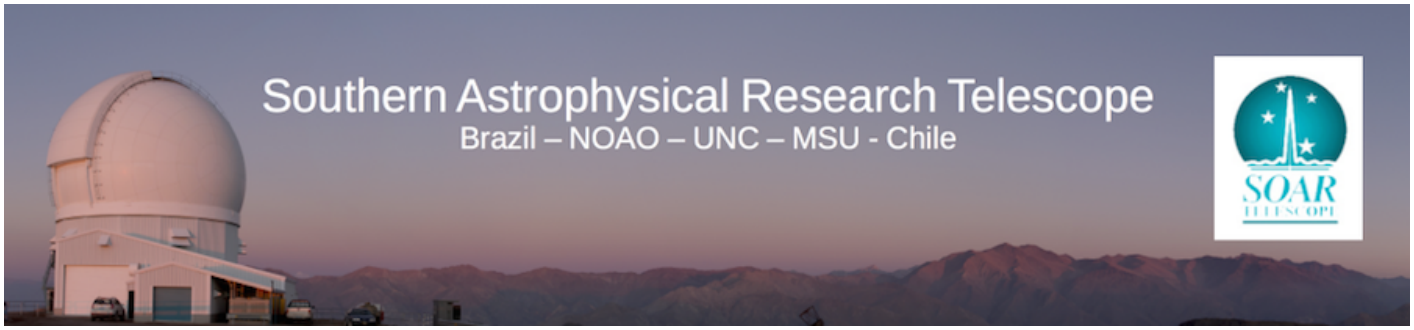

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About the Goodman Data-Reduction Pipeline

The Goodman Data-Reduction Pipeline (DRP) is a Python-based package for producing science-ready, wavelength-calibrated, one-dmiensional (1-D) spectra. The pipeline is an ongoing work aimed to provide SOAR users with an easy to use, documented software for reducing images and spectra obtained with the Goodman High-Throughput Spectrograph. Though the current implementation assumes offline data reduction, our goal is to provide the capability to run it in real time, so 1-D wavelength calibrated spectra can be produced shortly after the shutter closes.

The pipeline is primarily intended to be run on a data reduction dedicated computer. Please, check the instructions at the Running on SOAR Server [1] for more details.

The Goodman DRP project is hosted on GitHub at it's GitHub Repository [2]. Currently, the pipeline is separated into two main components. The initial processing is done by `redccd`, which trims the images, and carries out bias and flat corrections, and apply cosmic ray rejection.

The spectroscopic processing is done by `redspec` and carries out the following steps:

- Identifies multiple point-source targets (spectra of more than one object in the slit);
- Trace the spectra
- Extract the spectra
- Estimate and subtract background
- Find the wavelength solution
- Linearize data (resample)
- Write wavelength solution to FITS header
- Create a new file for the wavelength calibrated 1-D spectrum

Goodman DRP Team:

Simón Torres (SOAR Data Analyst - main code developer), César Briceño (SOAR Telescope Scisntist - team lead), Bruno Quint (Brazil Support Astronomer - code development adviser). **Contact page.** [3]

Notes and caveats

- In this first release, the pipeline performs the wavelength calibration only for spectroscopy data obtained with the 400 l/mm grating with the 400M1 and 400M2+GG455 (order-blocking filter) modes.
- The pipeline has been tested with long-slit spectra and point source objects. In its present form it will not work for multi-object spectroscopy nor extended sources.
- Because the pipeline deals first with the basic CCD reductions, in the separate module `redccd`, it also suited for reducing Goodman imaging data.
- Data obtained with different modes are grouped into different sets and processed separately
- Comparison lamps for wavelength calibration are used in the following order: proximity to the science target coordinates and acquisition time. If no comparison lamp was obtained during the night, the pipeline will look for lamp files obtained in the previous afternoon or in the next morning *as long as they are in the same folder.*

Backward Compatibility

The Goodman Spectrograph Control Software (GSGC) has gone through a considerable amount of updates and improvements. Some of them changed the way that the data is saved into the FITS files (image data region of interest and keywords added/removed). For future releases we are working on making the Goodman DRP compatible with legacy data, but in its current inception the software is designed for processing data obtained **since March 2018**.

Available Spectroscopic Modes

Because this is an ongoing work, some modes are not yet available for general use. The limitations are mostly due to the availability of wavelength solutions in the redspec module. The automatic solution for wavelength calibration relies on having spectra obtained with comparison lamps that are already calibrated in wavelength. Here is the table with the available modes:

Grating	Mode	Filter	Comparison Lamps
400 l/mm	400 M1	--	HgAr, HgArNe
	400 M2	GG455	Ar, Ne, HgAr, HgArNe, CuHeAr, FeHeAr

If your data was obtained with a non-supported mode, the pipeline will not perform the wavelength calibration, but will output the other files (like the extracted 1D spectra). Please, contact us [3] if your data is not supported. We will give higher priority to the most popular modes.

Links
[1] http://www.ctio.noirlab.edu/soar/content/running-soar-server
[2] https://github.com/soar-telescope/goodman
[3] http://www.ctio.noirlab.edu/soar/content/contact-goodman-drp