

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 file (all settings of the graph), named „sky.plt“, is located in „programs/windows“- (and windows/linux or windows/mac) subdirectory. When the „View result“-button in the Skyglow software is pressed, the „sky.plt“-file is copied into the „results“-folder and the GNUplot visualizer is invoked. GNUplot reads the local „sky.plt“-file from „results“-folder and displays the plot.

Changing the default plot settings

As explained above, any change in „sky.plt“-file located in „programs/windows“- (or similar for other OS) subdirectory affects all plots displayed in the future. So parameters written in programs/windows/sky.plt“-file are default values. The content of the „sky.plt“-file is described later in more detail.

Changing the current plot settings

As explained above, the „sky.plt“-file located in „results“-subdirectory is used for the displaying of the current plot. So, changes in this file influence the current plot only. Pressing the „View result“-button in the Skyglow software results in the replacing of the „sky.plt“-file in the „results“-subdirectory by the default „sky.plt“-file from „programs/windows“-subdirectory and in restoring of default settings of the plot.

So, if you want to change the current plot only, do following steps:

1. Change the content of the „sky.plt“-file in „results“-subdirectory using any text editor like Notepad or Wordpad.
2. Double-click changed „sky.plt“-file. The GNUplot will be automatically invoked and will display the data from current „results“ subdirectory.

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, modify the „sky.plt“-file located therein and double-click the „sky.plt“-file.

Frequently asked modifications of the plots

We don't expect you to be a GNUplot-specialist. The „sky.plt“-file contains well-commented GNUplot commands, so it should be easy to understand and to modify them. Please consult the GNUplot user guide (http://gnuplot.info/docs_5.0/gnuplot.pdf) if needed. In following text we explain how to change some basic properties of the plot.

Plot title

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

```
splot "results.dat" with lines title "Skyglow:log-scale" #data...
```

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 pa...
#set palette rgbformulae 8,9,10           #color palette for B&W pri...
#set palette rgbformulae 30,31,32         #another color palette...
#set palette gray negative                #inverted greyscale palette
```

Isolines values

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 ...
```

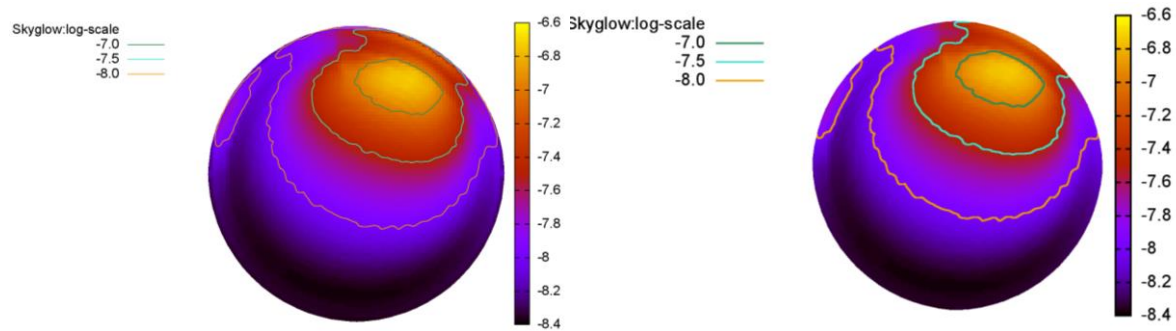
Modifying the plot shown on the screen

Find corresponding section at the end of 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 wxt size 1024,500 font "10" linewidth 2    #size=win...
```

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

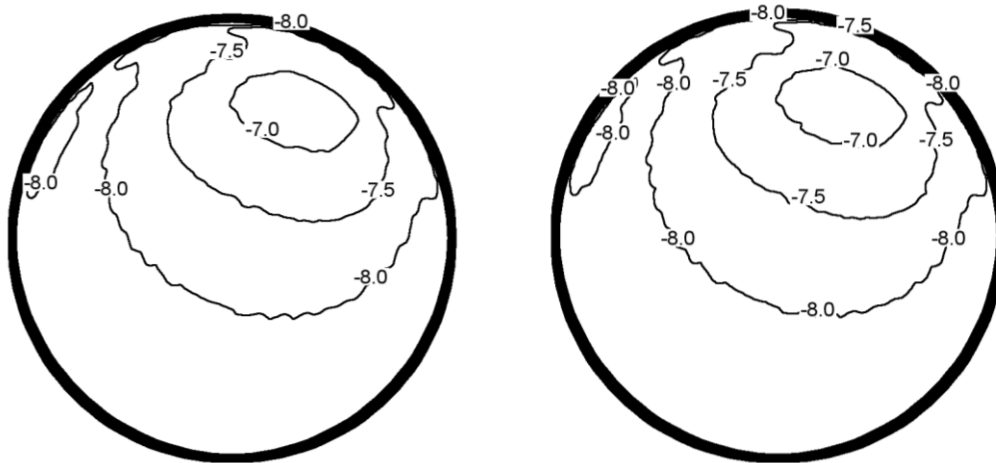
Find corresponding section at the end of file and feel free to modify the **size (resolution)** of the **picture**, the **size of the font**, or the **width of the isolines**:

[illegible]

Modifying the black&white PNG plot written to the disk (results_bw.png)

Find corresponding section at the end of file and feel free to modify the **size (resolution) of the picture** and the **size of the font**, or the **width of the isolines**. You can also change the **position of the numbers** on the isolines and the **numbers of labels (numbers)** in isolines

