



MARCO LAM (LJMU, UK / TEL-AVIV UNIVERSITY, ISRAEL)

JOSH VEITCH-MICHAELIS (ICECUBE, ANTARCTICA)

ROBERT SMITH, IAIN STEELE (LJMU, UK)

ROSS MCWHIRTER (IAC, SPAIN)

ASPIRED ::

SPECTRAL REDUCTION WITHOUT IRAF

ASPIRED

- ▶ Automated SpectroPhotometric Image REDuction
- ▶ Originated from a joint LJMU-UoW project for a portable instrument + pipeline
 - ▶ OPTICON (LJMU+UoW; ended Mar 2020)
 - ▶ Polish NCN Grant (UoW; ended June 2020)
- ▶ Part of an ERC grant (TAU; up to ~2022/23)



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MOTIVATION

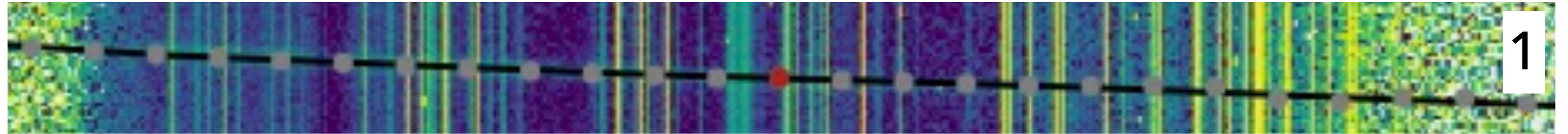
- ▶ **iraf** is no longer officially supported
- ▶ Building a pipeline takes a long time and staff effort
- ▶ Facilitate rapid science outcomes
- ▶ Allow cross-platform deployment
- ▶ Allow interactivity and web-based approach

SOFTWARE SOLUTION

- ▶ Versioning, Bug Tracking, Feature Request: GitHub
- ▶ Continuous Integration: GitHub Actions (perform build and unit tests)
Dependabot (external dependency version alert)
- ▶ Continuous Distribution: GitHub Actions uploads to PyPI (i.e. pip install aspired)
- ▶ Documentation: Readthedocs (auto-update if there are new comments or API)
- ▶ Interactivity: Plotly (interactive plots in html; static png/jpg/pdf; JSON string)



