Semester I 2025

Astroinformatics I

Graded Practice 1

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1. **Write a shell script to output a file containing all the file names of your CSV files. Run it.**

   After downloading 20 light curve fits files from the TESS satellite using the 'tess-curl_sector_73_lc.sh' script, and converting them to csv using TOPCAT, the files were saved to a /csv subdirectory. The shell script provided below (saved as list_csv_files.sh) scans said subdirectory (located in the root directory, where the script is located and runs from). The script then extracts the filenames (excluding the paths) and writes them to a file named 'csv_files.txt' (one per line) in the root directory. If no .csv files are found, the script skips the loop. Once complete, a confirmation message is printed.

```
#!/bin/sh

# Get the script's root directory
root_dir="$(dirname "$0")"

# Set the csv files directory
csv_dir="${root_dir}/csv"

# Create the text file in the root directory
touch "${root_dir}/csv_files.txt"

# Get the list of CSV files and add them to the text file
for csv_file in "${csv_dir}"/*.csv; do
    # Skip if no files matched
    [ -e "$csv_file" ] || continue
    echo "$(basename "$csv_file")" >> "${root_dir}/csv_files.txt"
done

echo "CSV files saved to csv_files.txt"
```

   The resulting file (csv_files.txt) contains the following:

```
tess2023341045131-s0073-0000000001750268-0268-s_lc.csv
tess2023341045131-s0073-0000000001755406-0268-s_lc.csv
tess2023341045131-s0073-0000000001827744-0268-s_lc.csv
tess2023341045131-s0073-0000000001828620-0268-s_lc.csv
tess2023341045131-s0073-0000000001840666-0268-s_lc.csv
tess2023341045131-s0073-0000000001942416-0268-s_lc.csv
tess2023341045131-s0073-0000000001942969-0268-s_lc.csv
tess2023341045131-s0073-0000000001947463-0268-s_lc.csv
tess2023341045131-s0073-0000000001950736-0268-s_lc.csv
tess2023341045131-s0073-0000000001950893-0268-s_lc.csv
tess2023341045131-s0073-0000000002006984-0268-s_lc.csv
tess2023341045131-s0073-0000000002008765-0268-s_lc.csv
tess2023341045131-s0073-0000000002014191-0268-s_lc.csv
tess2023341045131-s0073-0000000002102329-0268-s_lc.csv
```

```
15 tess2023341045131-s0073-0000000002104696-0268-s_lc.csv
16 tess2023341045131-s0073-0000000002105589-0268-s_lc.csv
17 tess2023341045131-s0073-0000000002143575-0268-s_lc.csv
18 tess2023341045131-s0073-0000000002149979-0268-s_lc.csv
19 tess2023341045131-s0073-0000000002152411-0268-s_lc.csv
20 tess2023341045131-s0073-0000000002234692-0268-s_lc.csv
```

2. **Write a shell script to split this file containing the file names into small files containing only 5 each. Run it.**

   The shell script shown below reads the csv_files.txt file (created on the previous script), and splits it into multiple smaller files, each containing five filenames. The resulting files are named list_1.txt, list_2.txt, etc., and are created in the same directory as the script. The script processes csv_files.txt line-by-line using a loop where it also counts the number of read lines, for which, after the count reaches five, the file number increases by one, trigering the creation of a new file. This loop continues until all lines are processed.

```
 1 #!/bin/sh
 2
 3 # Get the script's root directory
 4 root_dir="$(dirname "$0")"
 5
 6 # Set csv_files.txt as the input file
 7 filenames_list="${root_dir}/csv_files.txt"
 8
 9 # Initialize the list file number and the read line in csv_files.txt
10 file_number=1
11 line_number=0
12
13 # Read csv_files.txt and split into n files of 5 lines
14 while read line; do
15     echo "$line" >> "list_${file_number}.txt"
16     line_number=$((line_number + 1))
17     if [ "$line_number" -eq 5 ]; then
18         file_number=$((file_number + 1))
19         line_number=0
20     fi
21 done < "$filenames_list"
22
23 echo "csv_files.txt has been split into ${file_number} files."
```

   The resulting files are:

   1. list_1.txt:

```
1 tess2023341045131-s0073-0000000001750268-0268-s_lc.csv
2 tess2023341045131-s0073-0000000001755406-0268-s_lc.csv
3 tess2023341045131-s0073-0000000001827744-0268-s_lc.csv
4 tess2023341045131-s0073-0000000001828620-0268-s_lc.csv
5 tess2023341045131-s0073-0000000001840666-0268-s_lc.csv
```

   2. list_2.txt:

```
1 tess2023341045131-s0073-0000000001942416-0268-s_lc.csv
2 tess2023341045131-s0073-0000000001942969-0268-s_lc.csv
3 tess2023341045131-s0073-0000000001947463-0268-s_lc.csv
4 tess2023341045131-s0073-0000000001950736-0268-s_lc.csv
5 tess2023341045131-s0073-0000000001950893-0268-s_lc.csv
```

3. list_3.txt:

```
1 tess2023341045131-s0073-0000000002006984-0268-s_lc.csv
2 tess2023341045131-s0073-0000000002008765-0268-s_lc.csv
3 tess2023341045131-s0073-0000000002014191-0268-s_lc.csv
4 tess2023341045131-s0073-0000000002102329-0268-s_lc.csv
5 tess2023341045131-s0073-0000000002104696-0268-s_lc.csv
```

4. list_4.txt:

```
1 tess2023341045131-s0073-0000000002105589-0268-s_lc.csv
2 tess2023341045131-s0073-0000000002143575-0268-s_lc.csv
3 tess2023341045131-s0073-0000000002149979-0268-s_lc.csv
4 tess2023341045131-s0073-0000000002152411-0268-s_lc.csv
5 tess2023341045131-s0073-0000000002234692-0268-s_lc.csv
```

3. Open the light curve files in CSV format with TOPCAT. Plot their light curves. For doing so, identify the correct plot type and the relevant columns.

After opening the csv tables with TOPCAT, the plot for each was generated using the proper columns. These columns, as well as the title and axes lables were determined by following the information given by TESS' beginner's guide on github. The resulting plots were saved as pdf files to a /lightcurves subdirectory. These are shown in the figures 1–20 bellow.

