

# James “Jake” Gearon — Curriculum Vitae

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## Education

**2021-2025** Ph.D in Sedimentology & Remote Sensing - [Indiana University–Bloomington](#)

Advisor: Douglas Edmonds

GPA: 3.8 / 4.0

Ph.D Dissertation *Investigating River Avulsion Dynamics  
with Large-Scale Remote Sensing Data Operations*

**2019-2021** MS in Geology - [The University of Texas at Austin](#)

Advisors: Cornel Olariu & Ronald J. Steel

GPA: 4.0 / 4.0

Masters Thesis - *The Supply-Generated Sequence:  
A New Sequence-Stratigraphic Model for Fluvio-Lacustrine Deposits*

**2015-2019** BS Honors, Special Honors in Geology - [The University of Texas at Austin](#)

Certificate in Creative Writing

GPA: 3.6 / 4.0

Undergraduate Thesis - *Geomorphic Influences on Canopy Architecture  
of Larrea tridentata in Northern Mojave Desert, Nevada, USA*

Advisor: Michael H. Young

## Publications

- [1] James H Gearon and Michael H Young. Geomorphic controls on shrub canopy volume and spacing of creosote bush in northern mojave desert, usa. *Landscape Ecology*, pages 1–21, 2020.
- [2] James H. Gearon, Cornel Olariu, and Ronald J. Steel. The supply-generated sequence: A unified sequence-stratigraphic model for closed lacustrine sedimentary basins with evidence from the Green River Formation, Uinta Basin, Utah, U.S.A. *Journal of Sedimentary Research*, 92(9):813–835, September 2022.
- [3] Puyu Liu, Chenglin Gong, James H. Gearon, Dayong Guan, Qiming Wang, Kun Qi, and Dongwei Li. Increased sediment connectivity between deltas and deep-water fans in closed lake basins: A case study from bozhong sag, bohai bay basin, china. *Sedimentary Geology*, page 106561, 2023.
- [4] T. H. Doane, J. H. Gearon, H. K. Martin, B. J. Yanites, and D. A. Edmonds. Topographic roughness as an emergent property of geomorphic processes and events. *AGU Advances*, 5(5), 2024.

- [5] James H. Gearon, Harrison K. Martin, Clarke DeLisle, Eric A. Barefoot, David Mohrig, Chris Paola, and Douglas A. Edmonds. Rules of river avulsion change downstream. *Nature*, pages 1–5, 2024.
- [6] Joseph S. Levy, Thomas F. Subak, Ian Armstrong, Izzy King, Lingfeng Kuang, Lily Kuentz, James H. Gearon, Sophie Naylor, M.C. Rapoza, and Haobo Wang. Martian chaos terrain fracture geometry indicates drainage and compaction of laterally heterogeneous confined aquifers. *Icarus*, 426:116377, 2025.
- [7] James H. Gearon and Douglas A. Edmonds. River avulsion precursors encoded in alluvial ridge geometry. *Geophysical Research Letters*, 52:e2024GL114047, 2025.
- [8] Aman Agarwal, James Gearon, Raksha Rank, and Etienne Chenevert. Fighting Fires from Space: Leveraging Vision Transformers for Enhanced Wildfire Detection and Characterization, April 2025.

## Research Experience

**Aug. 2025** [Global Hydrology Lab, University of North Carolina, Chapel Hill](#)

**Present** *Post-Doctoral Researcher*

Working under Dr. Tamlin Pavelsky as part of the science mission of the Surface Water and Ocean Topography Satellite (SWOT). Work includes updates to the SWOT River Database (SWORD), the premier global river topology network as well as investigations into imaging coastal fluvial backwater profiles with large scale remote sensing of water surface elevation. This work blends fundamental science with data engineering operations

**Sep. 2023-** [Army Engineer Research and Development Center \(ERDC\) Grant](#)

**Sep. 2024** *Research Assistant*

Worked as part of a multi-institution research group focused on automated inspection of levee systems in the United States. My role consisted of building a system architecture to compare elevation profiles recorded in the National Levee Database (NLD) with USGS 3DEP 1m lidar-derived DEMs.

