Skyglow – formatting the plots

How the plot is displayed

For the visualisation of the skyglow the GNUplot software (http://gnuplot.info/) is used. The GNUplot configuration files (all settings of the graph), named „sky_polar.plt“ and “sky_hammer.plt”, are located in „programs/windows“ subdirectory. When Skyglow sofware calculates the project, these files are copied into the „results“-folder. GNUplot reads the local „*.plt“-files from „results“-folder and displays the plots, when the ‘Results’ menu items are selected.

Changing the default plot settings

As explained above, any change in „sky_polar.plt“ or “sky_hammer.plt”-files located in „programs/windows“ subdirectory affects all plots displayed in the future. So parameters written in these files are default values. The content of the “*.plt”-files is described later in more detail.

Changing the current plot settings

As explained above, the „*.plt“-files located in „results“-subdirectory are used for the displaying of the current plot – there contain current (local) settings of plots. These settings are used until you select “Results/Reset local plots settings…” menu item. If selected, “*.plt” files located in “results” subdirectory are replaced by these from “program/windows” subdirectory.

Both global and local plots settings are accessible also via “Results” menu items.

Replot of earlier computed data

The same method as described in the previous section can be used also for older results. Open the folder with older results, eventually modify the „sky_polar.plt“ or “sky_hammer.plt”-file located therein and double-click it.

Frequently asked modifications of the plots

We don’t expect you to be a GNUplot-specialist. The “sky_polar.plt” and “sky_hammer.plt” files contain well-commented GNUplot commands, so it should be easy to understand and to modify them. Please consult the GNUplot user guide („Help/GNUplt help“ menu item) if needed. In following text we explain how to change some basic properties of the plot. We demonstrate settings on “sky_polar.plt” file. Setting in “sky_hammer.plt” file are similar.

Plot title

Find line (at the beginning of the file) starting with “splot” and change the title:

```
splot "results_polar.dat" using 1:2:3 with lines title "Skyglow:log-scale"     #data name and plot title, title can be changed
```

Plot palette

Find line starting with “set palette” and activate (remove #-sign at the beginning of the line) one of the recommended palettes:

```
#set palette rgbformulae 7,5,15          #default color palette
(black-blue-red-yellow)
#set palette rgbformulae 8,9,10         #color palette for B&W
printing (blue-yellow)
#set palette rgbformulae 30,31,32       #another color palette for
B&W printing (black-blue-magenta-yellow-white)
#set palette defined (0 "black", 2 "blue", 4 "yellow", 6 "red")
#color palette (black-blue-yellow-red)
set palette defined (0 0 0 0, 1.8 0 0.4 0.7, 3 0 0.7 0.7 , 4 1 1 0,
6 1 0 0) #color palette (black-cyan-green-yellow-red)
#set palette gray negative              #inverted greyscale palette
#set palette gray                       #greyscale palette
```

Isolines values

Find line starting with “set contour base” and activate (remove #-sign at the beginning of the line) if you want to have isolines in the plot.

```
#set contour base   #comment this line (put # at the beginning) if
no isolines are requested#set cntrparam levels 5
```

Find line starting with “set cntrparam levels” and activate (remove #-sign at the beginning of the line) one of the recommended set of isolines values. You can also write your own values of isolines:

```
#set cntrparam levels 5                #aproximate number …
#set cntrparam levels discrete -15,-14,-13,-12,-11,-10,-9…
set cntrparam levels discrete -15,-14.5,-14,-13.5,-13,-12.5,…
                              -5.5,-5,-4.5,-4,-3.5,-3,-2.5,-2,…
                              7,7.5,8,8.5,9,9.5,10   #more dense …
```

Set also the optimal number of decimal places shown in numbers in the key (legend). Find line starting with “set clabel” and modify the number of decimal places:

```
set clabel '%.1f'                      #f=floating format, …
```

Fixed range of the colour scale

The colour scale is set automatically by default. In the case you need to plot more results using the same colour scale, find the line starting with “set cbrange”, activate the command (remove #) and modify the scale range:

```
#set cbrange [-9:-5]                  #uncomment (remove #) …
```

Position of the key (legend) in the plot

Find the line starting with “set key”, activate/modify one of the recommended options. Standard positions are left, right, top, bottom,lmargin, rmargin,tmargin,bmargin:

```
set key lmargin                        #position of the …
#unset key                             #hide legend
#set key at -110,90                    #exact position …
```

Modifying the plot shown on the screen

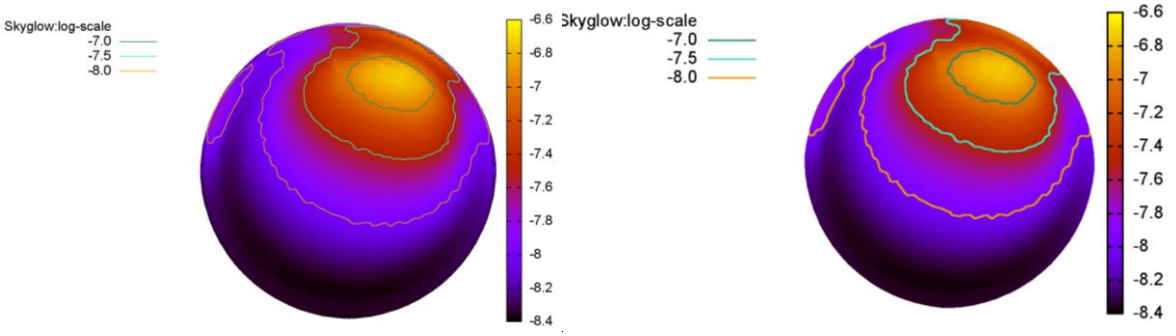
Find corresponding section at the begin of the file and feel free to modify the size of the window, the size of the font, or the width of the isolines:

```
#--following line controls the look of the plot on the screen -----
set term windows size 1024,500 font ",10" linewidth 2     #size=win…
```