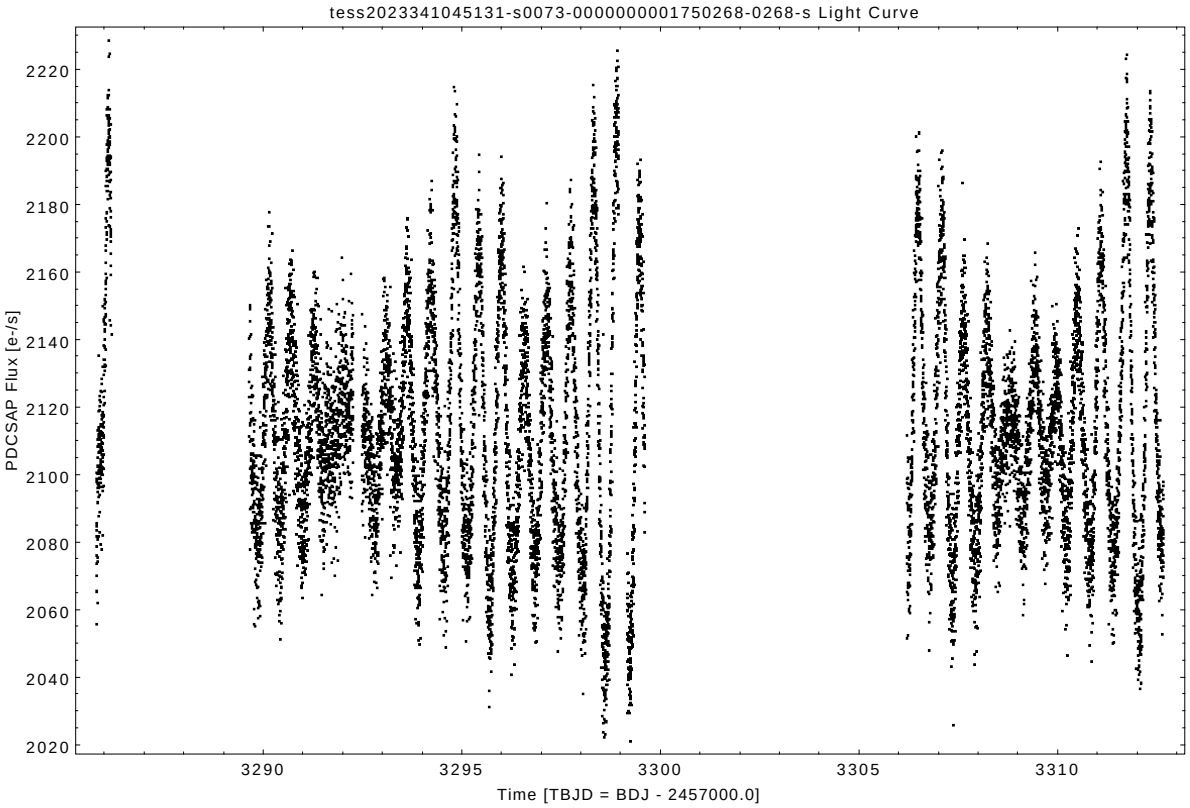

Figure 1: *tess2023341045131-s0073-0000000001750268-0268-s light curve*

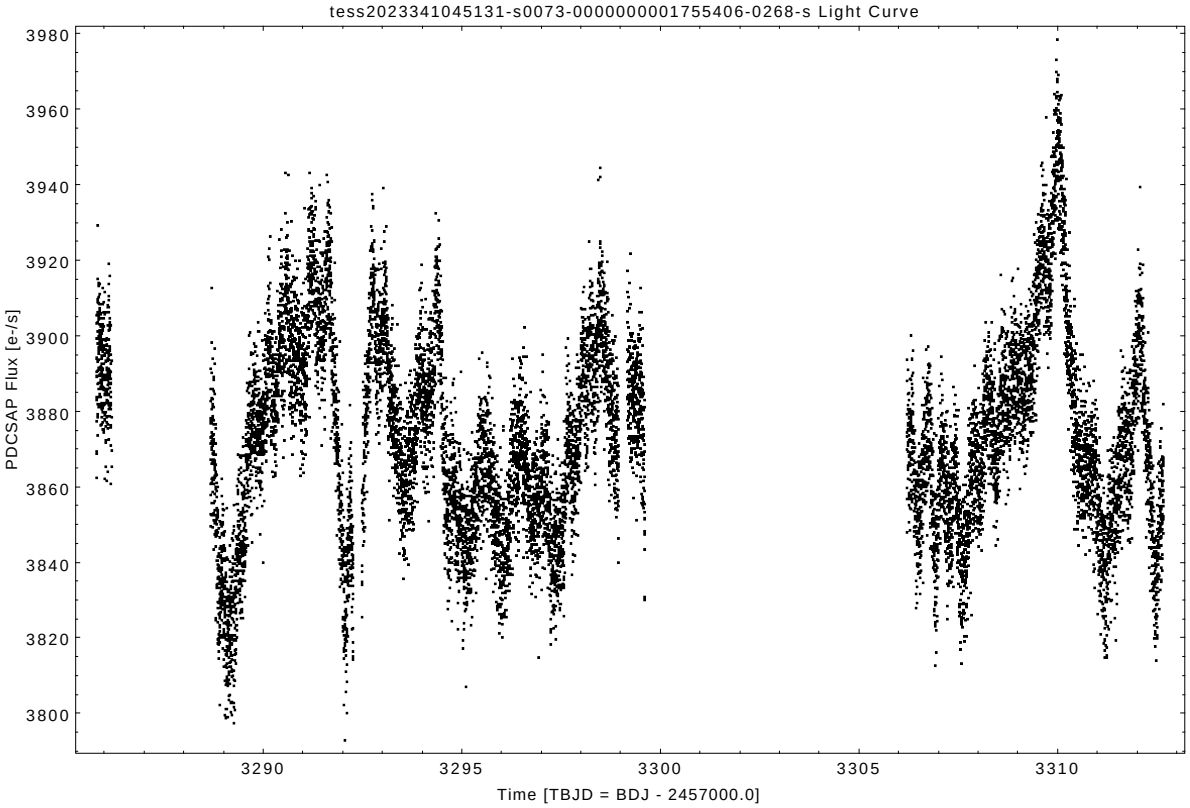

Figure 2: *tess2023341045131-s0073-0000000001755406-0268-s light curve*

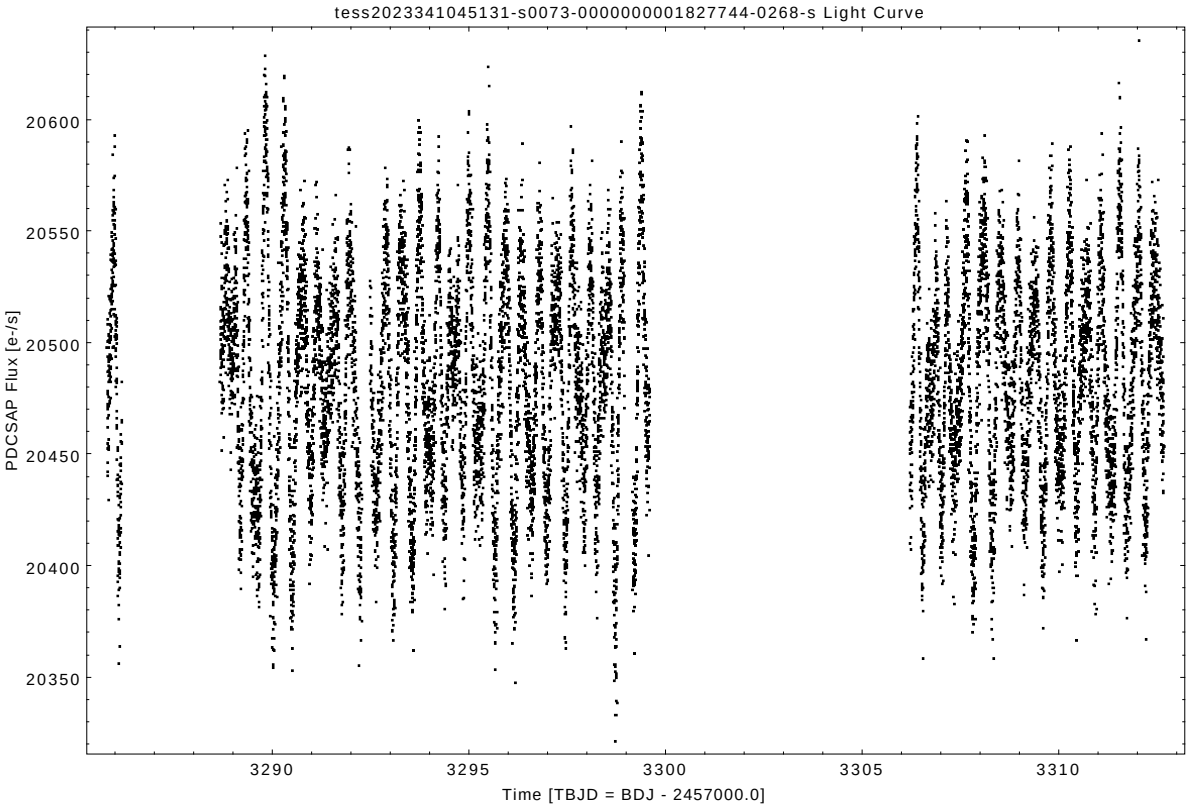

Figure 3: *tess2023341045131-s0073-0000000001827744-0268-s light curve*