**Aug. 2021-** [Indiana University Dept. of Earth and Atmospheric Science](#)

**May. 2025** *Doctoral Student/Candidate*

Advised by Dr. Douglas Edmonds, Committee Members: Dr. Brian Yanites, Dr. Ben Kravitz, Dr. Santo Fortunato (Minor Advisor), and Chris Paola (External)

**Feb. 2020-** [Earth Science Information Partners \(ESIP\) Winter 2020 RFP Grant](#)

**Jan. 2021** *Principal Investigator*

Authored a proposal as PI to develop the [Global Lake Level Database](#). Three separate databases (USGS, G-REALM, and HydroWeb) were merged and are hosted in an AWS RDS Database with an attached API. To provide ease-of-access to end-users, I developed a pythonic front-end [LakePy](#) designed to rapidly access up-to-date water levels from the Global Lake Level Database back-end.

**Aug. 2019-** UT Austin, Jackson School of Geosciences, Dynamic Stratigraphy Group

**May 2021** Master's Student

Advised by Drs. Ron Steel and Cornel Olariu, my third committee member was Dr. Brian Horton. Developed thesis project on constraining single lacustrine sedimentation “events” or deposodes and how they appear in the rock record using drone orthophotogrammetry, logged section and well-log analysis. My field area was in Uinta Basin, UT in the Middle Green River formation. To better understand the high-frequency response of lacustrine deltas to base level rise, I also investigated modern lake deltas using original remote sensing algorithms.

**June 2017-** Bureau of Economic Geology, Undergraduate Honors Thesis

**May 2019** Undergraduate Research Assistant to Dr. Michael Young

Built algorithms in Python to measure and chart spatial properties of vegetation of a large alluvial deposit in Southern California based on remote sensing data, presented poster at AGU 2018 and GSA 2019. Gained experience in processing and analyzing Lidar and Multi-Spectral Imagery data using Python. Wrote undergraduate thesis based on this work finding statistically significant relationships between plant size and spacing based on soil age and clay content.

**Nov. 2015-** University of Texas Institute for Geophysics, Undergraduate Research Project

**April 2017** Undergraduate Research Assistant to Drs. Joseph Levy & Tim Goudge

Assisted in the mapping and general geomorphological analysis of Martian Chaos terrain, utilizing ArcGIS and Python for detailed geostatistical evaluation and interpretation of data. Presented poster at 2017 Lunar & Planetary Science Conference in Houston, Texas

## Field Experience

**June 2024** NSF 'Rivers of the Andes Field Trip' Course

The RAFT program provided a unique opportunity to engage in transdisciplinary and cross-cultural collaboration with students and researchers from diverse backgrounds and expertise. This experience in Colombia highlighted the importance of international collaboration and knowledge transfer in advancing our understanding of complex environmental challenges.

**May 2023** IU Colorado Plateau Class

Co-led a week-long trip to Utah as part of a class for undergraduates and graduate students on the structure and stratigraphy of the Colorado Plateau with Dr. Kaj Johnson. Lessons covered sequence stratigraphy, depositional environments, sedimentary data collection, log interpretation, and general field skills  
*Takeaways: teaching experience, leading a group of students with varying geoscience knowledge*

- July 2020** Field Season in 9-Mile Canyon, Uinta Basin, Utah  
Conducted a month of field-work in the Sunnyside Delta Interval (after Remy et al., 1991) of the Middle Green River Formation. 1000m of logged section was produced, as well as 20GB of Drone Imagery. *Takeaways: lacustrine sequence stratigraphy, self-directed field work, drone imagery acquisition*
- Nov. 2019** Borrego Springs Field Trip w/ Ron Steel & Cornel Olariu  
Attended trip for "Clastic Depositional Systems". Logged 100m of section in the Lycium turbidite units. *Takeaways: rift-basin sequences, distinguishing source from turbidite grain character, antidune outcrop examples*
- Mar. 2019** Peruvian Andean Geology Trip w/ Dan Breecker & Liz Cassel  
Attended 10-day trip as a part of the UT Austin Undergraduate Research Honors Program. *Takeaways: Andean tectono-stratigraphy, Fold-Thrust-Belt sedimentology/sequences, growth strata*
- July 2018** UT Austin Field Camp  
Attended the 6-week, 6,600-mile mobile field course from UT covering many aspects of geological study. Professors included David Mohrig, Tim Goudge, Rowan Martindale, Dan Breecker, Jaime Barnes, Danny Stockli, Mark Helper. *Takeaways: geologic field mapping, rock/mineral ID, stratigraphic log interpretation, and more.*
- Mar. 2018** Book Cliffs Sedimentology Short Course w/ Ron Steel  
Attended a 10-day trip to NE Utah as a part of the UT Austin Undergraduate Honors Research Program. *Takeaways: western interior seaway formation/deposition, hyperpicnites, lacustrine carbonates, shelf behavior primer*