```
#--- Writes Portable Network Graphics (PNG) using black ...
set terminal png size 1800,1024 linewidth 3 font ',24' #picture...
set monochrome #black isolines
set output 'results_bw.png' #picture filename
unset pm3d #no color map
set cntrparam point 1 #labels density ...
set cntrl label format '%.1f' font ',24' start 30 interval -1 #no. ...
set cntrl label onecolor #show only one line in the ...
set style textbox opaque noborder #white rectangle uder labels
unset object 2 #no white line (nedded only ...
set object 3 circle at 0,0 size 90 fs empty border ...
splot "results.dat" with lines title "Skyglow:..."
unset output #close file
#--- End -----...
```



How to change the color of the isolines

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

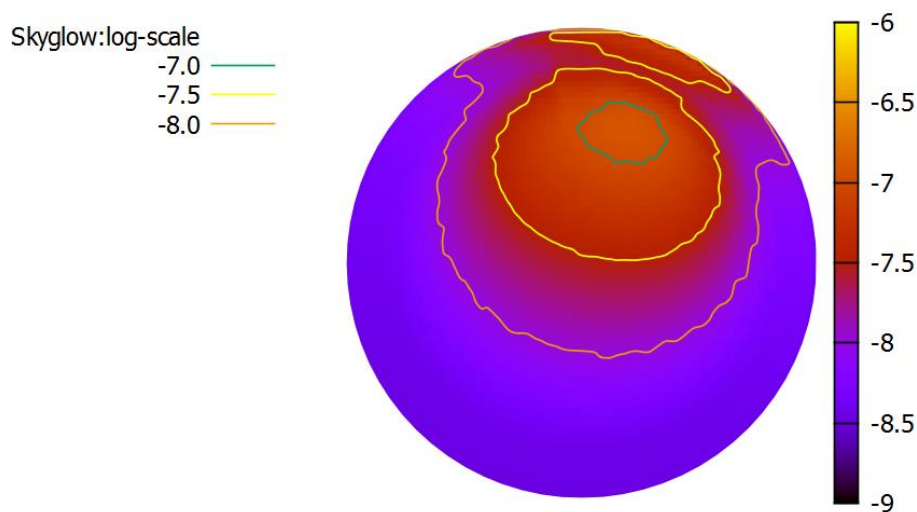
As an example, we change one of the isolines to yellow color in the „sky.plt“-file by adding one line:

```
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

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:

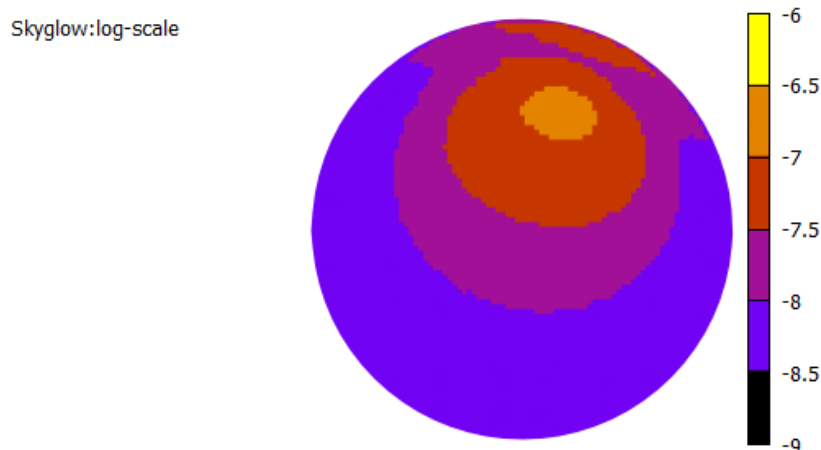
1. Add a line to the “palette” section:

```
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:

Skyglow:log-scale