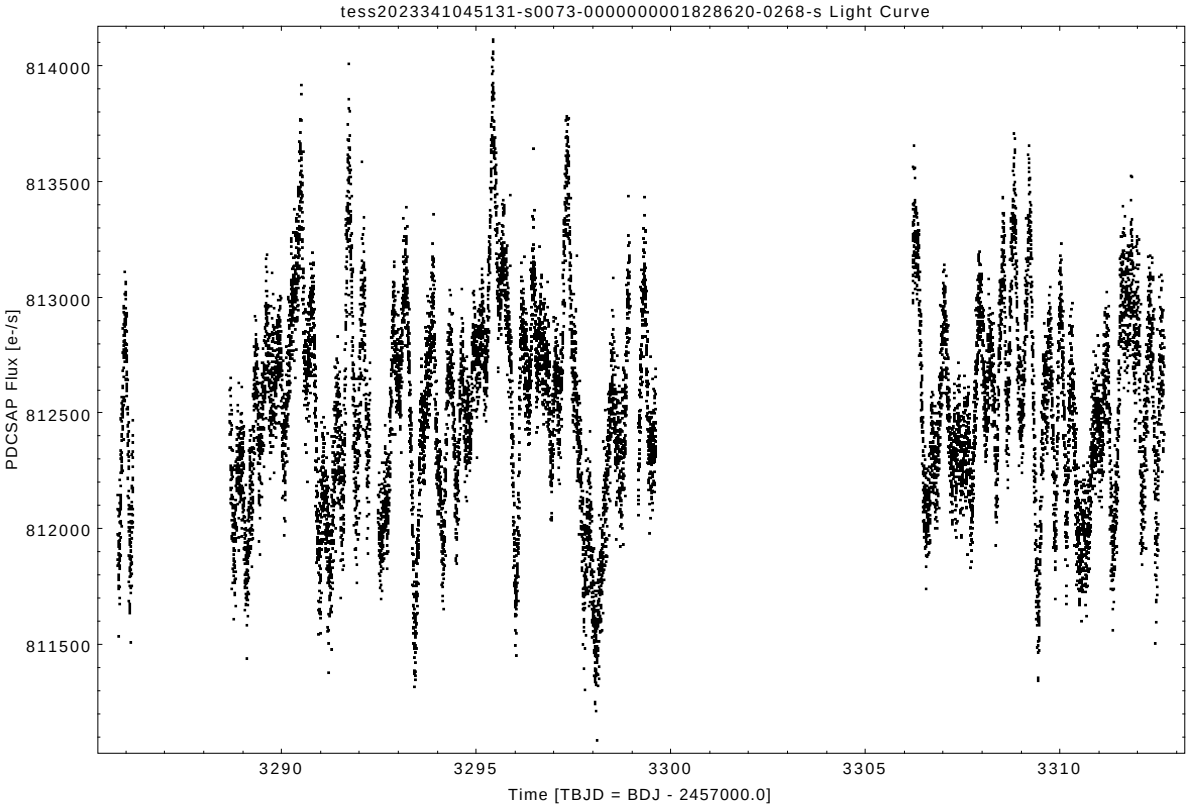

Figure 4: *tess2023341045131-s0073-0000000001828620-0268-s light curve*

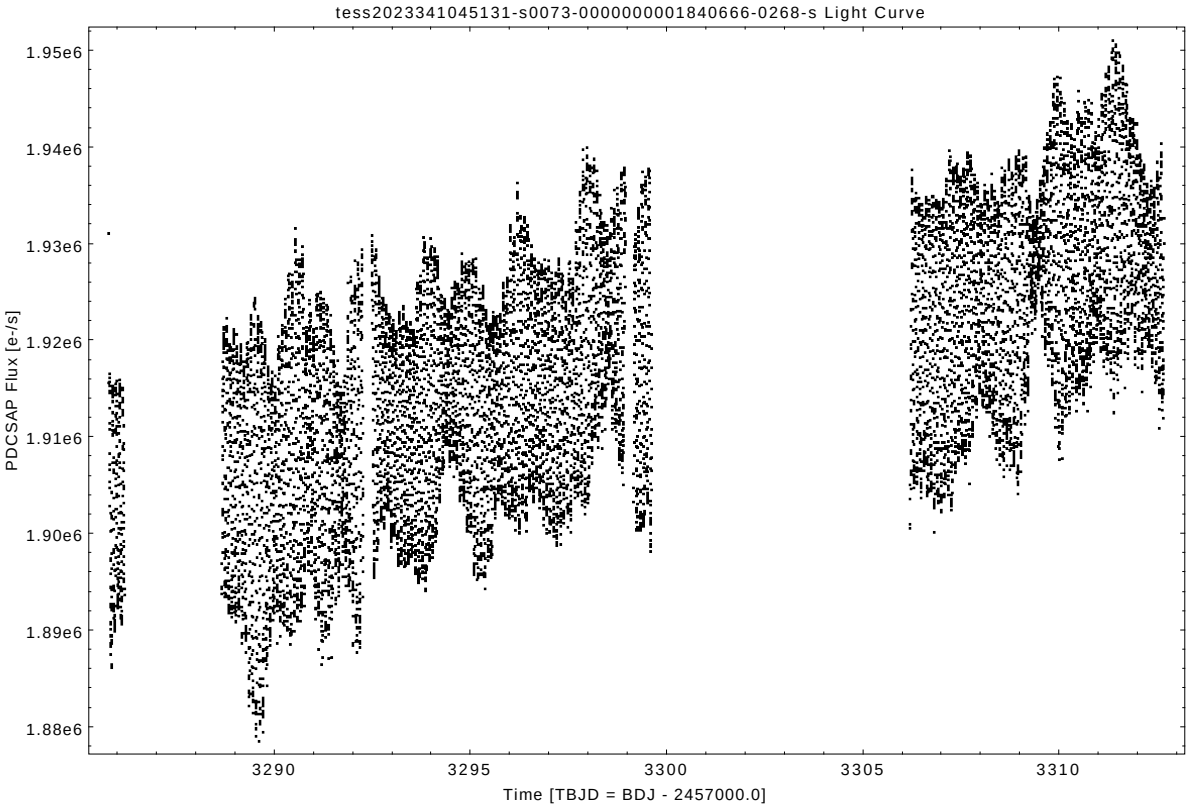

Figure 5: *tess2023341045131-s0073-0000000001840666-0268-s light curve*

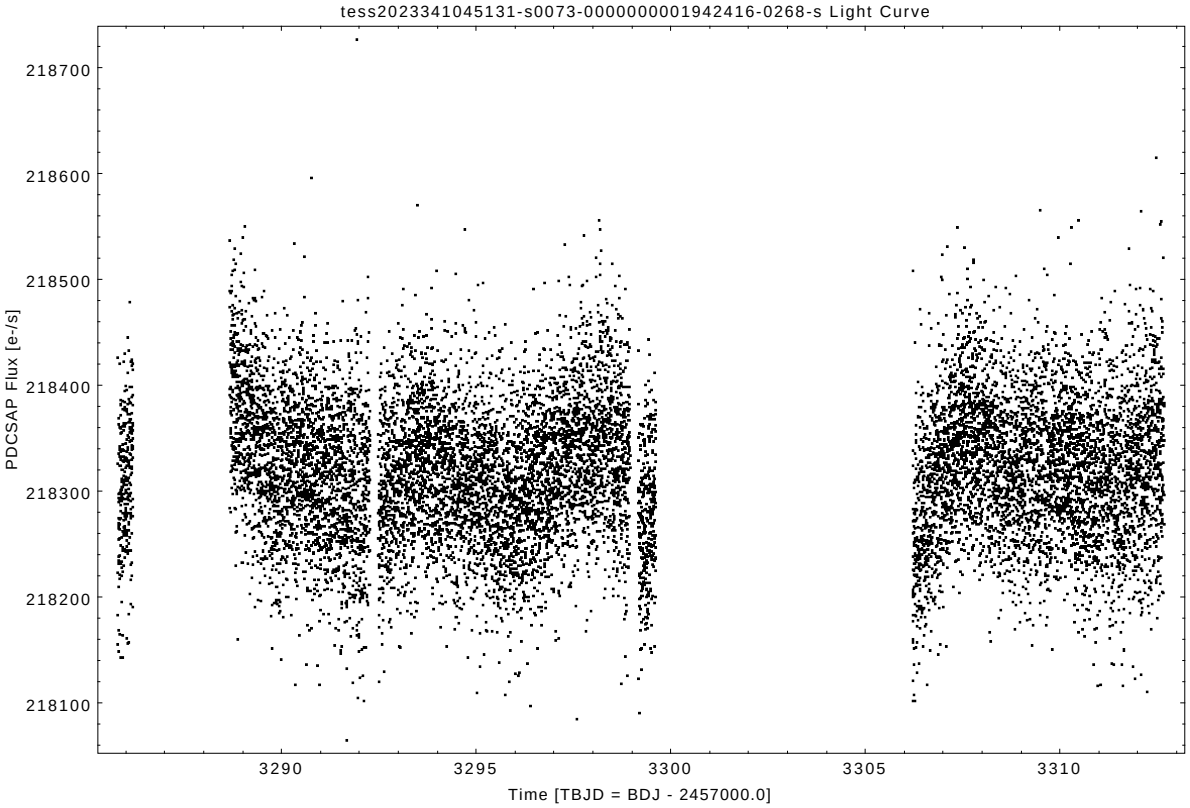

Figure 6: *tess2023341045131-s0073-0000000001942416-0268-s light curve*

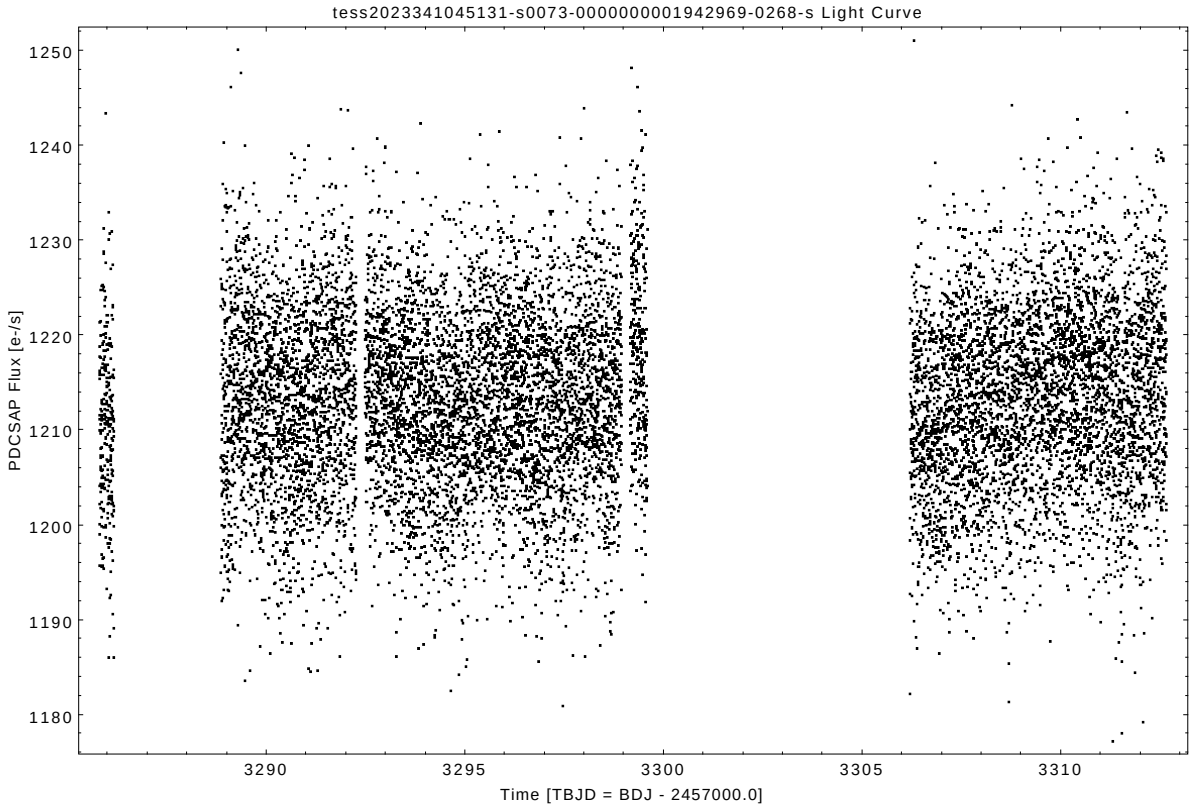

Figure 7: *tess2023341045131-s0073-0000000001942969-0268-s light curve*

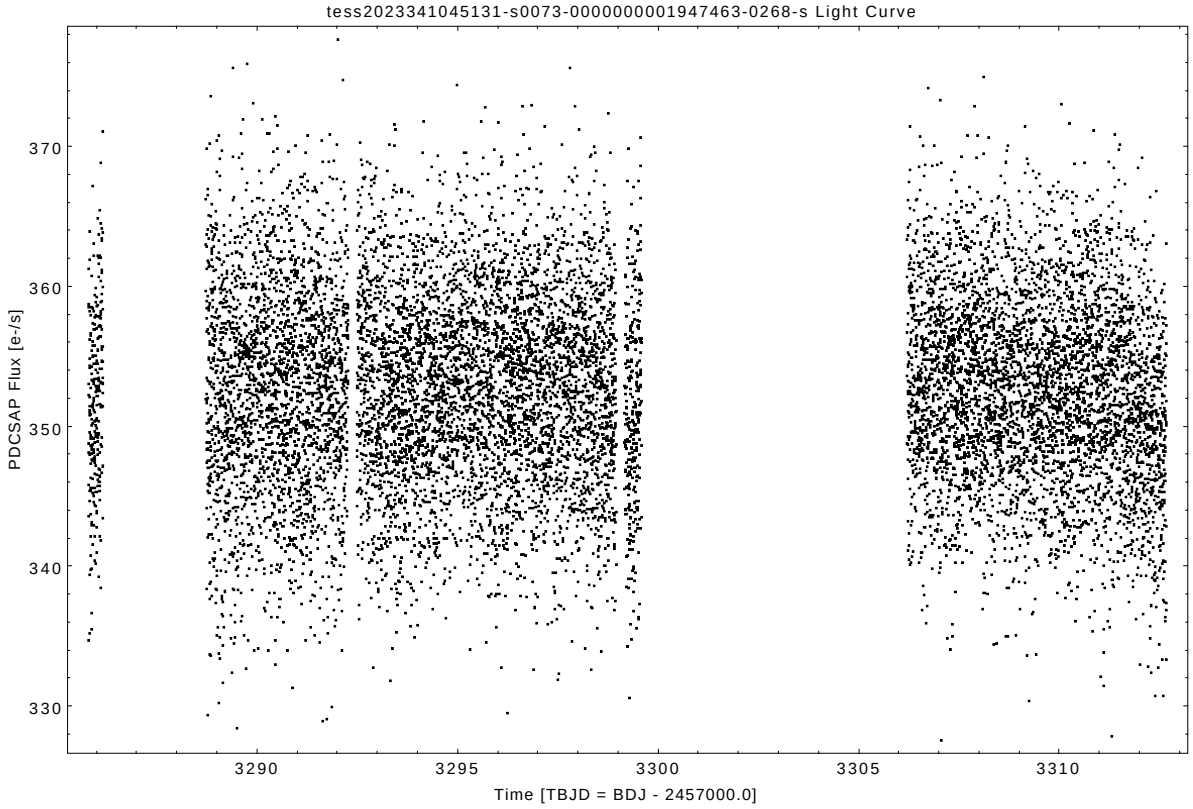

Figure 8: *tess2023341045131-s0073-0000000001947463-0268-s light curve*

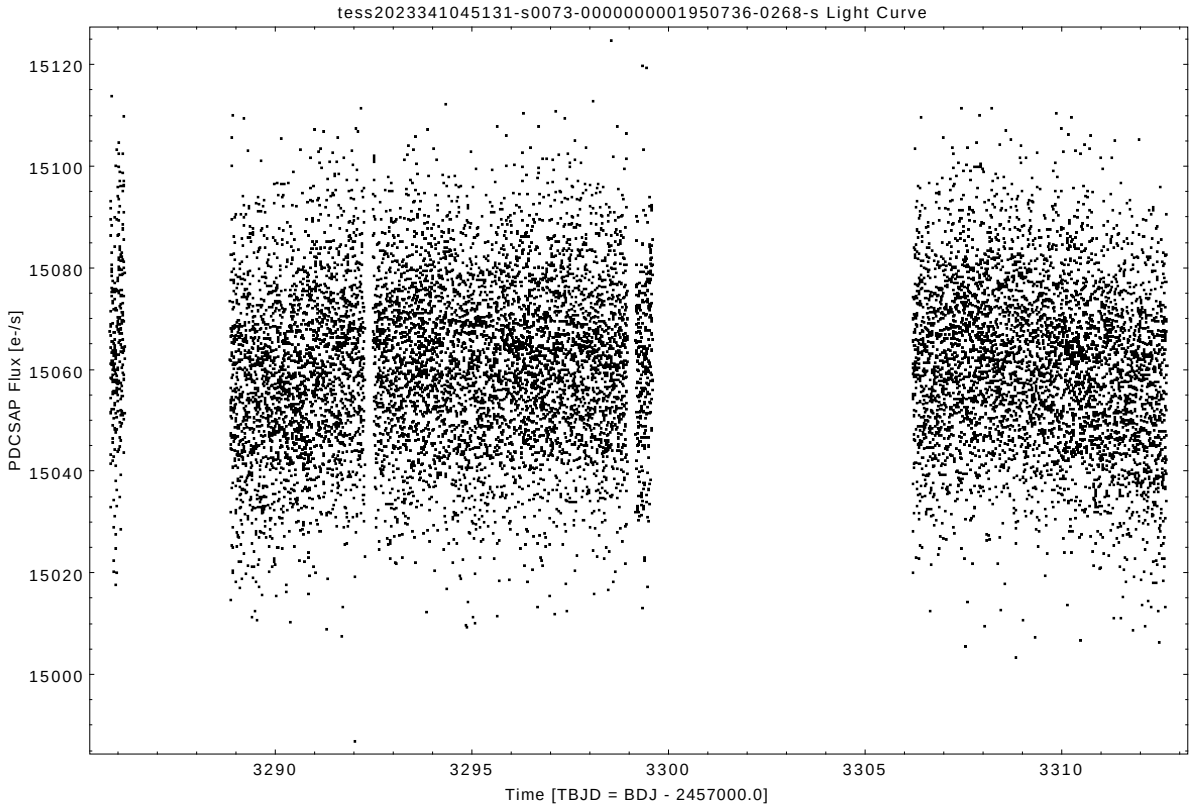

Figure 9: *tess2023341045131-s0073-0000000001950736-0268-s light curve*

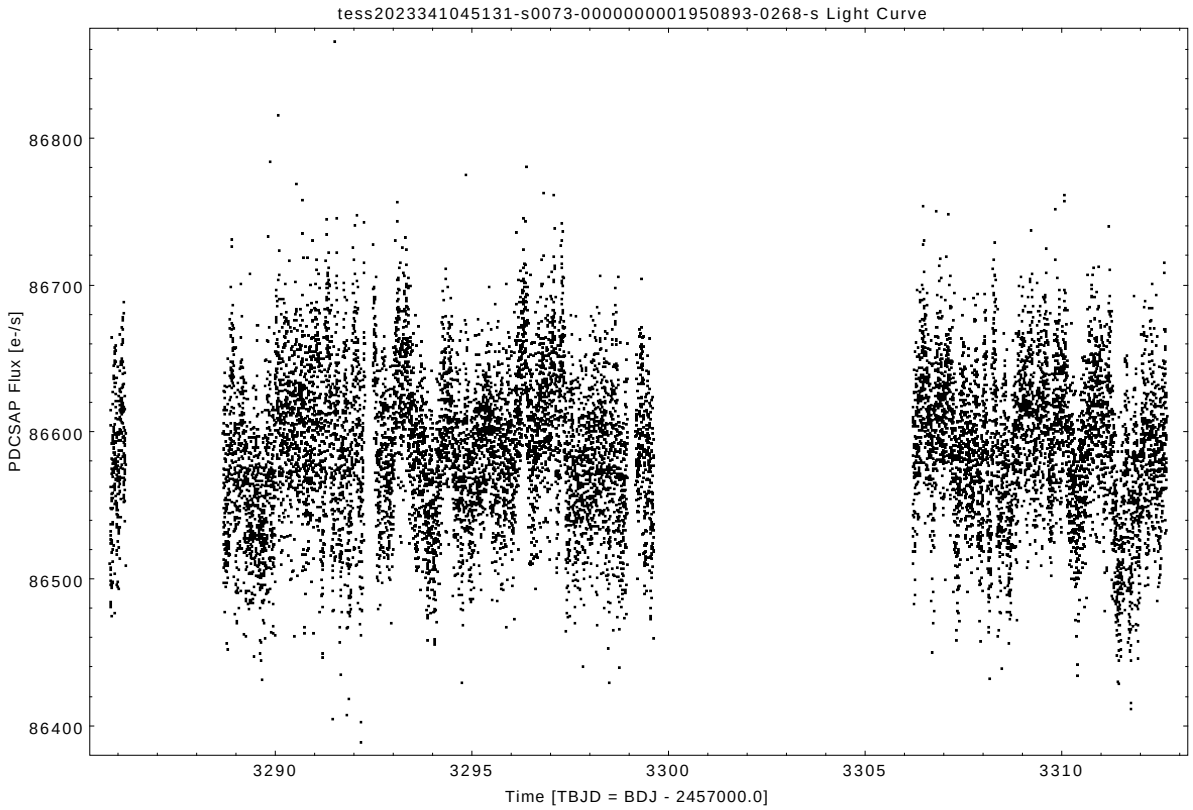

Figure 10: *tess2023341045131-s0073-0000000001950893-0268-s light curve*

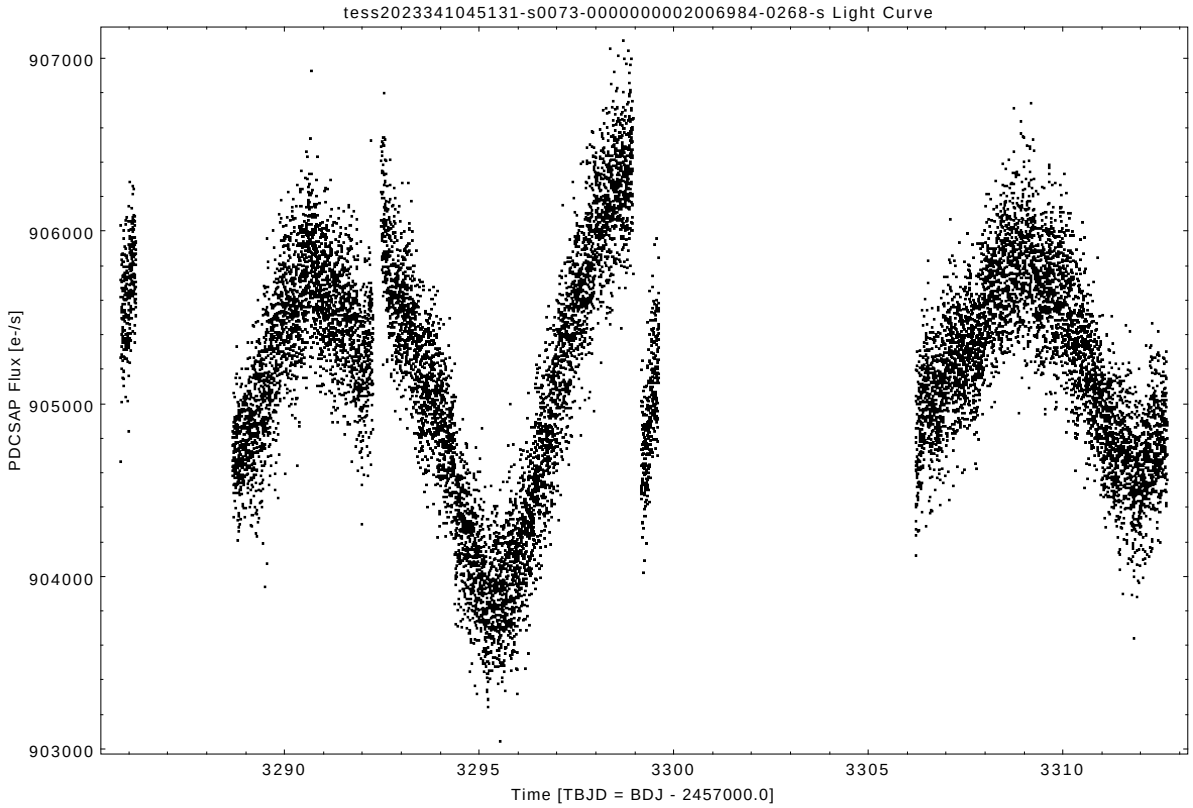

Figure 11: *tess2023341045131-s0073-0000000002006984-0268-s light curve*

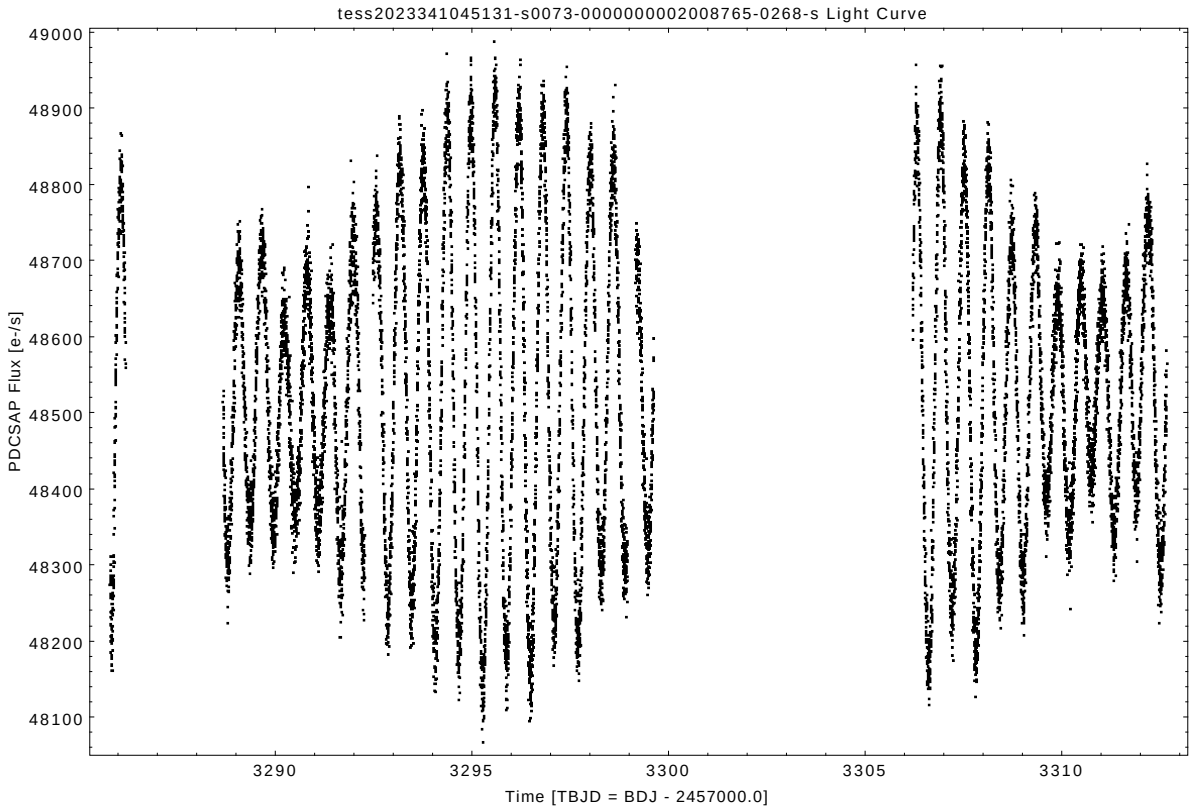

