NATHAN D. MILES

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PROFESSIONAL EXPERIENCE

CIRES, Boulder, Colorado March 2023 -
Associate Scientist, II

Support the development of ground processing pipelines for SWFO-L1 at NOAA/SWPC.

Frontier Development Lab, SETI June 2021 - August 2021
Researcher

Co-developed unsupervised and supervised machine learning techniques to study the solar wind

Space Telescope Science Institute, Baltimore, Maryland May 2018 - July 2020
Research and Instrument Analyst II

Supported operations of the Advanced Camera for Surveys on the Hubble Space Telescope

Space Telescope Science Institute, Baltimore, Maryland June 2016 - May 2018
Research and Instrument Analyst I

Supported operations of the Advanced Camera for Surveys on the Hubble Space Telescope

Red Canyon Engineering & Software, Cape Canaveral, Florida October 2015 - June 2016
Software Engineer

Led the development of a Lightning Prediction and Warning System (LPAWS)

Red Canyon Engineering & Software, Cape Canaveral, Florida June 2015 - September 2015
KLXS-II Intern

Developed a weather application with a touch screen interface for the GlassWall project using the game engine, Unity.

EDUCATION

PhD Candidate *September 2020 -*
Advisor: Professor Christopher T. Russell
Department of Earth, Planetary, and Space Sciences
University of California, Los Angeles

M.S. Space Physics *September 2020 - June 2022*
Advisor: Professor Christopher T. Russell
Department of Earth, Planetary, and Space Sciences
University of California, Los Angeles

B.S. Astronomy, Summa Cum Laude *August 2010 - 2015*
Department of Astronomy
University of Florida

B.S. Physics, Cum Laude *August 2010 - 2015*
Department of Physics

University of Florida

B.S. Mathematics, Cum Laude *August 2010 - 2015*
Department of Mathematics
University of Florida

TECHNICAL SKILLS

Software Languages
`BASH`, `C++`, `python` (preferred), `HTML`

Modeling and Data Analysis
`astropy`, `HDF5`, `numpy`, `pandas`, `pymc3`, `scipy`, `scikit-learn`, `scikit-image`

Data Visualization
`matplotlib`, `plotly`

Web Frameworks
`flask`, `jinja`

Parallelization
`dask`, `multiprocessing`

Version Control
`git`

Amazon Web Services (AWS)
`EC2`, `S3`, `IAM`, `Lambda`, `API Gateway`, `SAM`

RESEARCH EXPERIENCE

Space Telescope Science Institute, Baltimore, Maryland June 2017 - March 2018
HST FUV/NUV Photometry of the Putative Binary Companion to the SN 1993J Progentior

Advisor: Dr. Ori D. Fox
Analyzed WFC3/UVIS and ACS/SBC observations and found strong evidence consistent with previous analyses of the existence of a surviving B-type companion and the results were presented at the 232nd meeting of the American Astronomical Society.
Skills Acquired

- Source finding and deblending (`SExtractor`).
- Iterative PSF building via minimization of aperture photometry and PSF photometry residuals for bright isolated sources (`PyRAF`, `DAOPHOT`).
- PSF photometry of crowded sources and pipeline processing

Space Telescope Science Institute, Baltimore, Maryland April 2018 - 2020
Geophysics with Hubble Space Telescope

Advisors: Dr. Susana Deustua and Dr. Gonzalo Tancredi
Analyzed over 75,000 dark calibration frames taken with 5 different CCD imagers to study cosmic rays incident at HST in a geophysical context. Resulted in a published paper in the Astrophysical Journal and a press release with Sky&Telescope Magazine.
Skills Acquired

- Cloud processing with AWS and the HST public dataset.

- End-to-end pipeline processing including all necessary documentation using ReadTheDocs.
- Machine learning (binary classification using KNearestNeighbors algorithm)
- Big data analysis (4.5 TB worth of images analyzed, over 1.2 billion cosmic rays studied)
- Parallel processing with `dask`

Space Telescope Science Institute, Baltimore, Maryland May 2019 - March 2020
Natural Language Processing for Classification of HST Proposals

Advisor: Dr. Lou Strolger
Rebuilt the Proposal Auto-Categorizer and Manager (PACMan) tool from the ground up utilizing industry standards. PACMan is capable of classifying HST proposals into the correct top two science categories with an accuracy of 96%.

Skills Acquired

- Text preprocessing and cleaning with `spaCy` NLP
- Multi-class classification using Näive-Bayes classifier implemented in `scikit-learn`

INVITED TALKS

Colloquium, Southwest Research Institute, Boulder CO, September 2021

Colloquium, University of Vienna, Department of Astrophysics, April 2022

PUBLICATIONS

Refereed Articles

1. **N. D. Miles**, S. E. Deustua, G. Tancredi, G. Schnyder, S. Nesmachnow, G. Cromwell, *Using Cosmic Rays detected by HST as Geophysical Markers I: Detection and Characterization of Cosmic Rays*, Accepted for Publication in ApJ, April 2021
2. H. Lamdouar, S. Sundaresan, A. Jungbluth, S. Boro Saikia, A. J. Camarata, **N.D. Miles**, M. Scoczynski, M. Stone, A. Sarah, A. Muñoz-Jaramillo, A. Narock, A. Szabo *Deep-SWIM: A few-shot learning approach to classify Solar WInd Magnetic field structures*, Accepted for Publication at NeurIPS 2021: Machine Learning for Physical Sciences Workshop.
3. R. A. Windhorst, T. Carleton, R. O'Brien,S. H. Cohen, D. Carter, R. Jansen, S. Tompkins, R. G. Arendt, S. Caddy, N. Grogin, A. Koekemoer, J. MacKenty, S. Casertano, L. J. M. Davies, S. P. Driver, E. Dwek, A. Kashlinsky, S. J. Kenyon, **N. D. Miles**, N. Pirzkal, A. Robotham, R. Ryan, H. Abate, H. Andras-Letanovszky, J. Berkheimer, J. Chambers, C. Gelb, Z. Goisman, D. Henningsen, I. Huckabe, D. Kramer, T. Patel, R. Pawnikar, E. Pringle, C. Rogers, S. Sherman, A. Swirbul, and K. Webber *Constraints on Zodiacal Light and Extragalactic Background Light through Panchromatic HST All-Sky Surface-Brightness Measurements: I. Survey Overview and Methods*, Accepted for Publication in ApJ, July 2022

Technical Reports

1. M. C. McDonald, T. D. Desjardins, and **N. D. Miles**, *Anneal Efficacy in the Advanced Camera for Surveys Wide Field Channel.* ACS ISR 2020-05. Space Telescope Science Institute, April 2020
2. **N. D. Miles** and N.A. Grogin, *Temporal Stability of the ACS/WFC OD-800W LED.* ACS ISR 2019-08. Space Telescope Science Institute, September 2019
3. **N. D. Miles** and M. Chiaberge, *photCTE: The Photometric CTE Pipeline for the ACS/WFC* ACS TIR 2019-01. Space Telescope Science Institute, July 2019

4. **N. D. Miles**, P. L. Lim, A. Bellini, and N.A. Grogin, *Updates to the CALACS Cosmic Ray Rejection Routine: ACSREJ.* ACS ISR 2018-05. Space Telescope Science Institute, September 2018.

5. T. D. Desjardins, **N. D. Miles**, J. E. Ryon, and D. C. Borncamp, *ACS/WFC Superbias, Superdark, and Sink Pixel File Generation.* ACS TIR 2018-01. Space Telescope Science Institute, August 2018.

6. S. L. Hoffmann, **N. D. Miles**, J. E. Ryon, N. Hathi, and N. A. Grogin, *A Minor Contamination Event in May 2017 Affecting the ACS/WFC CCDs.* ACS ISR 2018-03. Space Telescope Science Institute, May 2018.

7. **N. D. Miles**, *Updates to Post-Flash Calibration for the Advanced Camera for SurveysWide Field Channel.* ACS ISR 2018-02. Space Telescope Science Institute, March 2018.

Conference Abstracts

1. **N. D. Miles**, S. Deustua, and G. Tancredi (2019) *HSTCosmicrays: A Python Package for Analyzing Cosmic Rays in HST Calibration Data*, presented at 2019 ADASS Meeting, Gronigen, Netherlands, 6-10 Oct.

2. S. Deustua, **N. D. Miles**, and G. Tancredi, (2018), *Geophysics with the Hubble Space Telescope*, Abstract GP13A-41, presented at 2018 AGU Fall Meeting, Washington, D.C., 10-14 Dec.

3. **N. D. Miles**, O. D. Fox, K. A. Bostroem, W. Zheng, M. Graham, S. D. Van Dyk, A.V. Filippenko, T. Matheson, V. Dwarkadas, C. Fransson, N. Smith, and T. Brink, (2018), *HST FUV/NUV Photometry of the Putative Binary Companion to the SN 1993J Progenitor.* American Astronomical Society Meeting Abstracts, 232, #320.09

4. **N. D. Miles** and N. A. Grogin, (2018), *Calibration Improvements for the Hubble Space Telescope Advanced Camera for Surveys Wide Field Channel: Post-Flash and Commanding Overheads.* American Astronomical Society Meeting Abstracts, 231, #355.33