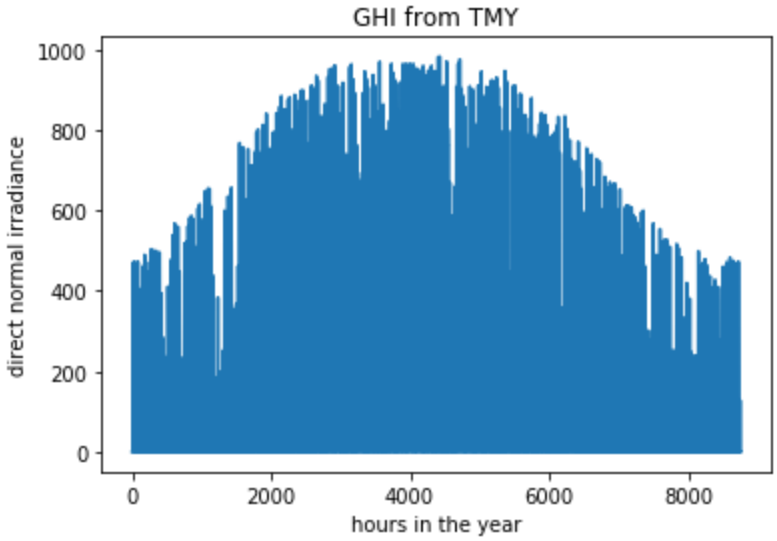



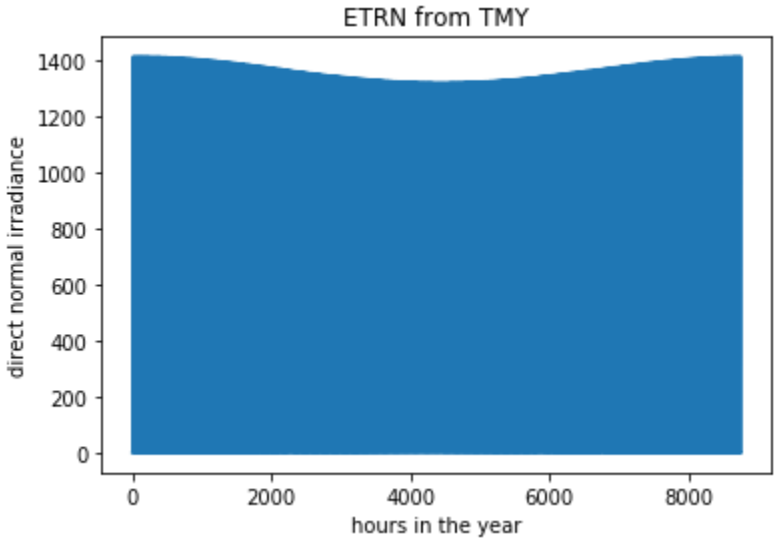

Gloabl_illum_uncert from TMY
direct normal irradiance
0
2
4
6
8
10
12
0
2000
4000
6000
8000
hours in the year

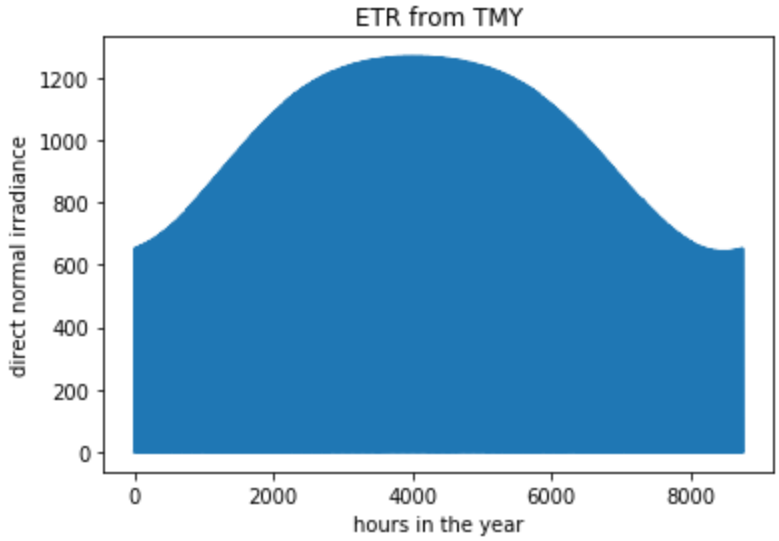

GHI_uncert from TMY
direct normal irradiance
0
2
4
6
8
10
12
0
2000
4000
6000
8000
hours in the year

