Miles Reed, PhD

Mount Pleasant, MI · email · 989-954-3774 · website · GitHub · Work Sample
Geospatial Scientist | Terrain Change | Deep Learning | Numerical Modeling

I am a geoscientist who uses LiDAR data, GIS, field work, and numerical modeling to detect, measure, and explain environmental change. My scientific work examines how landscapes adjust after natural or human disturbance. I possess a particular expertise on the reclaimed mountaintop coal mining landscapes of Central Appalachia. I turn complex spatial and scientific data into maps, measurements, models, and written products that can support environmental monitoring, research, and public-interest decision-making.

Core Strengths

- Terrain-change detection from LiDAR and other remote sensing data
- Reproducible geospatial workflows in ArcGIS Pro, Python, and MATLAB
- Large-scale geospatial dataset construction, QA/QC, and feature attribution
- Field-based geomorphic assessment and sampling
- Numerical modeling of environmental processes in Python and MATLAB
- Clear technical writing, scientific visualization, and cross-disciplinary communication

Technical Skills

Geospatial: LiDAR terrain analysis and interpretation, ArcGIS Pro, QGIS, GDAL/OGR, WhiteBoxTools, Orfeo Toolbox, GeoAI/OpenGeoAgent

Programming: Python, MATLAB, deep-learning workflows (PyTorch), Linux/Unix command line and shell scripting
Field methods: Field assessment of erosion and deposition, soil classification, geologic and geomorphic mapping, stream sampling, GPS data collection
Communication: maps, figures (Adobe Illustrator/Affinity Designer), peer-reviewed manuscripts, and presentations (PowerPoint)

Technical Highlights (Work Sample)

- Using LiDAR data, built a regional inventory of 13,134 erosional features across 5,900 km^2 of reclaimed mined landscapes, including 6,993 gullies and 6,141 landslides.
- Used repeat LiDAR to extract high-magnitude erosion/deposition patches, compare mined/unmined terrain, estimate rates of change, and evaluate uncertainty.
- Contributed to a published deep-learning workflow using DEM-derived land-surface parameters for semantic segmentation; able to implement the workflow from training-data preparation through inference.
- Developed a novel MATLAB-based landscape evolution models with climate-sensitive process laws and a geochemical tracer.
- Built a geospatial database linking mapped erosion features to mine permits, coal seams, geology, operating history, and company-level attributes.

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Professional Experience

National Science Foundation Postdoctoral Fellow - Geomorphology
West Virginia University Department of Geology & Geography | 8/2024 – 8/2026

- Led a large, regional-scale study of erosion and instability on reclaimed mountaintop coal mining landscapes in eastern Kentucky.
- Mapped and analyzed more than 13,000 gullies and landslides across multi-temporal LiDAR datasets covering ~5900 km^2.
- Integrated LiDAR-derived terrain metrics, mine permit data, and geologic maps via Python (ArcPy) workflows.
- Produced deep-learning training datasets for gully and landslide detection.
- Field sampled streams across eastern Kentucky and southwest West Virginia for geochemical analysis.

Graduate Researcher - PhD Geoscience
University of Wisconsin–Madison Department of Geoscience | 8/2020 – 4/2024

- Developed a novel MATLAB-based model of long-term landscape evolution with an integrated geochemical tracer.
- Developed an open source, machine-learning workflow for quantitative mineralogy.
- Communicated results through peer-reviewed publications, presentations, collaborative projects, and teaching/mentoring.

Education

PhD, Geoscience (Geomorphology) – University of Wisconsin-Madison, 2020 - 2024
MS, Geology (Geomorphology) – West Virginia University, 2016 - 2018
BS, Geology – West Virginia University, 2013 – 2016

Selected Publications (Google Scholar)

Reed, M. M., et al. Ongoing Geomorphic Change on Earth's Most Extreme Anthropogenic Landscape. In review, *Earth's Future*.
Maxwell, A. E., Farhadpour, S., & **Reed, M. M**. 2026. A deep learning architecture and workflow for geomorphic feature extraction. *Earth Surface Processes and Landforms*.
Reed, M. M., et al. 2025. Climatic controls on soil production, transport and chemical erosion. *Earth Surface Processes and Landforms*.
Reed, M. M., et al. 2025. A free, open-source method for automated mapping of quantitative mineralogy. *Geoscientific Instrumentation, Methods and Data Systems*.