DATA REDUCTION



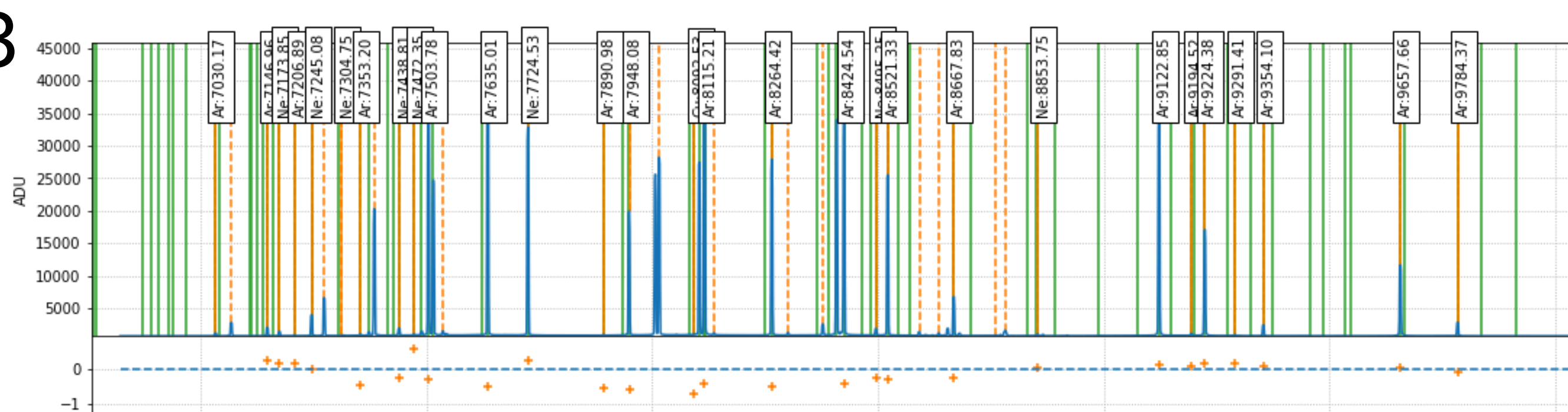
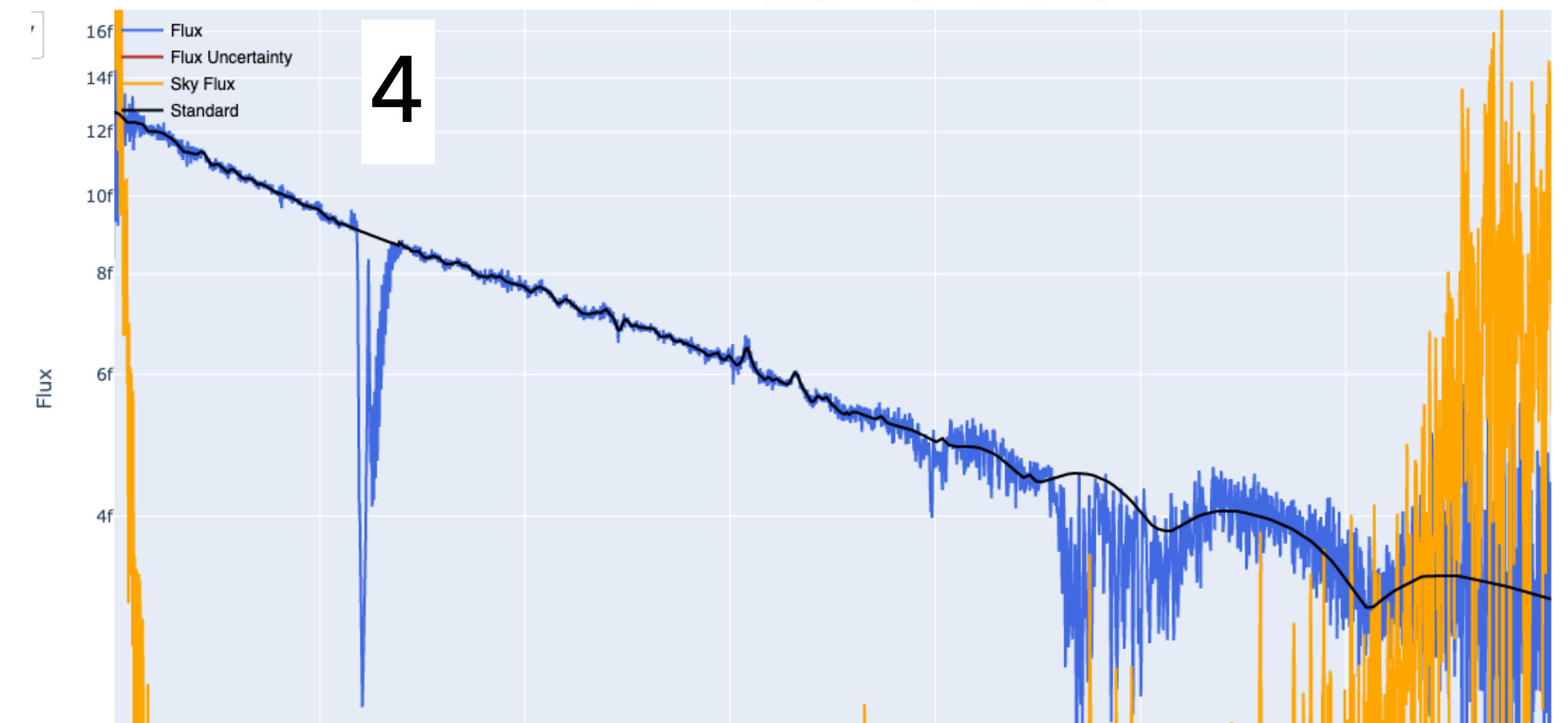