Figure 12: *tess2023341045131-s0073-0000000002008765-0268-s light curve*

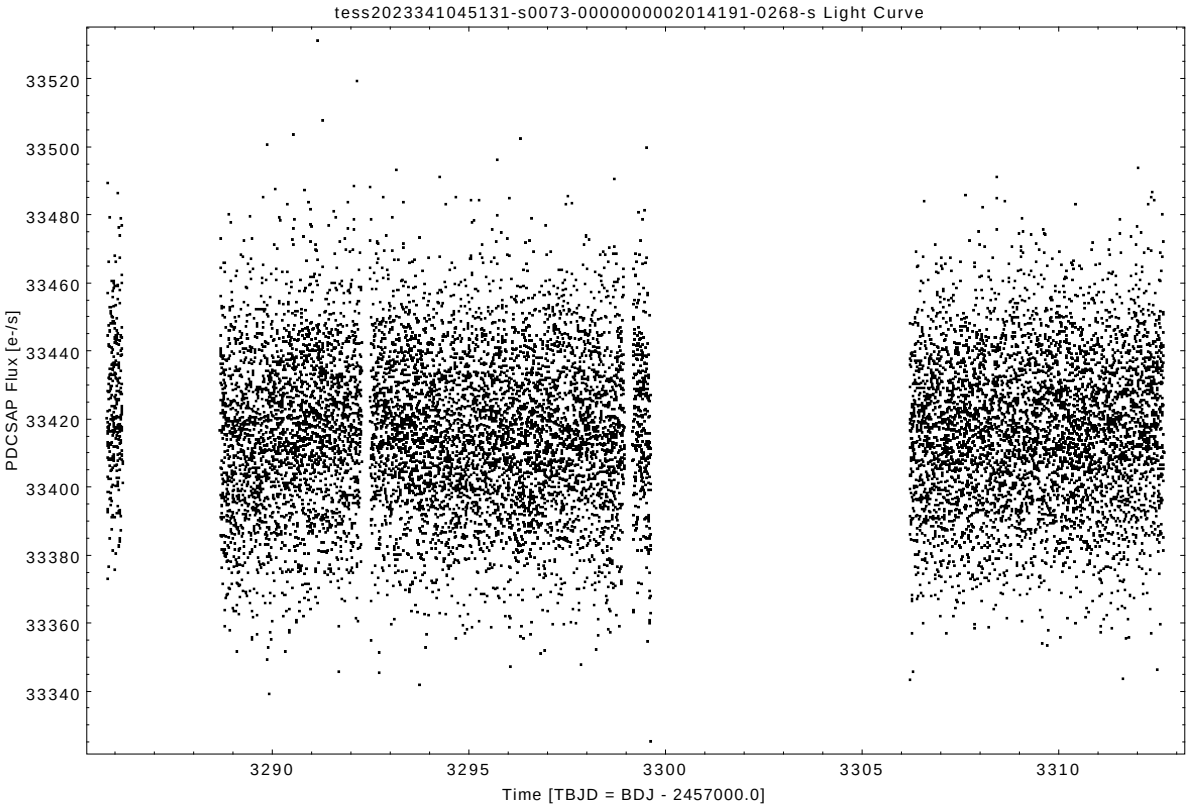

Figure 13: *tess2023341045131-s0073-0000000002014191-0268-s light curve*

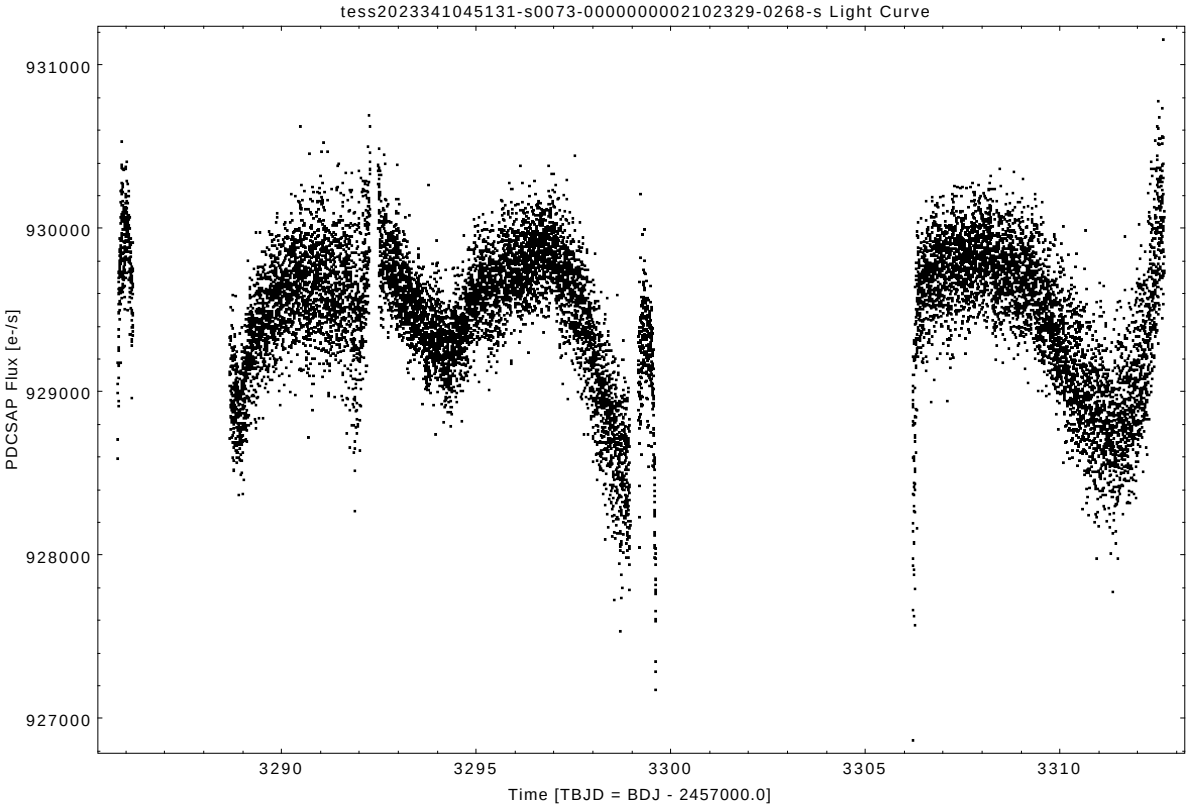

Figure 14: *tess2023341045131-s0073-0000000002102329-0268-s light curve*

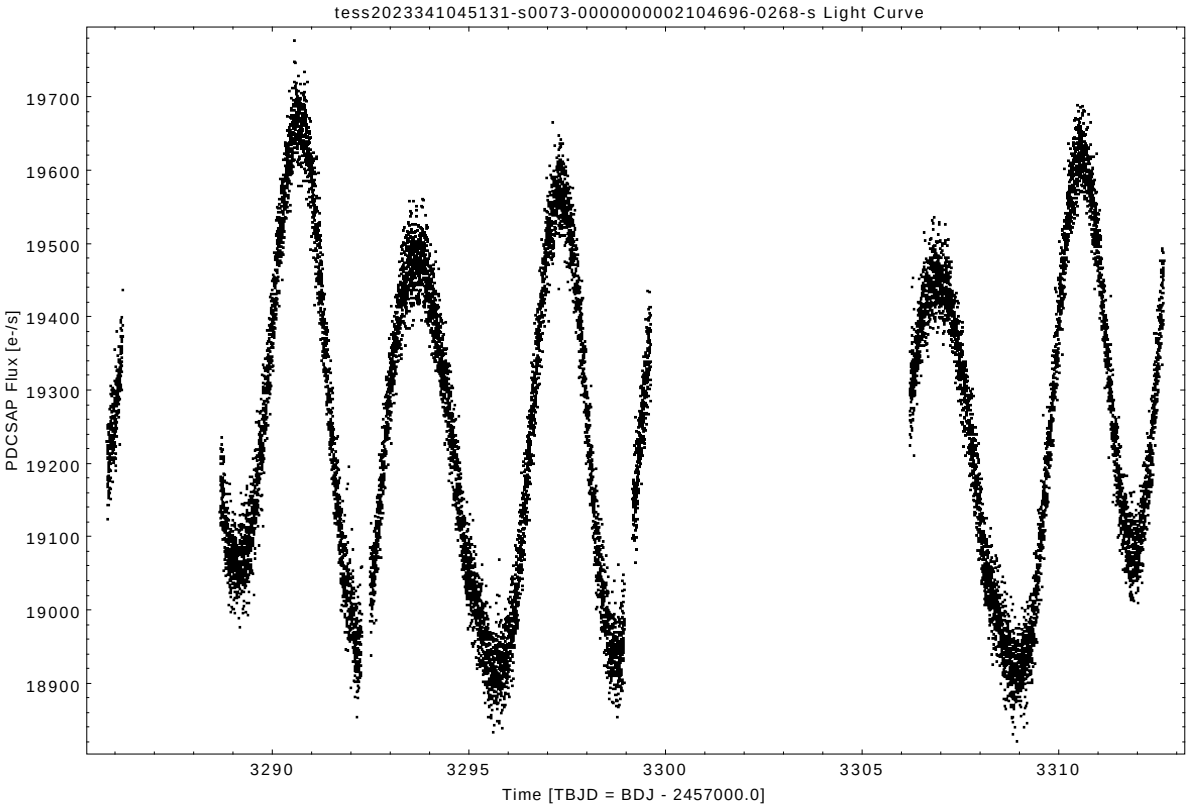