## Teaching Experience

- May 2023** Co-Instructor: Colorado Plateau Field Course  
Co-led a week-long trip to Utah as part of a class for undergraduates and graduate students on the structure and stratigraphy of the Colorado Plateau with Dr. Kaj Johnson. Lessons covered sequence stratigraphy, depositional environments, sedimentary data collection, log interpretation, and general field skills
- Fall 2020** Teaching Assistant: GEO 416K *Earth Materials*  
Course taught by Dr. Elizabeth Catlos. I led two 4-hour labs and instructed students on a range of topics from mineralogy, crystallography, and petrology and assisted professor in re-designing course for online instruction due to COVID-19
- Spr. 2020** Teaching Assistant: GEO 316P *Sedimentary Rocks*  
Course taught by Dr. Cornel Olariu. I Created quizzes and extra credit assignments for 84 petroleum engineering students while achieving an average student evaluation score of 4.3/5.00. Further assisted professor in re-designing course for online instruction due to COVID-19

**Fall 2019** Teaching Assistant: GEO 401 *Physical Geology*

Course taught by Drs. Jaime Barnes & Daniel Breecker. I led three two-hour lab sessions with 45 students total emphasizing practical aspects of geology including mineral & rock identification, field hydrology, map-reading, and structural interpretation. Achieved an average student evaluation score of 4.63/5.00

## Employment History

**May 2019-** [Chevron Corporation ETC, 1111 Bagby St. Houston, TX 77002](#)

**Aug. 2019** *Data Engineering Intern*

Developed a Python package for full stack analytics model deployment from DevOps repository to production-level, server-hosted models to be queried for prediction results via REST API. Built in customizable functionalities to track model metrics throughout successive runs and fully deploy most accurate models utilizing container services. Gained experience in Software Engineering, VCS, Spark Python, Microsoft Azure, Databricks, and MLflow.

**July 2018 -** [Chevron Corporation ETC, 1111 Bagby St. Houston, TX 77002](#)

**Aug. 2018** *Technical Computing Intern*

- Worked in Subsurface Workflows dept. on workflow regression testing for Petrel 2016.3, 2017.4, and 2018.1.
- Worked with Petrophysics team on machine learning applications for lithofacies identification. Gained experience in Microsoft Visual Studio, Geolog 18.0, and Pythonic data analytics.

## Service Activities

**Fall 2022 -** [Earth and Atmospheric Science Graduate Student Association](#)

**Spr. 2023** *Faculty Representative*

Function was to meet with Dept. Chair and Director of Graduate Studies monthly to relay information from the graduate student population as well as to get updates on departmental goings-on. Additionally served on the Faculty Hiring Committee.

**Fall 2020 -** [UT Austin: Technology Enhanced Education Oversight Committee \(C-14\)](#)

**Spr. 2021** *Graduate Student Assembly Representative*

Function: to evaluate and formulate policy on technology-enhanced education and make recommendations on such matters to the Faculty Council. We meet monthly to discuss current issues within the context of technology and higher education. This year (2021) we have passed a resolution recommending the creation of a school-wide dedicated Education Technology Officer to better coordinate between stakeholders.

## Media Coverage

**Oct. 2024** What leads rivers to suddenly change course? *ScienceNews*

**Oct. 2024** Scientists discover new way of predicting where and when rivers suddenly change course and flood *National Science Foundation*

**Sep. 2024** Breakthrough study from IU Scientists predicts catastrophic river shifts that threaten millions worldwide *UN Office for Disaster Risk Reduction*

**Dec. 2020** 'Big Data' Enables First Census of Desert Shrub *Jackson School of Geosciences*

## Grants & Fellowships

**Sep. 2024-** Indiana University Dissertation Year Fellowship

**May 2025** Ph.D Candidate

Awarded by the Indiana University College of Arts and Sciences on a yearly basis

**Feb. 2020-** Earth Science Information Partners (ESIP) Winter RFP 2020

**Dec. 2020** Principal Investigator

**Funded \$8,000:** Developing an Open-Source Workflow and Toolset for Quantifying Lacustrine Sedimentation using Publicly Available Data

**Aug. 2021-** Grassman Fellowship

**May. 2022** Ph.D Student

Awarded to one candidate by the Indiana University Department of Earth & Atmospheric Sciences on a yearly basis

## Presentations & Posters

[1] James H. Gearon and Douglas A. Edmonds. River avulsion precursors encoded in alluvial ridge geometry. In *RCEM 2025, Barcelona*, 2025.

[2] Cheryl Lyn Watts, Luke Jospah Gezovich, Sam Bagge, Alejandro Arboleda, and James Hooker Gearon. Determining imminent avulsion risk on the nechi river, colombia. In *AGU Fall Meeting 2024*, 2024.

[3] Eric Alexander Barefoot, James Hooker Gearon, JeongYeon Han, Tamlin Pavelsky, and Douglas A Edmonds. Measuring the abundance and dimensions of natural river levees across the contiguous usa with 3dep lidar. In *AGU Fall Meeting 2024*, 2024.

[4] Yuan Li, James Hooker Gearon, Arya Mimi Gotoh, and Douglas A Edmonds. Assessing the degradation of artificial levees across the us with remotely sensed data. In *AGU Fall Meeting 2024*, 2024.

[5] James Hooker Gearon and Douglas A Edmonds. Avulsion risk encoded in channel topography. In *AGU Fall Meeting 2024*, 2024.

[6] James Hooker Gearon, Eric Barefoot, Tamlin Pavelsky, and Douglas A Edmonds. Characterizing vertical relief in the world's riparian zones. In *AGU Fall Meeting 2023*, 2023.

- [7] Eric Barefoot, James Hooker Gearon, Jeongyeon Han, and Douglas A Edmonds. Measuring the abundance of natural river levees across the contiguous usa with 3dep lidar. In *AGU Fall Meeting 2023*, 2023.
- [8] Tyler Doane, James Hooker Gearon, Harrison Martin, Brian J Yanites, and Douglas A Edmonds. Generalized theory for relating topographic roughness to ecologic, hydrologic, and atmospheric processes. In *AGU Fall Meeting 2023*, 2023.
- [9] Tyler Doane, Aman Agarwal, James Hooker Gearon, Brian J Yanites, and Douglas A Edmonds. Automated mapping of tree uprooting in lidar data at scale using deep learning. In *AGU Fall Meeting 2023*, 2023.
- [10] James H. Gearon, Harrison K. Martin, Clarke DeLisle, Eric A. Barefoot, David Mohrig, Chris Paola, and Douglas A. Edmonds. Spatial variability of avulsion initiation mechanisms. In *Rivers, Coastal, and Estuarine Morphodynamics Conference*, 2023.
- [11] James H. Gearon and Douglas A. Edmonds. Investigating hypotheses for river avulsion using space-borne lidar. In *International Conference of Fluvial Sedimentology*, 2023.
- [12] James H. Gearon and Douglas A. Edmonds. Investigating hypotheses for river avulsion using space-borne lidar. In *AGU Fall Meeting 2022*. AGU, 2022.
- [13] Connor Broaddus, James H. Gearon, Douglas A Edmonds, and Efi Foufoula-Georgiou. Topographic scaling reflects process differences on alluvial and fluvial fans. In *AGU Fall Meeting 2022*, volume 2022, pages EP36A–08, 2022.
- [14] Etienne Chenevert, James H. Gearon, and Douglas A Edmonds. Using explainable machine learning to investigate the controls of vertical accretion on the mississippi river deltaic plain, louisiana, usa. In *AGU Fall Meeting 2022*, volume 2022, pages EP52D–0786, 2022.
- [15] Space lasers for rivers: Using ICESat-2 data for fluvial geomorphology. In *ESIP Winter Meeting 2022*.
- [16] James H. Gearon and Douglas A. Edmonds. Automated river profiling from space: A 21st century solution to an inconvenient problem. In *AGU Fall Meeting 2021*. AGU, 2021.
- [17] James H Gearon, Cornel Olariu, and Ronald J Steel. The supply-generated sequence: A new sequence-stratigraphic model for fluvio-lacustrine deposits. In *IMAGE Online Meeting, USA-2021*. IMAGE, 2021.
- [18] James H Gearon. LakePy: A python package for accessing and manipulating lacustrine time-series data. In *USGS & ESIP IT&I & CDI TechStack Working-group*. USGS ESIP, 2021.
- [19] James Hooker Gearon, Cornel Olariu, and Ronald Steel. Quantifying high-frequency lacustrine sedimentation patterns using publicly available data. In *AGU Fall Meeting 2020*. AGU, 2020.
- [20] Michael Young and James Hooker Gearon. Geomorphic controls on shrub canopy volume and spacing of creosote bush in northern mojave desert, usa. In *AGU Fall Meeting 2020*. AGU, 2020.

- [21] James H Gearon, Cornel Olariu, and Ronald J Steel. Proximal to distal changes of thin lacustrine deltas in the ancient and modern. In *AAPG Annual Online Meeting, USA-2020*. AAPG, 2020.
- [22] Developing an open-source database and pythonic toolset for quantifying lacustrine sedimentation using publicly available data. In *ESIP Summer Meeting 2020*.
- [23] James H Gearon, Cornel Olariu, and Ronald J Steel. Unveiling lake delta architectures in modern and ancient systems by mapping river flood deposodes. In *RioMAR Annual Meeting in Houston, Texas, USA-2019*. RioMAR, 2019.
- [24] James A Gearon and Michael H Young. Geomorphic controls on shrub canopy size and spacing of creosote bush in northern mojave desert, usa. In *GSA Annual Meeting in Phoenix, Arizona, USA-2019*. GSA, 2019.
- [25] James Hooker Gearon and Michael Young. Geomorphic influence on canopy structure in eldorado valley, nevada. *AGU FM*, 2018:H13G–1799, 2018.
- [26] James H Gearon, Joseph S Levy, and Timothy A Goudge. Making sense of chaos: Geomorphic investigations of martian chaos terrain. In *LPSC Annual Meeting in Houston, Texas, USA-2017*. LPSC, 2017.

## **Invited**

Landscapes Live Seminar (Online)

- **March. 2025:** How River Avulsions Work

University of Delaware Colloquium

- **March. 2025:** How River Avulsions Work

EEPS Brown Bag: Washington University in St. Louis (WashU)

- **Feb. 2025:** How River Avulsions Work

Smith Lecture: University of Michigan Earth & Environmental Sciences Dept.

- **Feb. 2025:** How River Avulsions Work

USGS CDI Geomorphology Group

- **Oct. 2024:** Observing River Avulsion from Space

USGS CDI Information Technology & Interpretability Group

- **Sep. 2021:** LakePy: A database and API for lake water level analysis

Water, Climate & Earth Seminar (UT)

- **Oct. 2020:** Geomorphic controls on shrub canopy volume and spacing of creosote bush in northern Mojave Desert, USA

Eco-Lunch (UT)

- **Oct. 2020:** Geomorphic controls on shrub canopy volume and spacing of creosote bush in northern Mojave Desert, USA

## Honors & Awards

**Oct. 2024** AGU EPSP Early Career Spotlight

**Nov. 2020** Invited Speech: Jackson School of Geosciences Scholarship Luncheon

**May 2019** - 7 Semesters of University Honors

**May 2019** - 5 Semesters Jackson Matrix Scholarship

**April 2017**-2nd Place in R.L. Folk and E. F. McBride Petrography Contest

## Professional Organizations

**American Association of Petroleum Geologists** - *Active Member*

**Geological Society of America** - *Active Member*

**The Society of Sedimentary Geology** - *Active Member*

**Earth Science Information Partners** - *Project Principal Investigator 2020*

**EarthCube** - *Member*

## Programming & Software

### ■ Proficient in:

Python - Pandas, NumPy, Sci-Kit Learn, Rasterio, GDAL, SciPy, Flask, GeoPandas, Boto3, Dask, Xarray, DuckDB, OpenCV, Earth Engine, STAC

SQL - PostgreSQL, PostGIS, DuckDB SQL

LLMOPs - RAG Pipelines, Gemini API, Claude API, OpenAI API, MLX, Scientific Paper Embeddings, LangGraph, Cursor IDE, Agentic Workflows

R - dplyr, tidyverse, broom, fitdistrplus, ggplot2, sf

Bash/Zsh - shell scripting, automation

LaTeX & Markdown - technical writing

### ■ Experience with:

Julia - numerical computing

JavaScript - web development

Scala/Spark - distributed computing

### ■ Miscellaneous Software

Cloud & DevOps - Docker, Poetry, UV, CI/CD, Git

AWS - RDS, S3, Aurora Serverless, Lambda, API Gateway

GIS Software - ArcGIS, QGIS, Global Mapper

IDE & Development - PyCharm, VSCode, Jupyter

Azure - database operations, cloud computing

Statistical Analysis - Spatial Statistics, GLMs, LASSO/RIDGE

Petrel - geologic operations