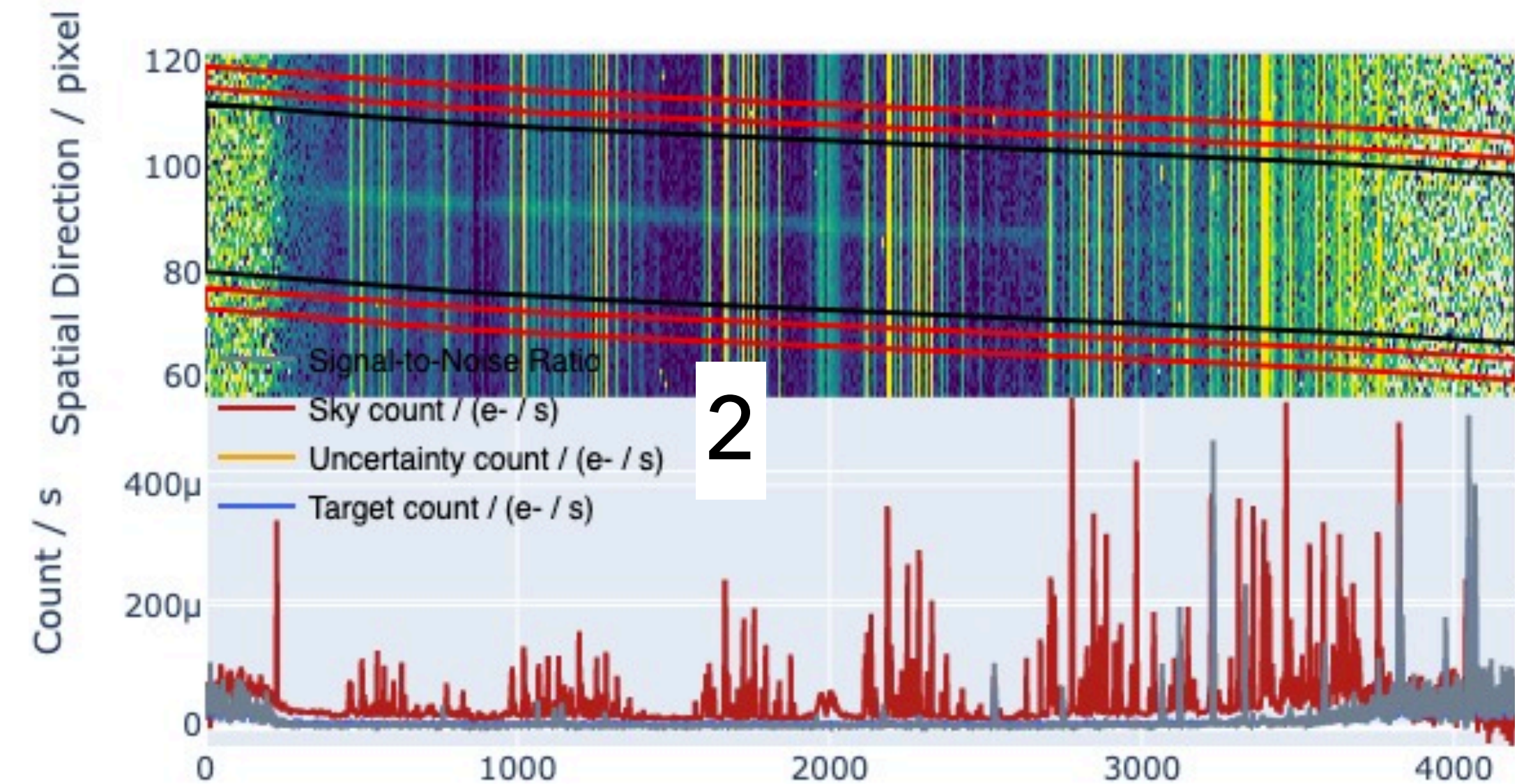
► Spectral Data Extraction and Calibration