Figure 15: *tess2023341045131-s0073-0000000002104696-0268-s light curve*

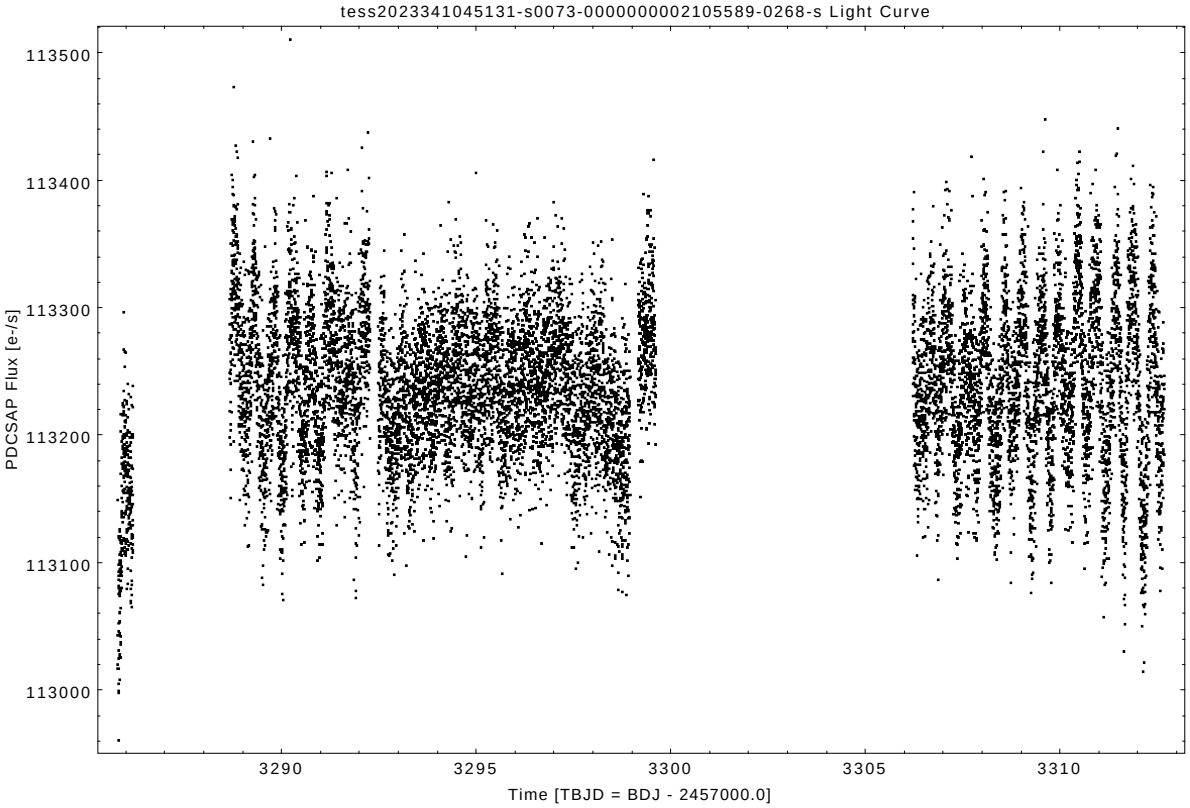

Figure 16: *tess2023341045131-s0073-0000000002105589-0268-s light curve*

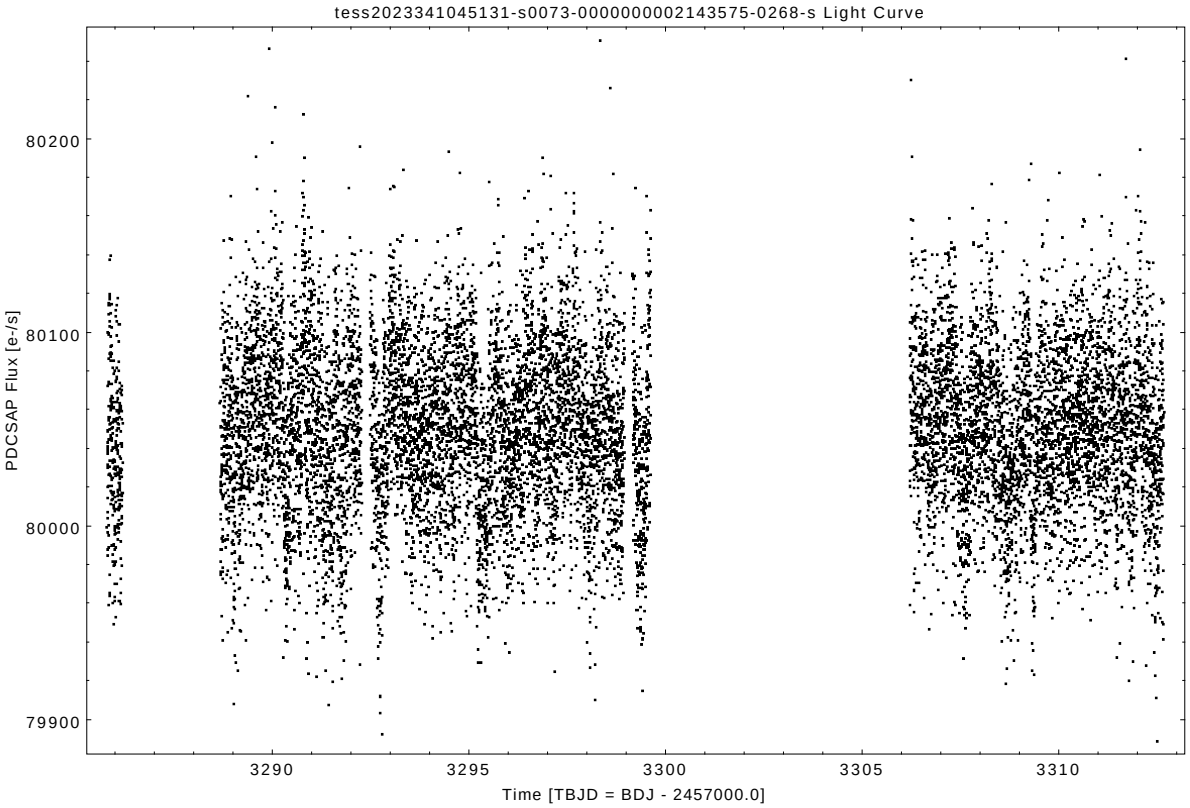

Figure 17: *tess2023341045131-s0073-0000000002143575-0268-s light curve*

