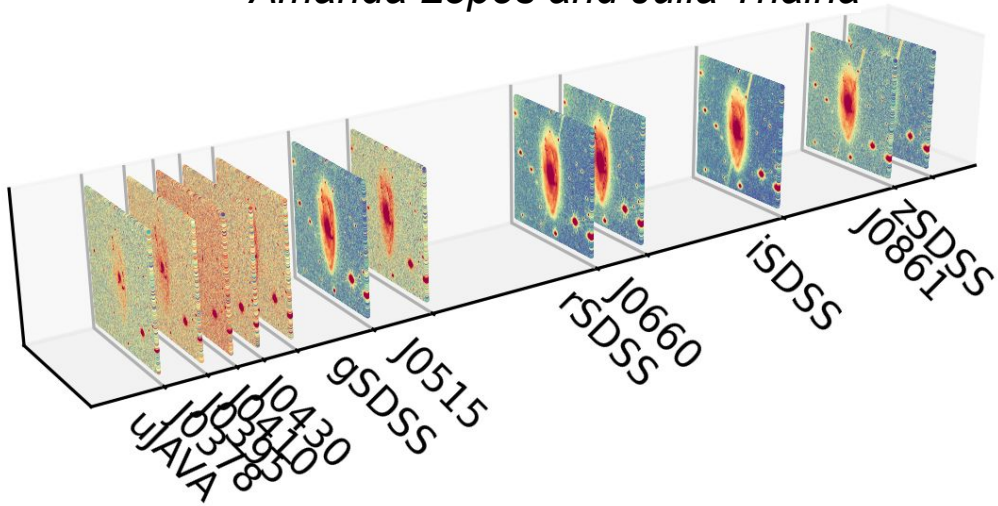
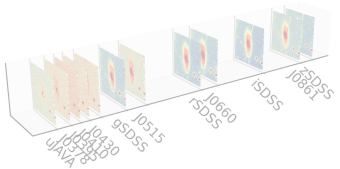
S-Cubes python package

creating IFS-like cubes with S-PLUS data

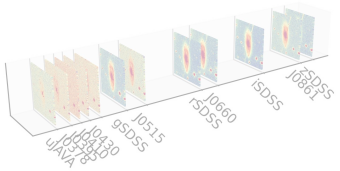
Eduardo A. D. Lacerda
***help on coding**: Fábio Herpich, Gustavo Schwarz*
***help on testing**: Roberto Cid Fernandes, Maiara Sampaio Carvalho, Victor Hugo Sasse, Amanda Lopes and Júlia Thainá*





S-Cubes package presentation

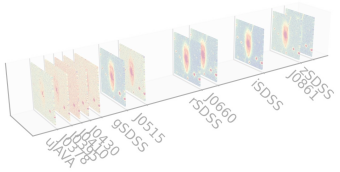
The software is a modern version of ***make_scubes_v02.py***, a script written by Fábio Herpich. **S-Cubes** has been completely remodeled and rewritten taking advantage of a new paradigm of coding, new python tools, and the recent release of the **splusdata** package.



S-Cubes package presentation

The package includes:

- **console scripts** create cubes, detection images and mask stars
- **modules** to access output data
- **modules** to plot output data
- **modules** to access online S-PLUS data
- S-PLUS DR4 Calibration **data**
- S-PLUS filters **data**
- **online documentation** with running examples

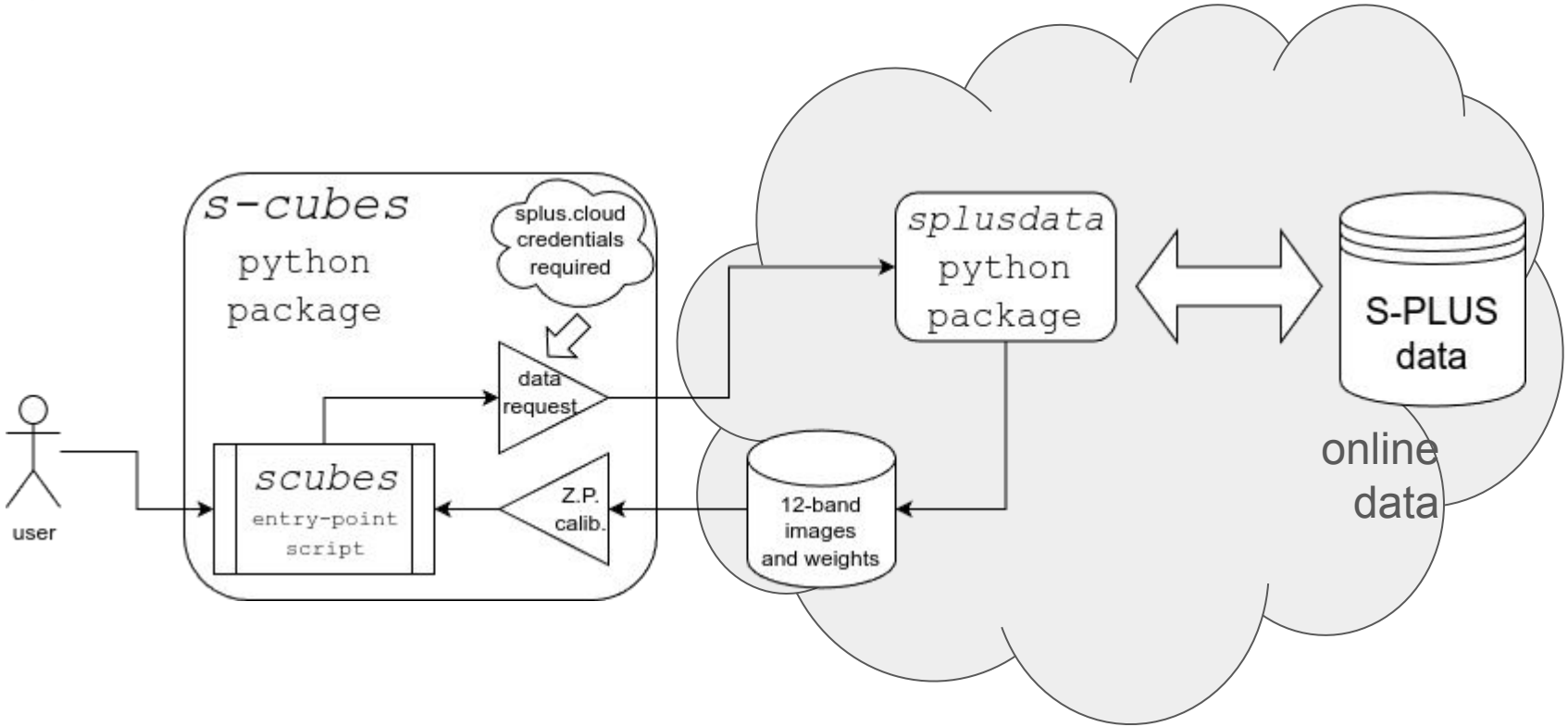


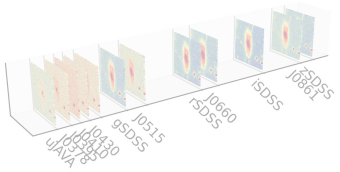
S-Cubes package main console scripts

- *scubes and scubesml:* the main script of **S-Cubes**. Download 12-band images cropped from S-PLUS observed tiles. The images are zero-point calibrated and the fluxes and uncertainties are calculated. At the end, generates a FITS file with the cube and some metadata. The "*ml*" version operates with an input ***masterlist*** of objects.

- *sex_mask_stars:* uses **SExtractor** in order to create a spatial mask of stars, attempting to remove the areas enclosed by the brightest ones along the FOV.

S-Cubes: scubes entry-point console script

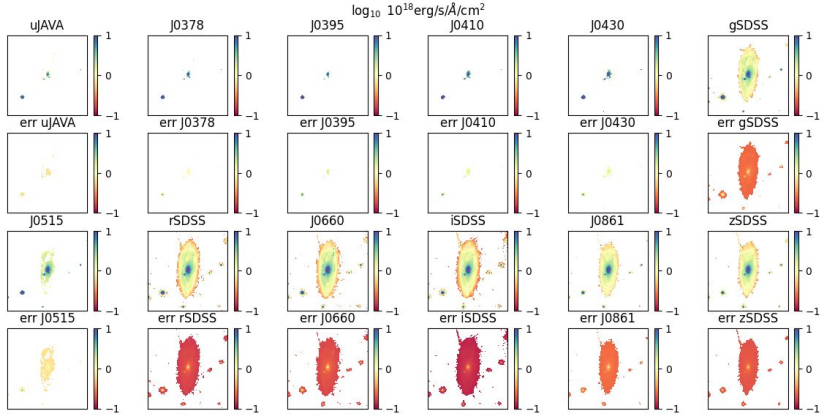




S-Cubes: SCUBE - the output cube

scubes FITS file

scubes FITS	
0 - PRIMARY	**Object info @ HEADER**
1 - DATA	12-band 3D spectra (x, y, bands)
2 - ERRORS	12-band 3D error spectra (x, y, bands)
3 - WEIMASK	Weights mask (x, y)
4 - METADATA	filters, central wavelenghts, pivot wavelenghts, exposure times, gains, PSF FWHM, obs. date.




```
FITS_rec([('uJAVA', 3576.5900319 , 3533.28150603, 1302.99580147, 2651.74575679, 1.4238565 , '2017-02-19'),
          ('J0378', 3770.66765668, 3773.16495619, 1266.43687077, 2590.53003934, 1.24601953, '2017-02-19'),
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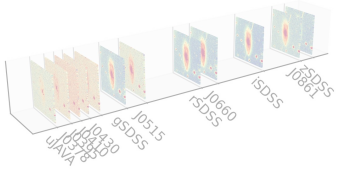
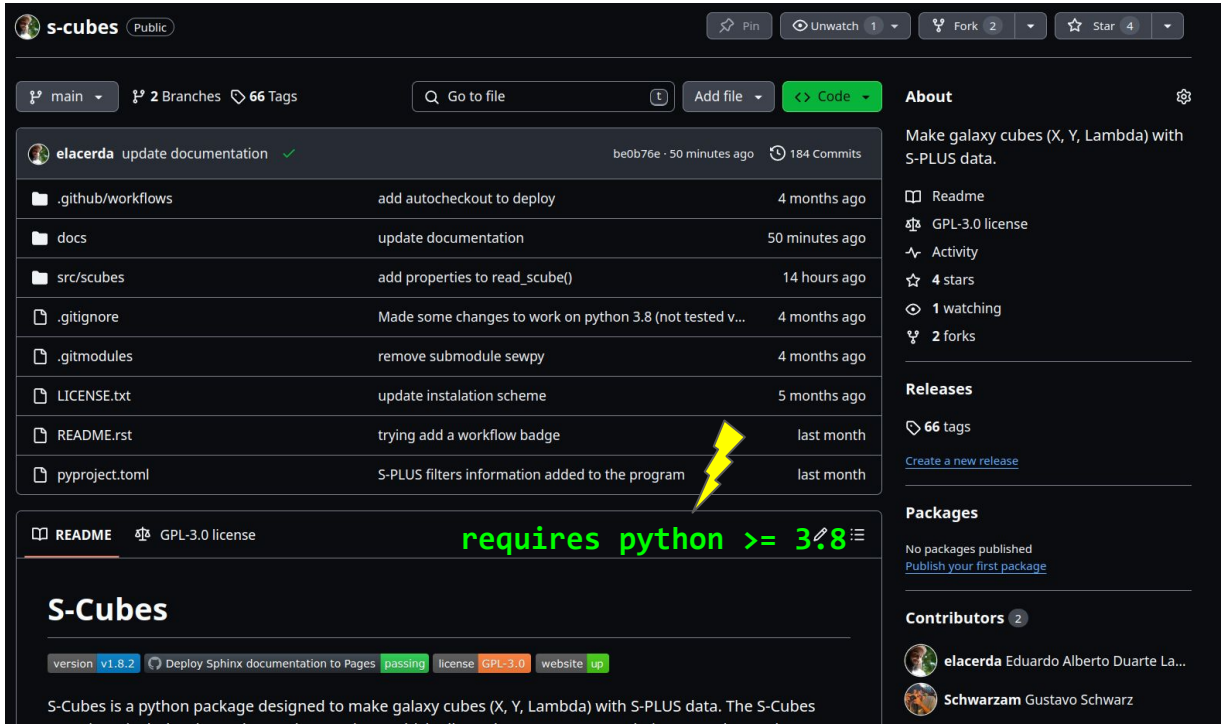
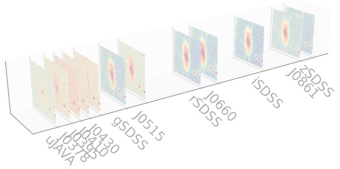


S-Cubes package source and online documentation

- GitHub page: https://github.com/splus-collab/s-cubes *(v1.11.0)*





S-Cubes package source and online documentation

- Webpage: https://splus-collab.github.io/s-cubes/

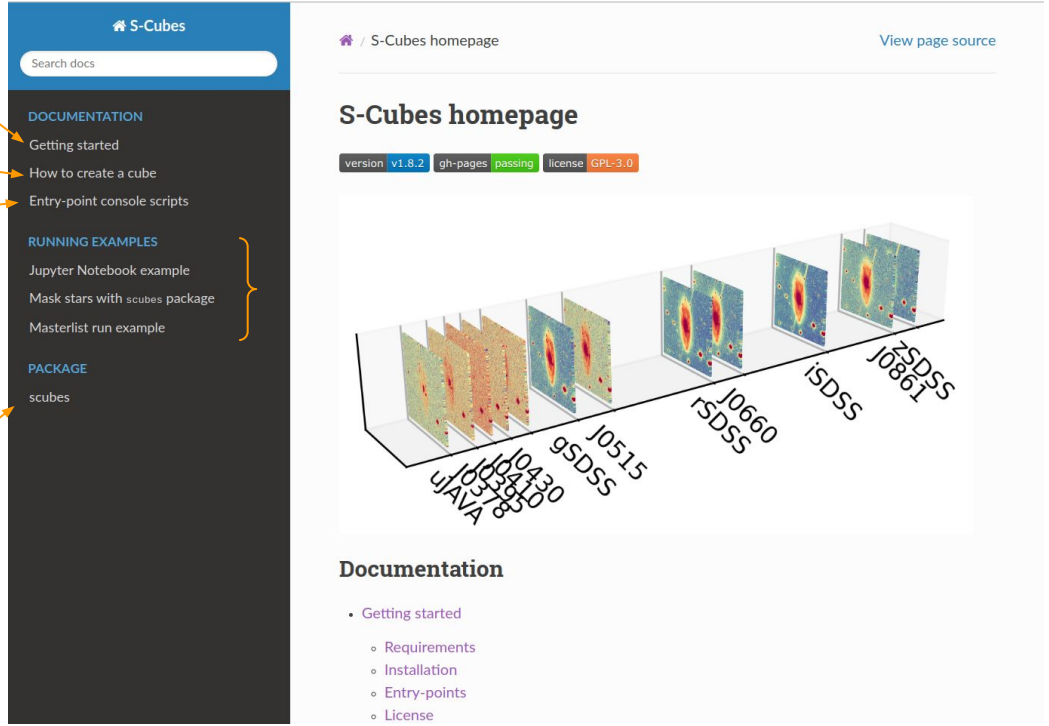
requirements and installation guide

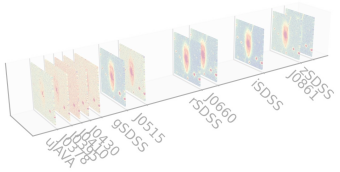
quick scubes example

scripts documentation

Three example notebooks with running scripts, output files reading and metadata explanation and usage.

source code documentation

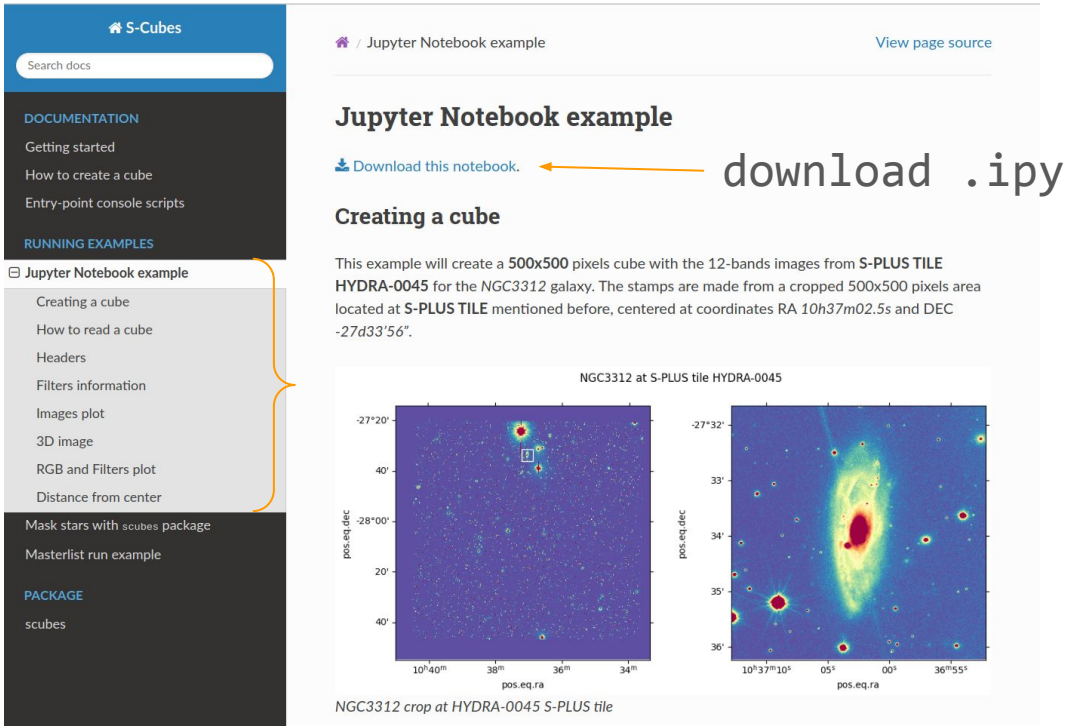


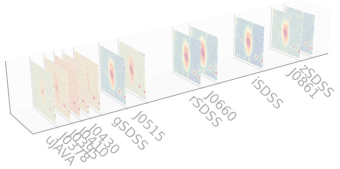


S-Cubes package source and online documentation

- Webpage: https://splus-collab.github.io/s-cubes/nb_example.html

interactive scubes package usage with plots





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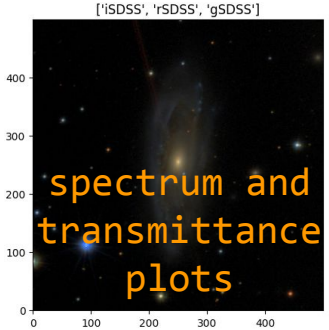
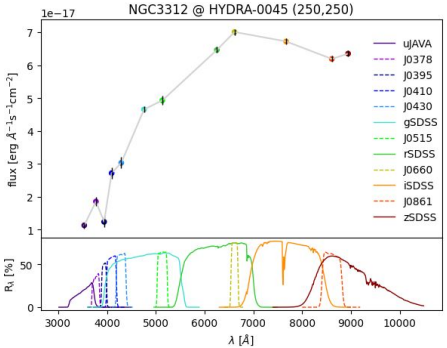
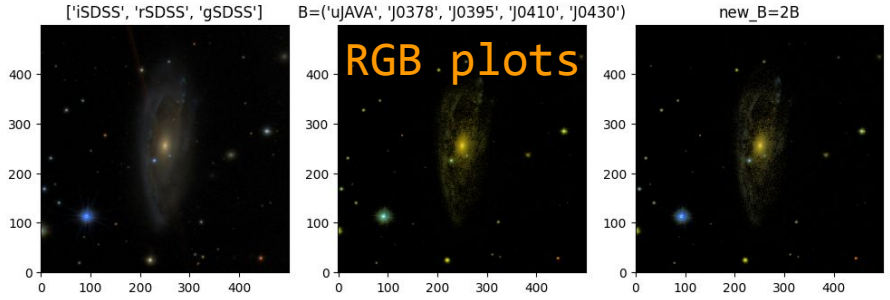
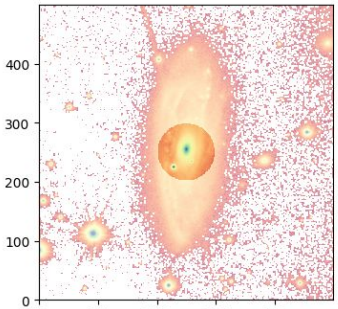
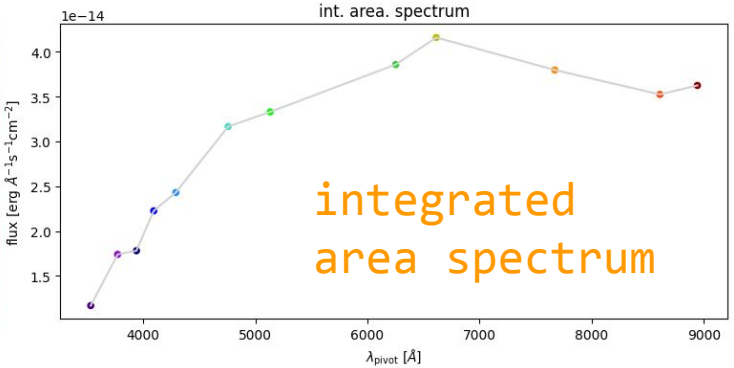
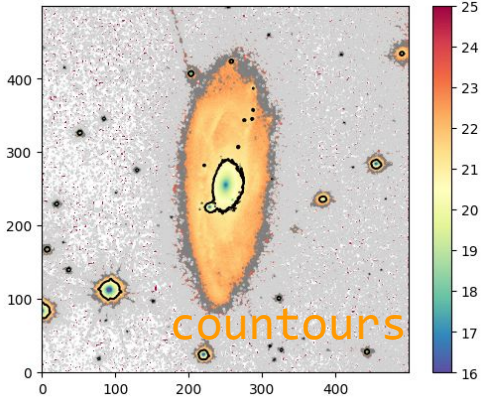


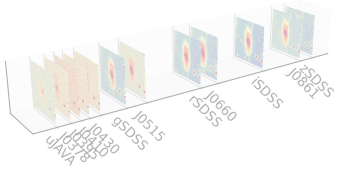








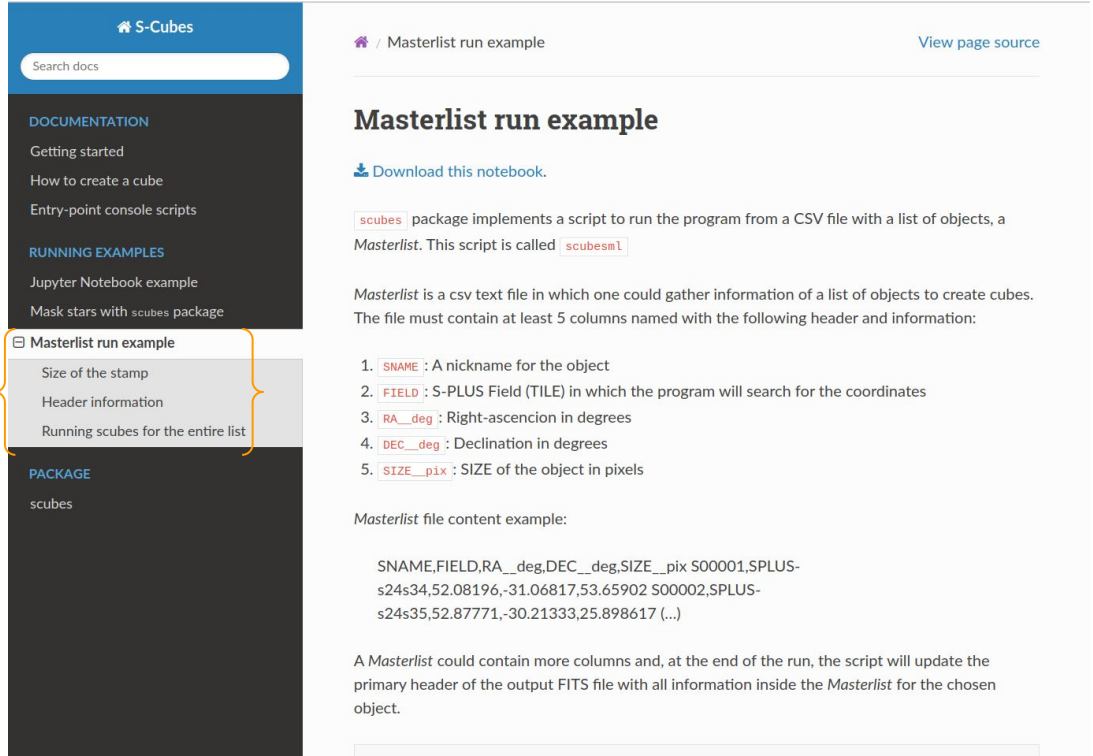


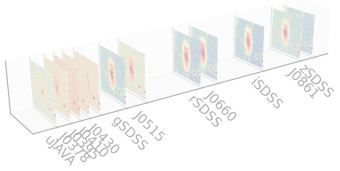


S-Cubes package source and online documentation

- Webpage: https://splus-collab.github.io/s-cubes/masterlist_example.html

How to run scubes using a list of objects



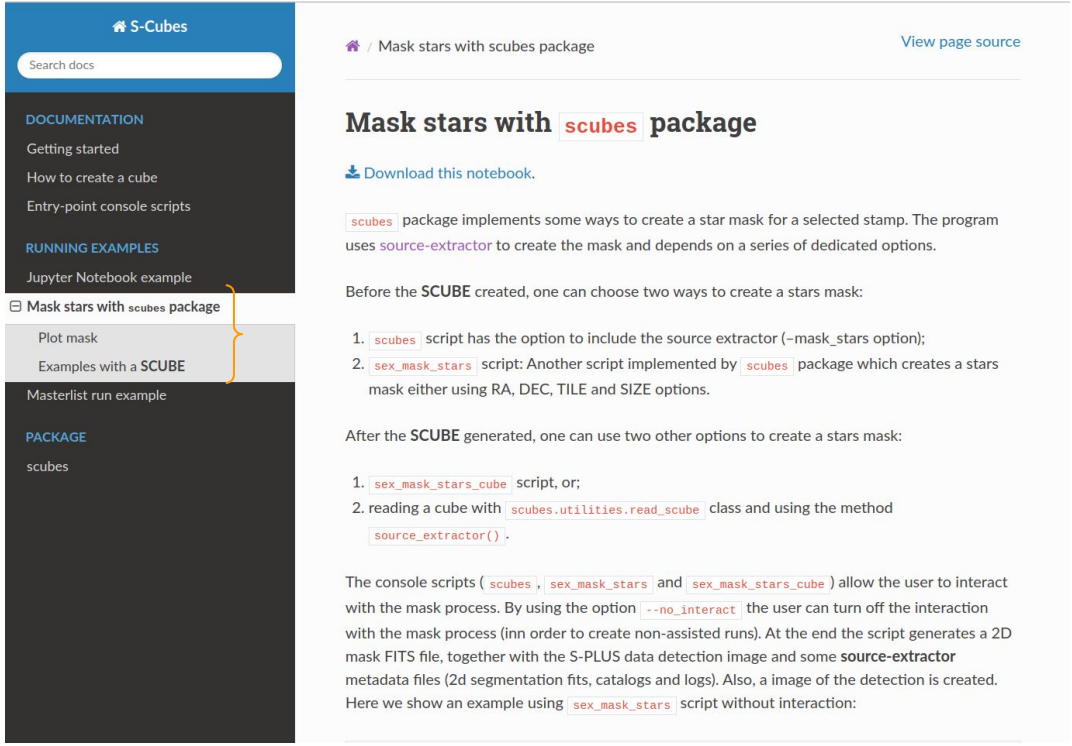


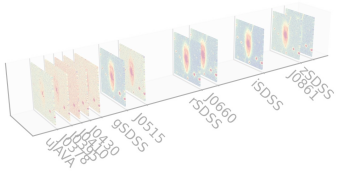
S-Cubes package source and online documentation

- Webpage: https://splus-collab.github.io/s-cubes/mask_stars_example.html

Using scubes package to create a mask of stars in the FOV

SExtractor (source-extractor) required



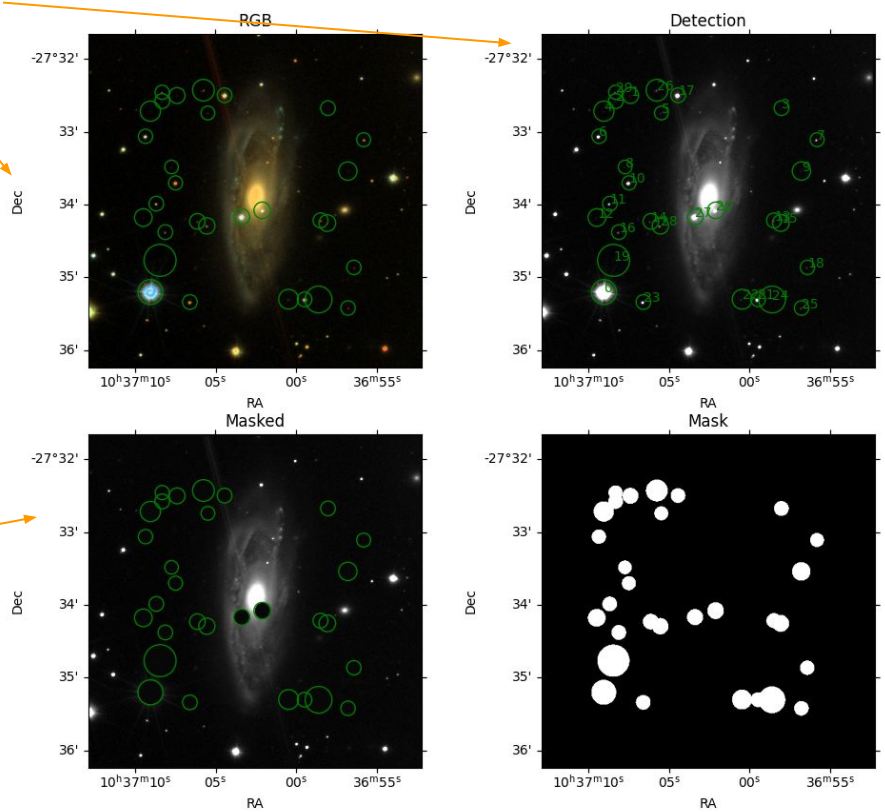


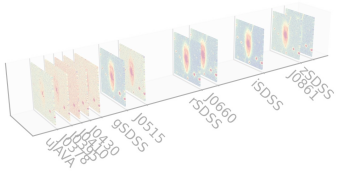
S-Cubes package mask stars output example

DETECTIONS

MASKED IMAGE

MASK





S-Cubes package: what's next?

- update for the new reduction (MAR)
- make available other stars mask processes
- get in touch with S-PLUS different science groups to search for usage adaptations
- bugs? e-mail: dhubax@gmail.com