



ASTROINFORMATICS

Project Practice 1

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1 Objective

In this report our objective is put in practice what we learned in class, using different methods to reach the different goals, using astronomical software like TOPCAT or DS9

2 Downloading Light curves

The first task we need to complete is visit the mikulski archive for Space Telescopes and downloading the next archive `tesscurl_sector73_lc.sh`

Lightcurve			
Sector 76	Light Curve	tesscurl_sector_76_lc.sh	DC
Sector 75	Light Curve	tesscurl_sector_75_lc.sh	DC
Sector 74	Light Curve	tesscurl_sector_74_lc.sh	DC
Sector 73	Light Curve	tesscurl_sector_73_lc.sh	DC
Sector 72	Light Curve	tesscurl_sector_72_lc.sh	DC
Sector 71	Light Curve	tesscurl_sector_71_lc.sh	DC
Sector 70	Light Curve	tesscurl_sector_70_lc.sh	DC
Sector 69	Light Curve	tesscurl_sector_69_lc.sh	DC
Sector 68	Light Curve	tesscurl_sector_68_lc.sh	DC
Sector 67	Light Curve	tesscurl_sector_67_lc.sh	DC
Sector 66	Light Curve	tesscurl_sector_66_lc.sh	DC

Figure 1: Download light curves

A common error is try to run the script without verify if we have install the package to download the archives from the server, another common error is try to run it without put in terminal `chmod +x`

```

ruben@ruben-IdeaPad-Flex-5-14ITL05: ~/Documents/astroin...
ruben@ruben-IdeaPad-Flex-5-14ITL05:~/Documents/astroinformatics/practicas/practi
ce1$ chmod +x tesscurl_sector_73_lc.sh
ruben@ruben-IdeaPad-Flex-5-14ITL05:~/Documents/astroinformatics/practicas/practi
ce1$

```

Figure 2: Bash script

After we download the 15 or 20 files approx we must stop the script. Once we have our