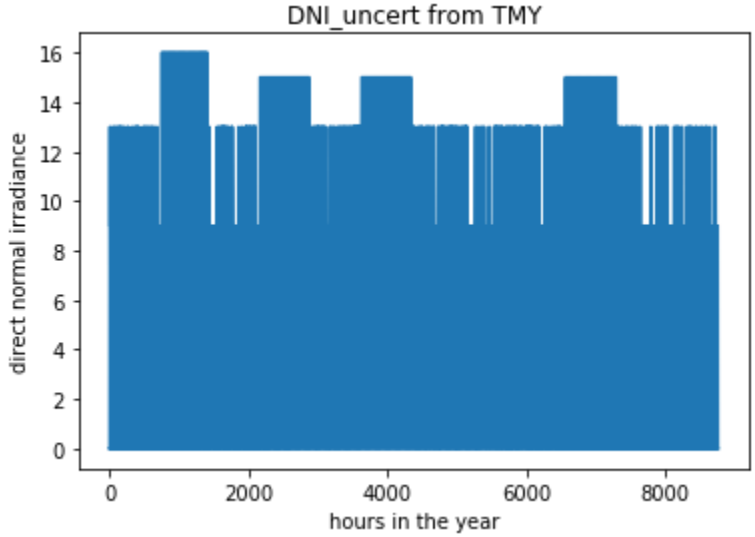

GHI_source from TMY
direct normal irradiance
2.0
1.8
1.6
1.4
1.2
1.0
0
2000
4000
6000
8000
hours in the year

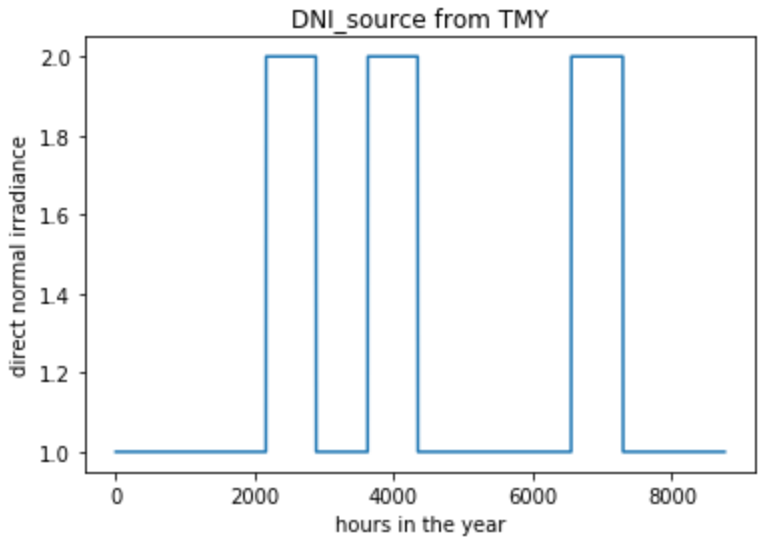

GH_illum from TMY
direct normal irradiance
1000
800
600
400
200
0
0
2000
4000
6000
8000
hours in the year

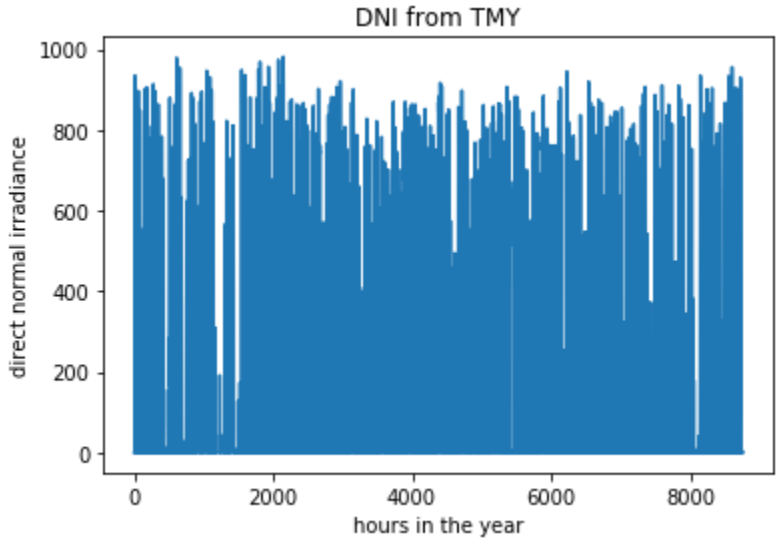

GHI from TMY
direct normal irradiance
hours in the year
0
200
400
600
800
1000
0
2000
4000
6000
8000