1. Trace Identification + Spectral Tracing

2. Spectral Extraction

3. Wavelength Calibration

4. Flux Calibration



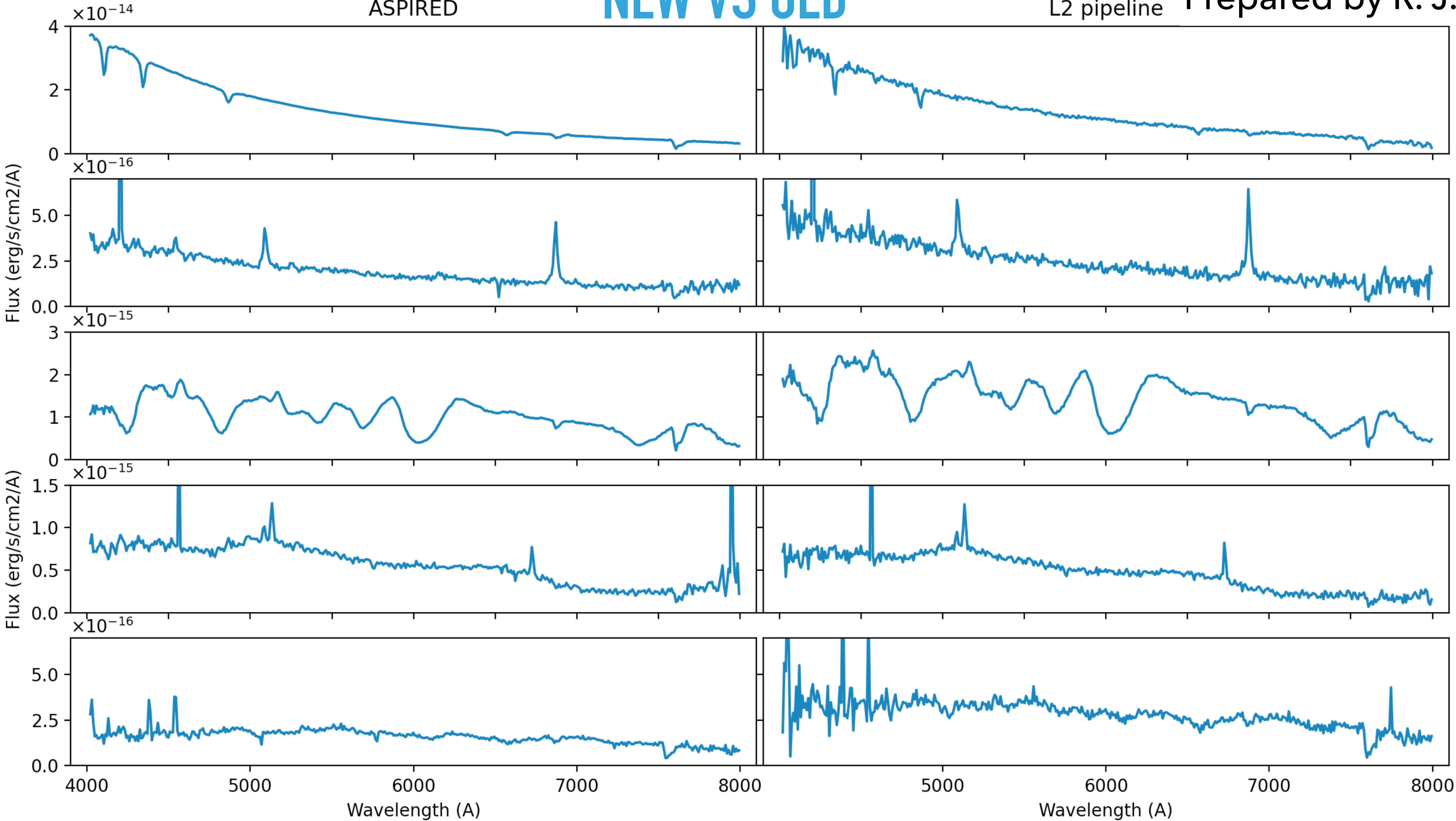
APPLICATION

- ▶ Affiliated with the facilities:
 - ▶ New joint-pipeline for Liverpool Telescope/**SPRAT** on La Palma and Lesedi Telescope/**MOKOODI** in South Africa
 - ▶ A pipeline for a new spectrograph at Observatoire de Haute-Provence
- ▶ Not affiliated with the facilities:
 - ▶ Gemini/**GMOS-longslit**
 - ▶ Other tests: WHT/**ISIS**, GTC/**OSIRIS-longslit**
 - ▶ Other system on the to-test-list: LCO/**FLOYDS**, TNG/**DOLORES**