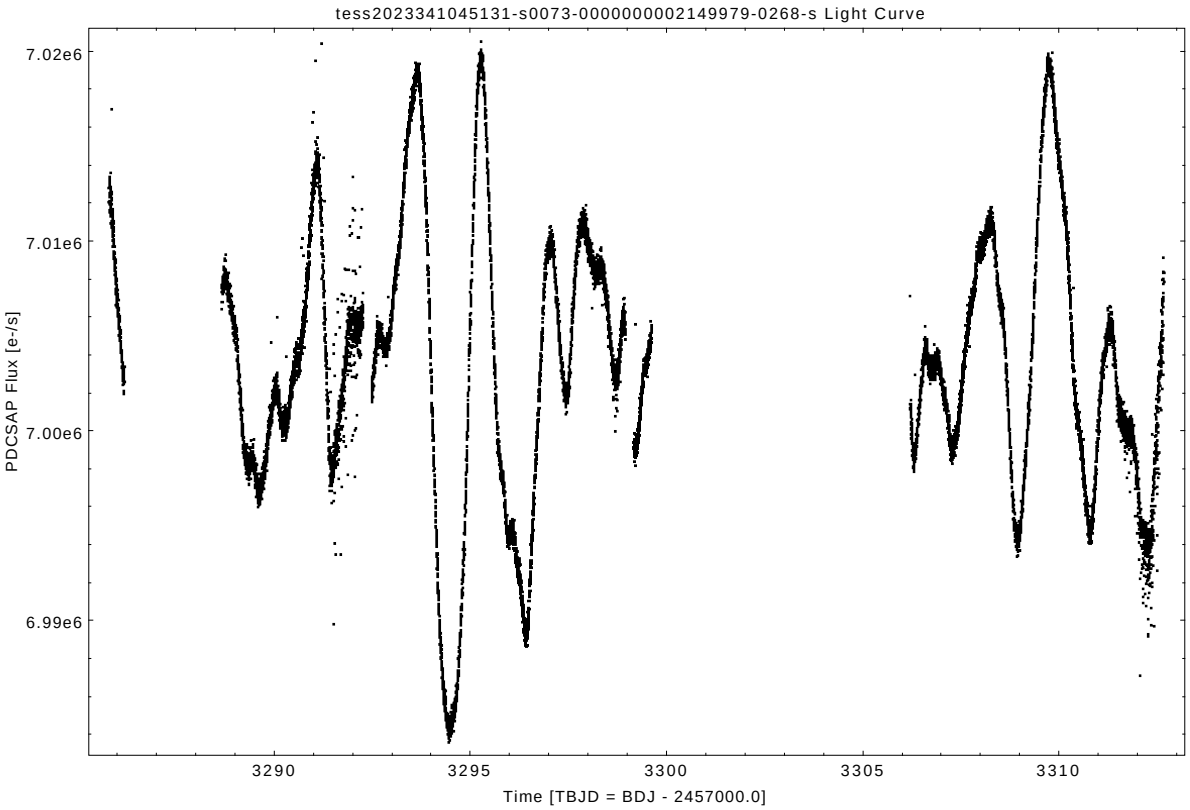

Figure 18: *tess2023341045131-s0073-0000000002149979-0268-s light curve*

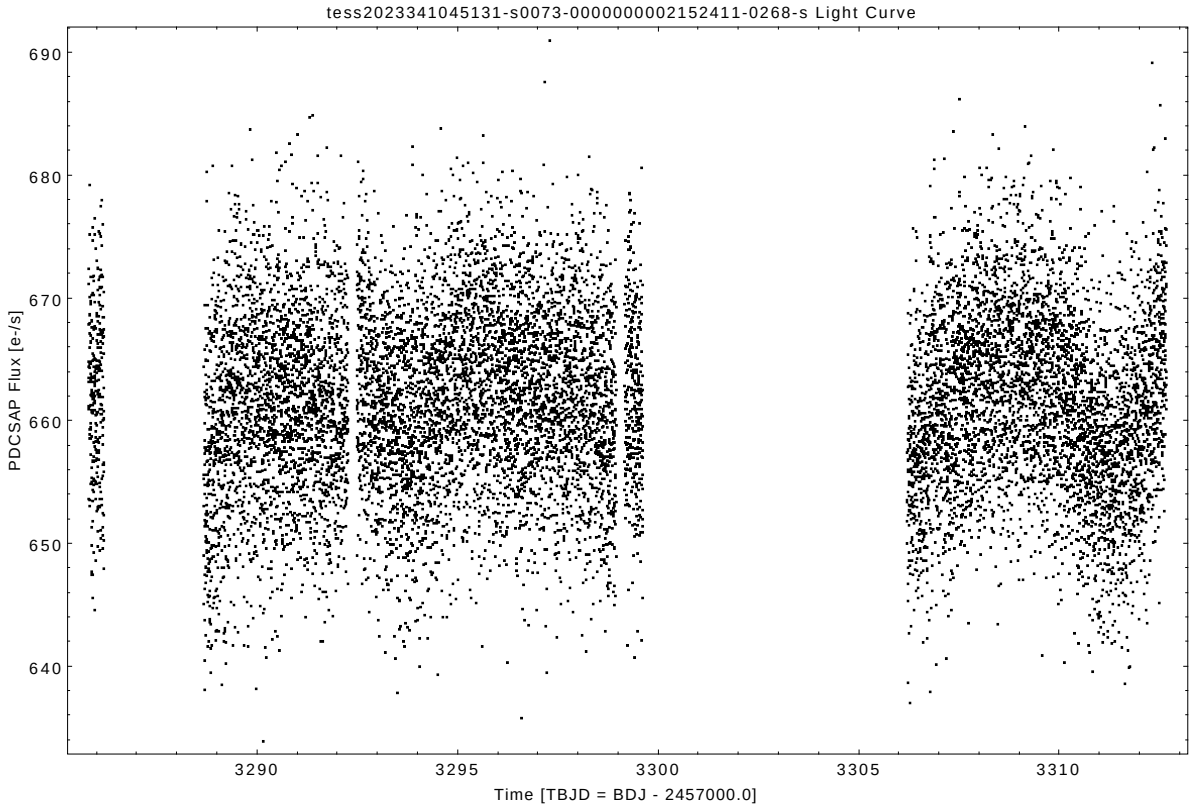

Figure 19: *tess2023341045131-s0073-0000000002152411-0268-s light curve*

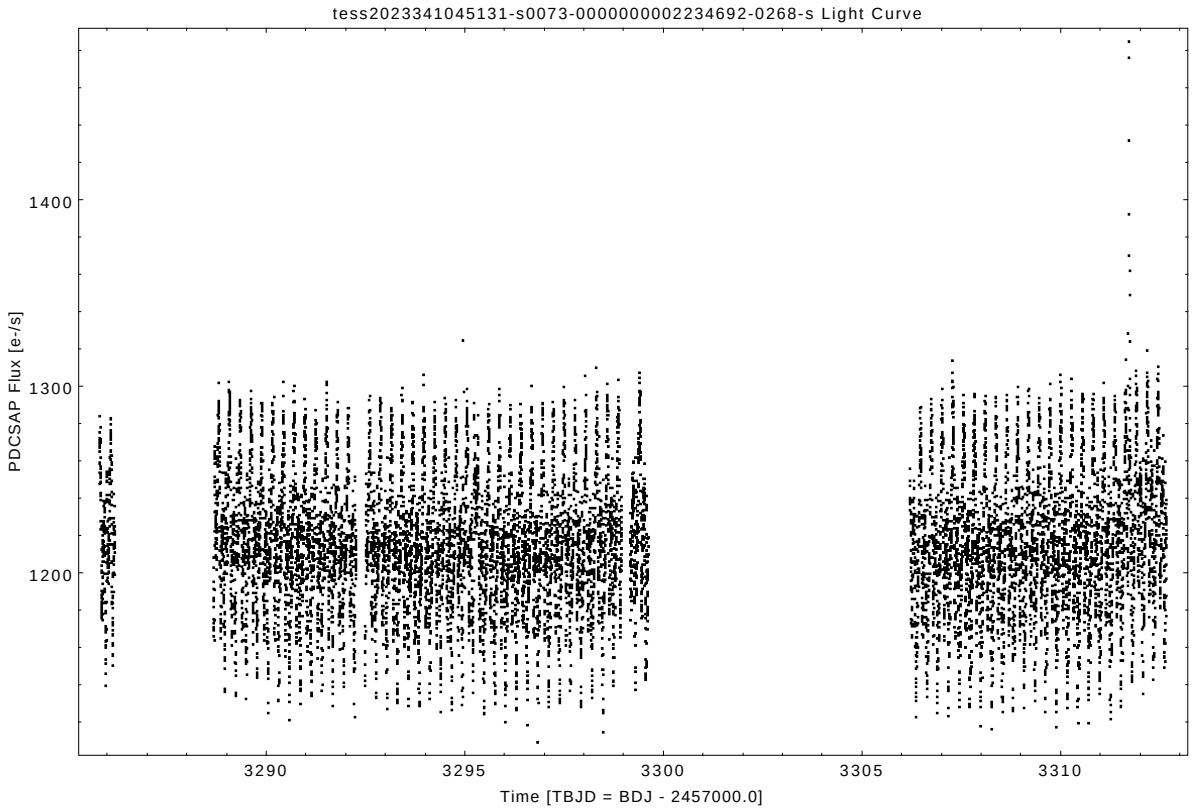

Figure 20: *tess2023341045131-s0073-0000000002234692-0268-s light curve*