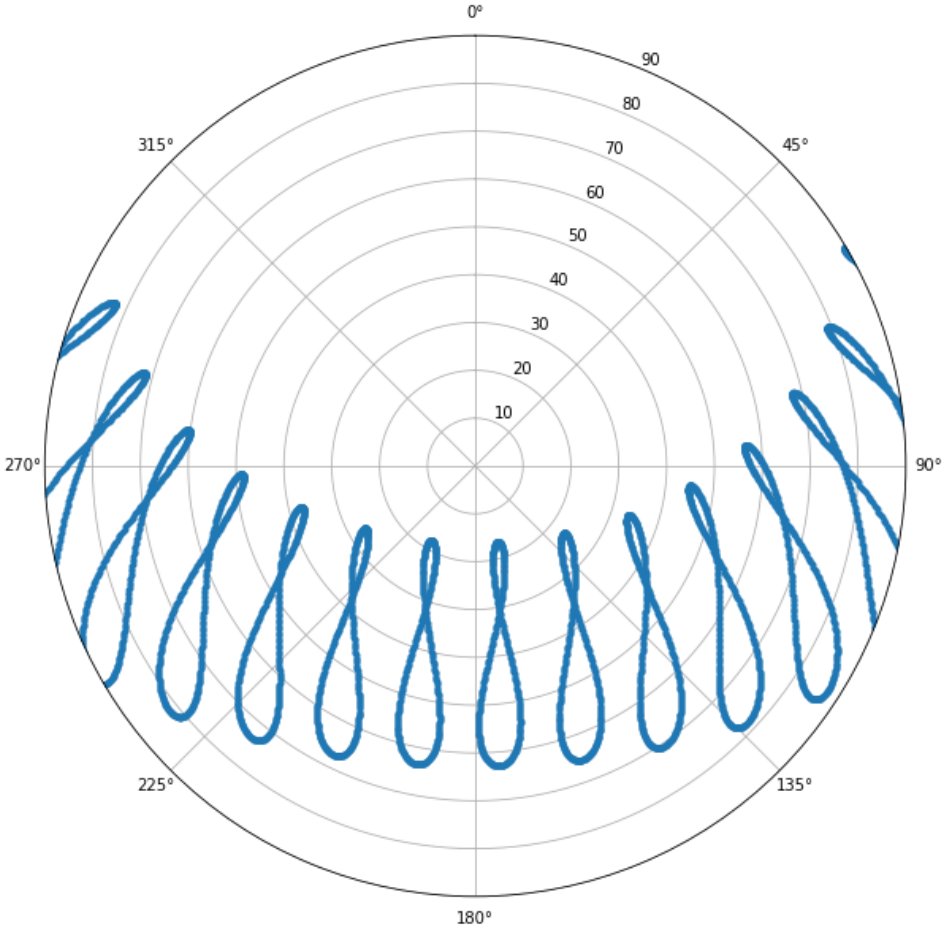

ETRN from TMY
direct normal irradiance
hours in the year
0
200
400
600
800
1000
1200
1400
0
2000
4000
6000
8000

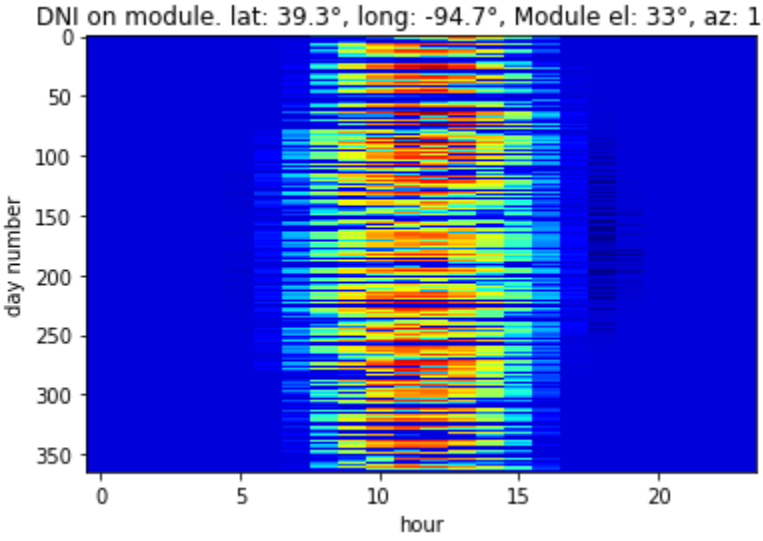

ETR from TMY
direct normal irradiance
hours in the year
0
200
400
600
800
1000
1200
0
2000
4000
6000
8000


DNI_uncert from TMY
direct normal irradiance
hours in the year
0
2
4
6
8
10
12
14
16
0
2000
4000
6000
8000


DNI_source from TMY
direct normal irradiance
2.0
1.8
1.6
1.4
1.2
1.0
0
2000
4000
6000
8000
hours in the year


DNI from TMY
direct normal irradiance
1000
800
600
400
200
0
0
2000
4000
6000
8000
hours in the year


0°
90
80
70
60
50
40
30
20
10
45°
90°
135°
180°
225°
270°
315°


DNI on module. lat: 39.3°, long: -94.7°, Module el: 33°, az: 180°
day number
hour
0
50
100
150
200
250
300
350
0
5
10
15
20