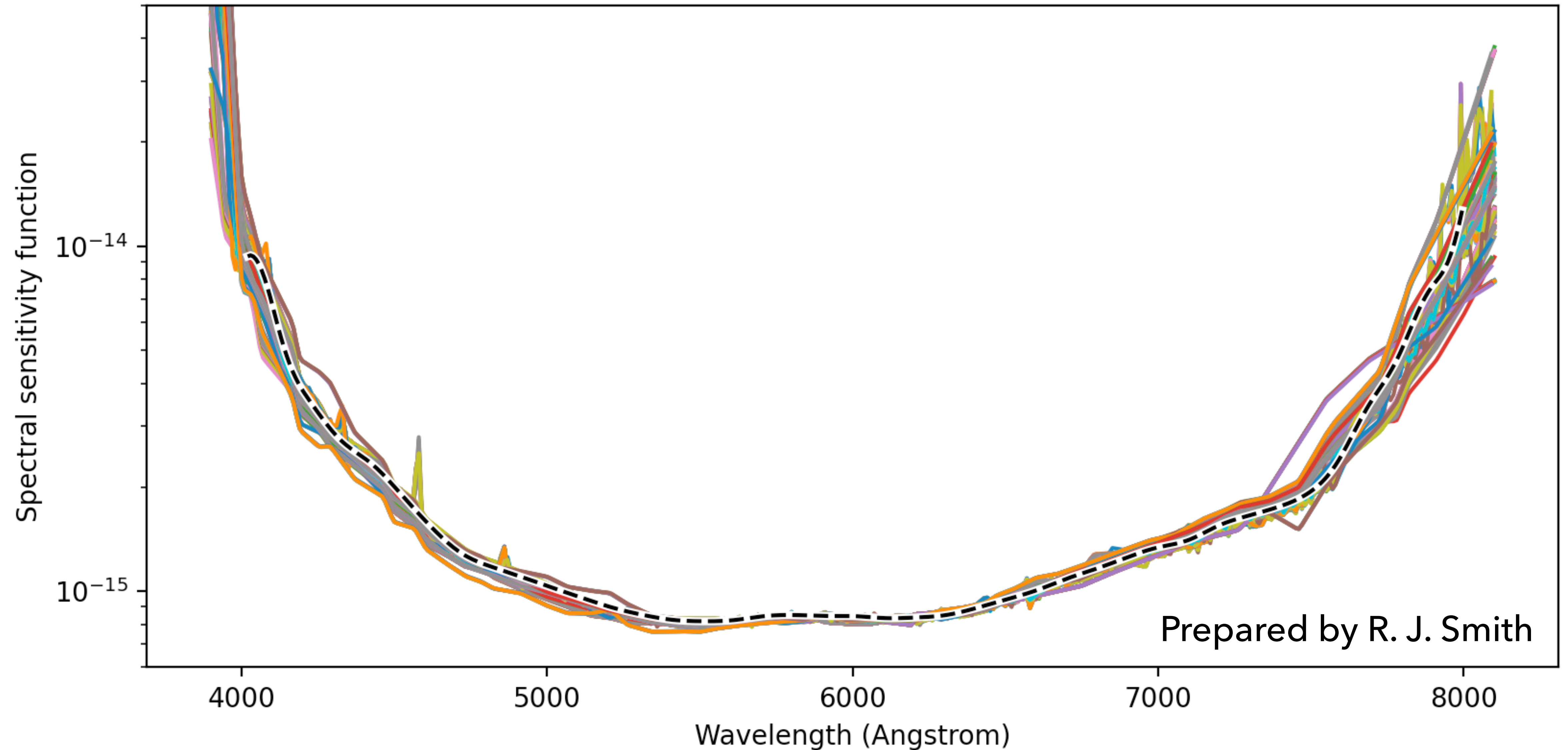
NEW VS OLD

ASPIRED

L2 pipeline Prepared by R. J. Smith



200 ASPIRED calibrations compared to a manual IRAF onedspec calibration



DEVELOPMENT TIMELINE

- ▶ Version 0.3.0 released on 18 Jan 2021
- ▶ API still subjects to changes
- ▶ Continue to employ as many automated development tools as possible
- ▶ Expect new major/minor/patch release in year/month/month-timescale

MORE INFORMATION

- ▶ GitHub: <https://github.com/cylammarco/ASPIRED>
- ▶ Readthedocs: <https://aspired.readthedocs.io/en/latest/>
- ▶ DOI: <https://doi.org/10.5281/zenodo.4127294>

README.md

Automated SpectroPhotometric Image REDuction (ASPIRED)

 Python package **passing**  coverage **61%**  docs **passing**  pypi package **0.3.0**  DOI **10.5281/zenodo.4127294**

We aim to provide a suite of publicly available spectral data reduction software to facilitate rapid scientific