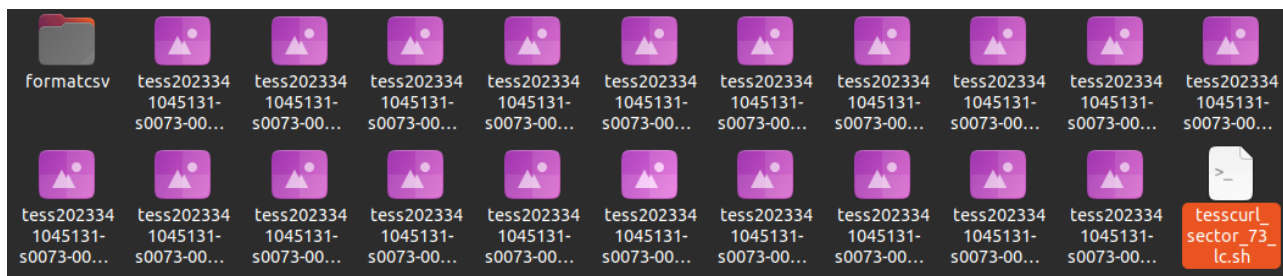


Figure 3: Light-curves files

files we need to open TOPCAT and save this files in the output format.CSV

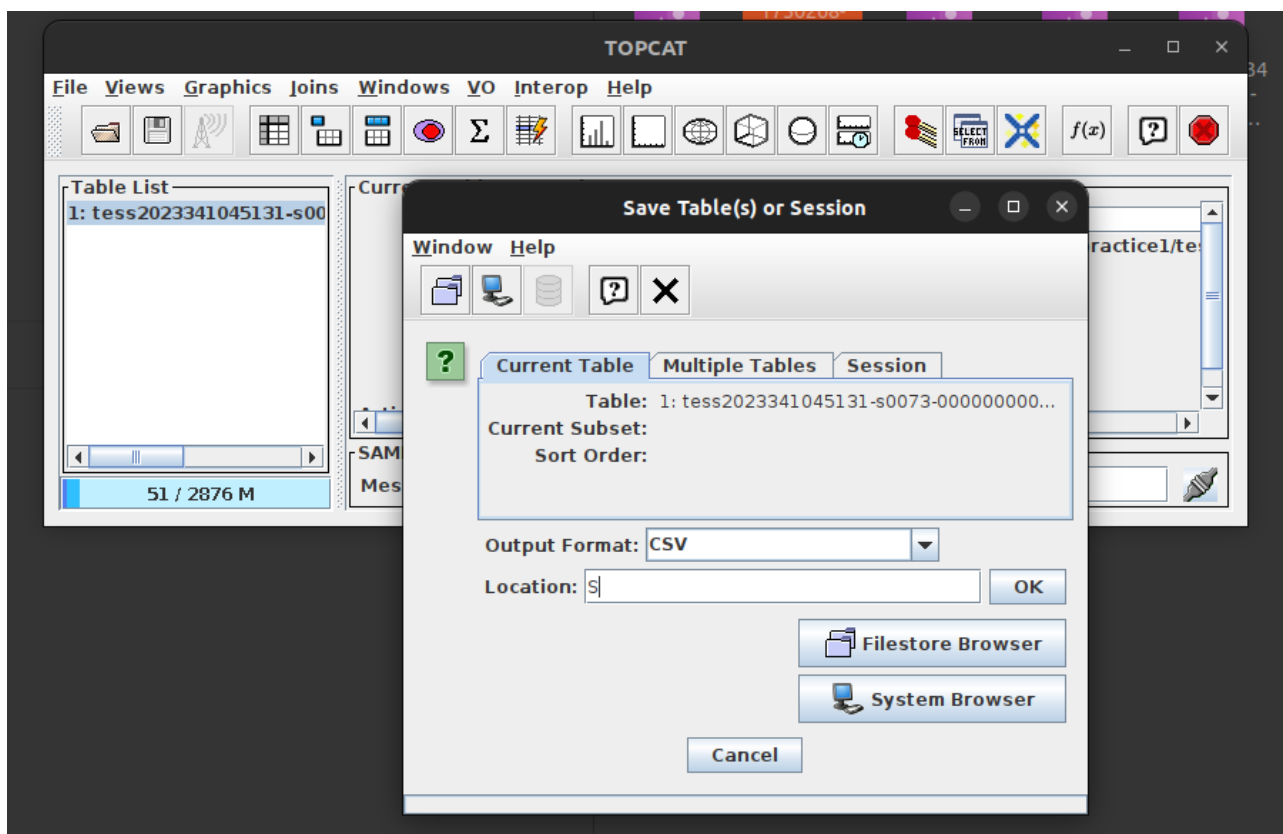


Figure 4: saving file in CSV format

3 Shell Scripts

Making script is one of the most important things we must do in order to be efficient when we work with a lot of astronomical data, so our first task is writing a script to output a file containing all the file names of our CSV files. We write `ls *.CSV > output1_files.txt` in order to create a file text that save all the files names of our CSV format.

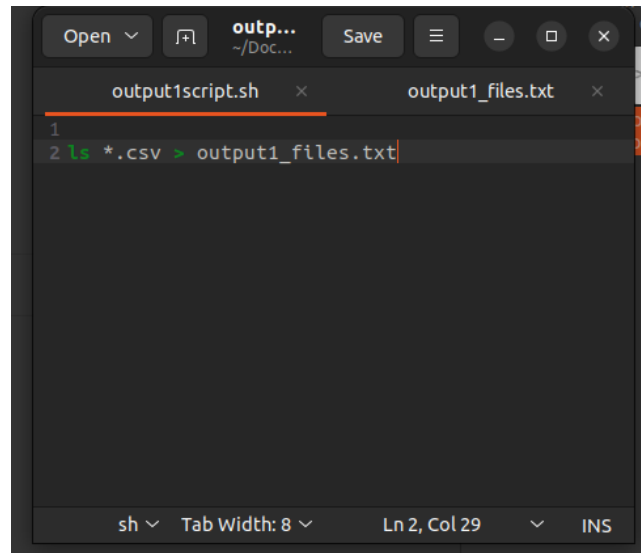


Figure 5: script to output a file

The result of this script is:

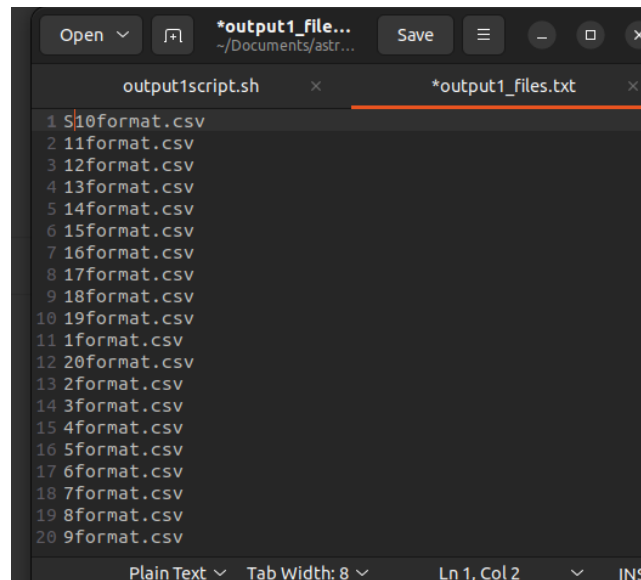
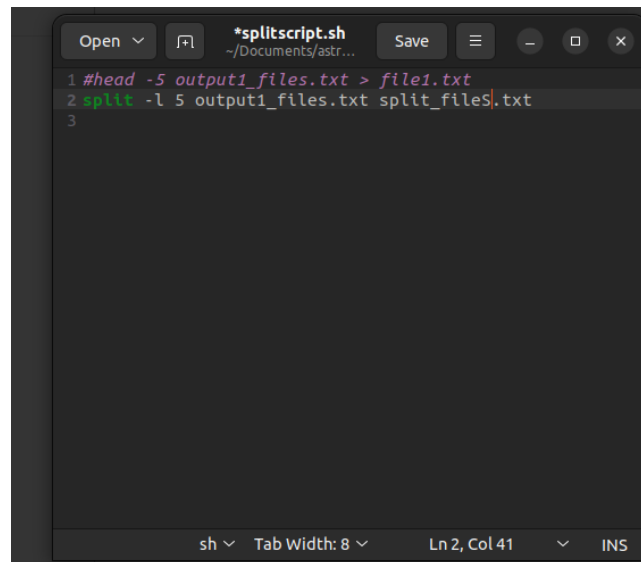


Figure 6: file with all CSV

3.1 Split files

The next thing to do is write a shell script to split this file containing all the file names into small files containing only 5 of each and run it. For this we must investigate a little more how to do it we find to do this is with this script so we find

split -l 5 output1_files.txt split_file.txt [1] is the correct line to split files (this code don't belong to me)



```
*splitscript.sh
~/Documents/astr...
1 #head -5 output1_files.txt > file1.txt
2 split -l 5 output1_files.txt split_file.txt
3

sh Tab Width: 8 Ln 2, Col 41 INS
```

Figure 7: Line to split files

The result of this script is 4 files in which we have 5 files (20 in total) with names from aa to ad but we can change this prefix with the syntax **split [options] name_of_file prefix_for_new_files** [1]

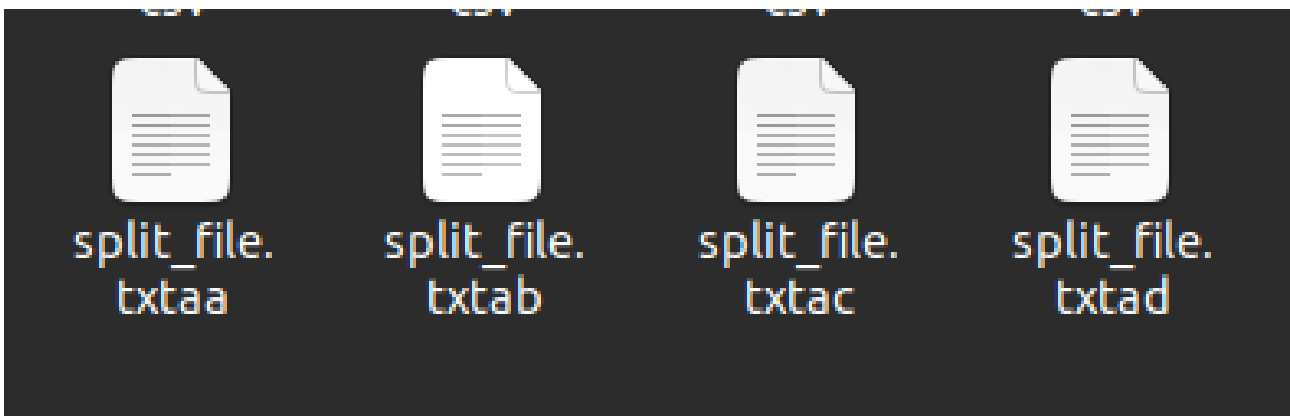
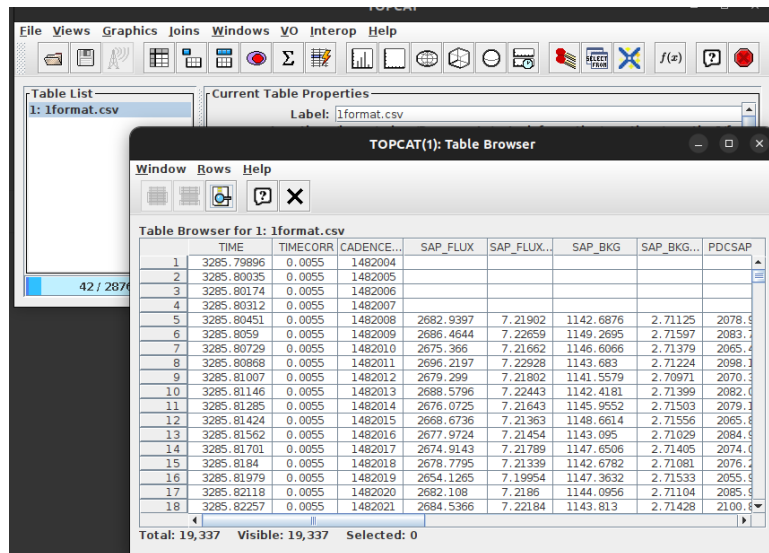


Figure 8: Split files

4 Light Curves

Now the next step is open TOPCAT and plot their light curves for doing so we need to identify the correct plot type and relevant columns in order to do this we open de CSV file with TOPCAT and we do double click in table list and it's show this:



The screenshot shows the TOPCAT Table Browser window for the file '1: iformat.csv'. The table contains 19 rows of data with the following columns: TIME, TIMECORR, CADENCE..., SAP_FLUX, SAP_FLUX..., SAP_BKG, SAP_BKG..., and PDCSAP. The data shows a series of light curve measurements over time, with flux values ranging from approximately 2674 to 2800 and background values around 2.7.

	TIME	TIMECORR	CADENCE...	SAP_FLUX	SAP_FLUX...	SAP_BKG	SAP_BKG...	PDCSAP
1	3285.79896	0.0055	1482004					
2	3285.80035	0.0055	1482005					
3	3285.80174	0.0055	1482006					
4	3285.80312	0.0055	1482007					
5	3285.80451	0.0055	1482008	2682.9397	7.21902	1142.6876	2.71125	2078.5
6	3285.8059	0.0055	1482009	2686.4644	7.22659	1149.2695	2.71597	2083.2
7	3285.80729	0.0055	1482010	2675.366	7.21652	1146.6066	2.71379	2065.4
8	3285.80868	0.0055	1482011	2696.2197	7.22928	1143.083	2.71224	2098.1
9	3285.81007	0.0055	1482012	2679.299	7.21802	1141.5579	2.70971	2070.3
10	3285.81146	0.0055	1482013	2688.5796	7.22443	1142.4181	2.71399	2082.0
11	3285.81285	0.0055	1482014	2676.0725	7.21643	1145.9552	2.71503	2079.1
12	3285.81424	0.0055	1482015	2668.6736	7.21363	1148.6614	2.71556	2065.8
13	3285.81562	0.0055	1482016	2677.9724	7.21454	1143.095	2.71029	2084.9
14	3285.81701	0.0055	1482017	2674.9143	7.21789	1147.6506	2.71405	2074.0
15	3285.8184	0.0055	1482018	2678.7795	7.21339	1142.6782	2.71081	2076.2
16	3285.81979	0.0055	1482019	2654.1265	7.19954	1147.3632	2.71533	2055.5
17	3285.82118	0.0055	1482020	2682.108	7.2186	1144.0956	2.71104	2085.5
18	3285.82257	0.0055	1482021	2684.5366	7.22184	1143.813	2.71428	2100.5

Total: 19,337 Visible: 19,337 Selected: 0

Figure 9: TOPCAT TABLE

So we can see the information on the columns like the flux and time that is we are looking for in order to graph this lightcurves we can see that we can change the scale of time and the axe y as function of flux or other things.

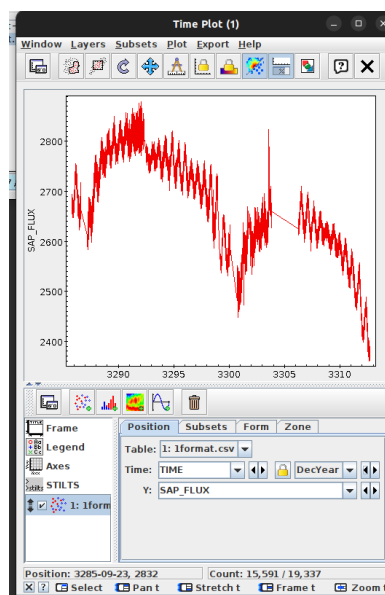


Figure 10: TOPCAT Graph

5 Questions

1) Where does TOPCAT get the units from?

R//TOPCAT can get the information in several form but the most used is the metadata where TOPCAT can get the information of units [2]

6 Conclusion

In this practice we learned to write script for splitting and download files,also we learned about using TOPCAT how to open the files in columns and making plot of the lightcurves vs time, we search about how TOPCAT get the units from and we could solve problems about writing code

References

- [1] <https://www.geeksforgeeks.org/split-command-in-linux-with-examples/>.
- [2] <https://www.star.bris.ac.uk/~mbt/topcat/sun253.pdf>.