Modifying the colourful PNG plot written to the disk (results_col.png)

Find corresponding section at the end of file and feel free to modify the size (resolution) of the picture, the size of the font, or the width of the isolines:

```
#--- Writes Portable Network Graphics (PNG) picture in full-colour…
set terminal png size 1800,1024 linewidth 4 font ',36'      #as on…
set output 'results_col.png'          #picture filename
replot                                #write picture
unset output                          #close file
#--- End ------------------------------------------------------------…
```



How to change the color of the isolines

You can change the color of any line in the plot. GNUplot uses lines of type 1, 2, 3, ... in that order.

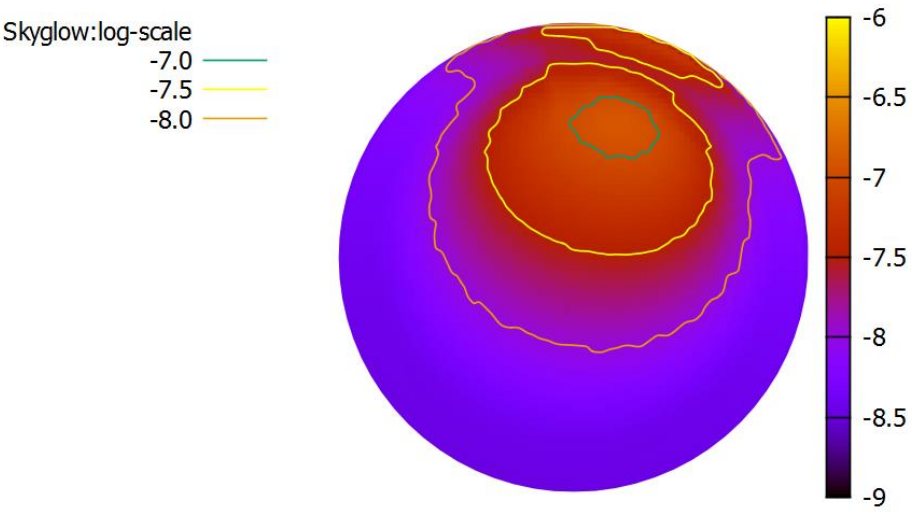
As an example, we change one of the isolines to yellow color in the „sky.plt"-file by adding one line:

```
set contour base                        #comment this line (put # at the ...
#set cntrparam levels 5                #aproximate number of isolines ...
#set cntrparam levels discrete -15,-14,-13,-12,-11,-10,-9,-8,-7,-6,-5,-4, ...
set cntrparam levels discrete -15,-14.5,-14,-13.5,-13,-12.5,-12,-11.5,-11, ...
set cntrparam bspline                   #isolines draw method (linear, …
set cntrparam order 10                  #smoothness of the isolines (use …
set linetype 3 linecolor rgb "yellow"
```

Besides the name of the color you can specify exact RGB composition of the color in the same way, as is commonly used in HTML:

```
set linetype 3 linecolor rgb "#FFFF00"
```

The results is here:



In the same way you can change the color of other isolines (change lines 2 and 4 on the plot above).

Skyglow distribution without isolines – an example

To show the distribution of the skyglow in an easily readable form, it is not necessary to use isolines. Instead of them you can use "stepwise" color palette by adding one single row into the "sky.plt"-file:

Make following changes:

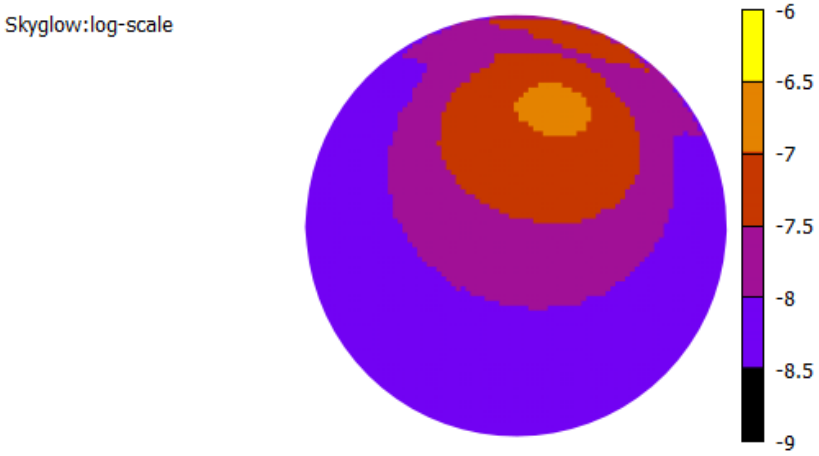
1. Add a line to the "palette" section:

```
set palette maxcolor 6
set palette rgbformulae 7,5,15          #default color …
#set palette rgbformulae 8,9,10         #color palette for B&W …
```

2. Inactivate (add the # character) the isolines:

```
#set contour base                        #comment this lin…
```

The result looks as follows:



The trick is that we are using the color scale divided into 6 intervals, corresponding to the color scale (`set cbrange [-9:-6]`).

According to the color scale you can use other number of steps in the “set palette maxcolor” command

Such plots are good-looking also in B&W:

