

Jarrold M. Burges, GIT

Wright-Rieman Laboratories

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RESEARCH INTERESTS

My primary research interests involve exploring the applications of machine learning algorithms to solve complex multivariate problems within the geological and planetary science disciplines. In addition, I am passionate about research data management tool/application workflows to conduct more efficient data management for researchers.

EDUCATION

Doctor of Philosophy, Earth and Planetary Sciences Expected May 2030
Rutgers University - New Brunswick
Thesis Advisor: Dr. Shaunna M. Morrison
Thesis: Machine Learning In The Geosciences: Case Studies in Mantle Heterogeneity, Zircon Paragneiss, and Petrography

Bachelor of Science, Computer Science & Geological Sciences December 2024
California State University - Fullerton
Thesis Advisor: Dr. Kathryn Metcalf
Thesis: GeoCORK: An improved workflow for U-Pb geochronology data management

PUBLICATIONS

3. **Burges, J.M.**, Codillo, E.A, Goltz, A.E, and Prabhu, A. (2026). An Approach To Mantle Heterogeneity Through Multiple Machine Learning Methods. *In prep*
2. **Burges, J.M.**, Yakymchuk, C., DiMaio, M., Lui, C.C., and Morrison, S.M. (2026). Metamorphic or igneous zircon? Classification through rare earth elements, machine learning, and logistic regression. *In review Journal of Metamorphic Geology*
1. Metcalf, K. and **Burges, J.** (2026). GeoCORK: An improved workflow for U-Pb geochronology data management. *In review Applied Computing and Geosciences*

CURRENT PROJECTS

- Using REEs and machine learning to determine zircon petrogenesis
- Disentangling MORB-OIB mantle reservoir end members through machine learning
- GeoCORK: Expanding into other geochronological and geochemical methods
- Looking at magnetite trace element data and economic ore deposits with data science

PENDING GRANTS - Total: \$969,120

Collaborative Research: CAIG: OnePetrographer: Developing High-Resolution Vision CNNs \$969,120
For Optical Mineralogy and Petrology, NSF, PI: Morrison, Co-PI: **Burges**, (submitted February 2026).

RESEARCH AWARDS - Total: \$500

1. Department of Earth and Planetary Sciences Research Fund (\$500), Rutgers University (November 2025)

TRAVEL AWARDS - Total: \$3850

9. Cordilleran Section Student Travel Award (\$350), Geological Society of America (September 2025)
8. Natural Sciences and Mathematics Inter-Club Council Travel Award (\$750), California State University, Fullerton (November 2024)

7. Armstrong-Butcher Undergraduate Geology Conference Travel Award (\$500), California State University, Fullerton (November 2024)
6. Undergraduate Research Opportunity Center (UROC) Travel Award (\$500), California State University, Fullerton (November 2024)
5. Armstrong-Butcher Undergraduate Geology Conference Travel Award (\$500), California State University, Fullerton (September 2024)
4. Cordilleran Section Student Travel Award (\$375), Geological Society of America (September 2024)
3. Armstrong-Butcher Undergraduate Geology Conference Travel Award (\$500), California State University, Fullerton (May 2024)
2. Undergraduate Research Opportunity Center (UROC) Travel Award (\$750), California State University, Fullerton (May 2024)
1. Cordilleran Section Student Travel Award (\$600), Geological Society of America (May 2024)

RESEARCH EXPERIENCE

Graduate Student Researcher - Rutgers University September 2025–Present

Undergraduate Honors Thesis - California State University, Fullerton October 2022–May 2025

GeoCORK: An improved workflow for geochronology data management

- Full-stack development in Python, SQLite3, and PyQt6 across 52 tables
- Designed automated data import, flexible filtering, and export to detritalPy, DzStats, IsoplotR formats
- Implemented custom tagging system and UI for complex geological datasets

Field Assistant - Tibet, China July 2023

Assisted four-week expedition collecting structural data for creation of balanced cross-sections.

GIS Analyst - CSU Fullerton Police 911 Dispatch Center February 2023

Updated CAD geodatabases and satellite imagery in ArcGIS/ArcMap to improve emergency dispatch accuracy.

PROFESSIONAL SERVICE

Student Representative October 2023–Present

Geological Society of America - Division of Geoinformatics & Data Science (GIDS)

TEACHING & ADVISING

Teaching Assistant - 01:460:201:91 Earthquakes & Volcanoes - Rutgers Spring 2026

Teaching Assistant - 01:460:201:91 Earthquakes & Volcanoes - Rutgers Fall 2025

Undergraduate Teaching Assistant - GEOL303A: Earth Materials - CSU Fullerton Fall 2023

Provided lab instruction for 25 students and delivered a seminar on AI applications in geology. Acted as in-class mentor to sophomore and junior-standing geology students.

PROFESSIONAL EXPERIENCE

Staff Geologist & Database Analyst - EEC Environmental, Orange, CA May 2024–Present

- Authored geological reports and managed multi-state environmental compliance projects
- Built and maintained Microsoft Access/SQL Server databases with full metadata documentation
- Monitored drilling operations and provided real-time geological interpretations
- Ensured compliance with environmental regulations across multiple states and company standards during fieldwork and data analysis.

Community Service Officer (CSO) Supervisor - CSU Fullerton Police Dept. June 2022–March 2025

Overseeing supervisor for 35 student CSOs. Managed scheduling, payroll, and field training to ensure program efficiency.

Lab Assistant (Winter Temp) - GMU Geotechnical, Rancho Santa Margarita, CA December 2022–January 2023

- Conducted comprehensive soil analyses to state and federally regulated procedures

Invited Lectures

2. Geoinformatics Research Group Lecture Series–Lamont-Doherty Columbia, Palisades, NY, 2025: "Pathways to integrate GeoCORK/EarthChem/SESAR2"
1. Rutgers Colloquium Series, Piscataway, NJ, 2025: "GeoCORK: An improved workflow for U-Pb geochronology data management"

ORAL MEETING ABSTRACTS

6. Earth Science Information Partners and Geological Society of America, 2025, Data Help Desk @ GSA Connects 2025:, doi:10.5281/ZENODO.17458264.
5. **Burges, J.** and Metcalf, K., 2025, GeoCORK: A Desktop Application to Manage U-Pb Geochronology Data: Abstract 24 T34-12 presented at 2025 Geological Society of America Annual Meeting, San Antonio, TX, 19-22 October.
4. **Burges, J.** and Metcalf, K., 2025, GeoCORK: Integrating Existing Databases: Abstract 287 T52-2 presented at 2025 Geological Society of America Annual Meeting, San Antonio, TX, 19-22 October.
3. **Burges, J.** and Metcalf, K., 2024, DESKTOP APPLICATION TO MANAGE AND STORE DETRITAL ZIRCON GEOCHRONOLOGICAL DATA IN A SQL DATABASE: Abstract 59-4 presented at 2024 Geological Society of America Annual Meeting, Anaheim, California, 22-25 September.
2. **Burges, J.** and Metcalf, K., 2024, DESKTOP APPLICATION TO MANAGE AND STORE DETRITAL ZIRCON GEOCHRONOLOGICAL DATA IN A SQL DATABASE: Abstract 38-2 presented at 2024 Geological Society of America Joint Cordilleran and Rocky Mountain Section Meeting, Spokane, Washington, 15-17 May.
1. **Burges, J.**, and Metcalf, K., 2024, DESKTOP APPLICATION TO MANAGE AND STORE DETRITAL ZIRCON GEOCHRONOLOGICAL DATA IN A SQL DATABASE: Abstract 411 presented at 2024 National Conference of Undergraduate Research, Long Beach, California, 8-10 April.

POSTER MEETING ABSTRACTS

10. **Burges, J.** 2026, Differentiating metamorphic and igneous zircons: Applications of machine learning on rare earth elements with newly derived formulas: Presented at 2026 Mineralogical Society of America Annual Meeting, Tucson, AZ, 16-19 February.
9. Metcalf, K. and **Burges, J.** 2025, GeoCORK: A Desktop Application to Manage U-Pb Geochronology Data: Abstract IN23C presented at 2025 American Geophysical Union Annual Meeting, New Orleans, LA, 15-19 December.
8. **Burges, J.** and Metcalf, K., 2024, DESKTOP APPLICATION TO MANAGE AND STORE DETRITAL ZIRCON GEOCHRONOLOGICAL DATA IN A SQL DATABASE: Abstract V23B-3335 presented at 2024 American Geophysical Union Annual Meeting, Washington, DC, 9-13 December.
7. **Burges, J.** and Metcalf, K., 2024, DESKTOP APPLICATION TO MANAGE AND STORE DETRITAL ZIRCON GEOCHRONOLOGICAL DATA IN A SQL DATABASE: Abstract 38-2 presented at 2024 Geological Society of America Joint Cordilleran and Rocky Mountain Section Meeting, Spokane, Washington, 15-17 May.
6. **Burges, J.** and Metcalf, K., 2024, DESKTOP APPLICATION TO MANAGE AND STORE DETRITAL ZIRCON GEOCHRONOLOGICAL DATA IN A SQL DATABASE: Presented at Southern California Geological Society May 2024 Meeting, Fullerton, California, 6 May.
5. **Burges, J.** and Metcalf, K., 2024, DESKTOP APPLICATION TO MANAGE AND STORE DETRITAL ZIRCON GEOCHRONOLOGICAL DATA IN A SQL DATABASE: Presented at 2024 Department of Geological Sciences Research Day, Fullerton, California, 3 May.
4. **Burges, J.**, and Metcalf, K., 2023, DESKTOP APPLICATION TO MANAGE AND STORE DETRITAL ZIRCON GEOCHRONOLOGICAL DATA IN A SQL DATABASE: Abstract 46-6 presented at 2023 Geological Society of America Annual Meeting, Pittsburgh, Philadelphia, 15-18 October.
3. **Burges, J.**, Metcalf, K., and Goffman, M., 2023, PYTHON PROGRAM TO INPUT, SORT, VIEW, AND STORE DETRITAL ZIRCON GEOCHRONOLOGICAL DATA IN A SQL DATABASE: Abstract 9-11 presented at 2023 Geological Society of America Cordilleran Section Meeting, Reno, Nevada, 16-19 May.

2. **Burges, J., Metcalf, K., and Goffman, M., 2023, PYTHON PROGRAM TO INPUT, SORT, VIEW, AND STORE DETRITAL ZIRCON GEOCHRONOLOGICAL DATA IN A SQL DATABASE:** Presented at 2023 College of Engineering and Computer Science Student Innovation Expo, Fullerton, California, 5 May.
1. **Burges, J., Metcalf, K., and Goffman, M., PYTHON PROGRAM TO INPUT, SORT, VIEW, AND STORE DETRITAL ZIRCON GEOCHRONOLOGICAL DATA IN A SQL DATABASE:** Presented at 2023 Department of Geological Sciences Research Day, Fullerton, California, 5 May

CERTIFICATIONS

- California Geologist-in-Training (GIT) - Obtained October 2024

TECHNICAL SKILLS

- **Languages:** Python, SQL, R, Java, C++
- **Development:** JetBrains IDE Suite, RStudio, Git/GitHub
- **GIS:** ArcGIS Pro / Toolbox
- **Productivity:** Microsoft Office Suite
- **Design:** Adobe Illustrator, Acrobat Sign, Photoshop, Premiere Pro
- **OS:** Linux(Ubuntu / Raspbian), Windows, Mac OS

References

Available upon request for both academic and/or professional.