Cole M. Speed

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Other Links

Education

May 2024 **Ph.D. Geological Sciences**, Jackson School of Geosciences, University of Texas at Austin
Research Theme: Remote Sensing and Earth/Planetary Surface Processes
Co-advisors: Zoltán Sylvester, David Mohrig
Cumulative GPA: 4.0/4.0

May 2017 **B.S. Geophysics**, Jackson School of Geosciences, University of Texas at Austin
Honors Thesis: *High-resolution stratigraphic analysis of the East Texas Inner-continental shelf*
Advisor: Sean Gulick
Cumulative GPA: 3.71/4.0 (High Honors)

Relevant Coursework Python for Geoscience Research, Scientific Programming (C++/Fortran), Remote Sensing for Geoscientists, Applied Geocomputation, Scientific/Technical Computing, Machine Learning Applications in Geosciences, High Performance Computational Engineering

Research Experience & Projects

Morphologic, Topographic, and Stratigraphic Evolution of Modern Fluvial Landscapes
Coupling time-lapse satellite imagery, co-located topographic (lidar) data, and simple numerical models to quantify linkages between plan-form river bend kinematics and topographic and stratigraphic evolution. Developing Python-based approaches for quantifying and predicting the evolution of modern fluvial landscapes and processes.
Conference Abstract

Preservation and Exhumation of Fluvial Landscapes in the Ancient Stratigraphic Record
Integrating 3-D digital outcrop models, lidar-derived digital terrain models, hyperspectral imagery, and field data to quantify linkages between fluvial processes and stratigraphic products, and to constrain the preservation and evolution of ancient fluvial landscapes on modern planetary surfaces.
Conference Abstract | Lidar Data (OpenTopography) | News

Automated Identification of Dune Fields on Mars using Deep Learning
Developing approaches for the identification and classification of geomorphic features - currently dune fields - on the surface of Mars using a convolutional neural network (U-Net) and a high-resolution global mosaic of images acquired by the Thermal Imaging Emission System (THEMIS) on board the Mars Odyssey orbiter.
Github | Jupyter Notebook

Stratigraphic Preservation of a Coastal Plain Fluvial Landscape on the Gulf of Mexico Continental Shelf
Integrated high-resolution 2-D multi-channel seismic reflection and CHIRP data using Landmark DecisionSpace software to investigate fluvial and marine processes and preservation on the Texas continental shelf
Manuscript

Technical Experience and Skills

- Advanced skills and experience in ArcGIS/QGIS and geospatial data processing/analysis/visualization in Python (GDAL, PDAL, Geopandas, Scipy).
- Experience in building programmatic workflows for accessing and utilizing cloud-hosted data resources.

Peer-Reviewed Journal Articles

Published

Speed, C.M., Swartz, J.M., Gulick, S.P.S., Goff, J.A. (2022) Seismic expression and stratigraphic preservation of a coastal plain fluvial channel belt and floodplain channels on the Gulf of Mexico inner continental shelf. *Sedimentology*. doi:10.1111/sed.13044

In Review

Speed, C.M., Sylvester, Z., Morris, P.D., Mohrig, D. The impact of post-cutoff bend curvature on channel kinematics in meandering rivers: An example from the Trinity River, Texas, USA. Geological Society, London, Special Publications, 540(1).

Presentations

Speed, C.M., Sylvester, Z., Morris, P., Mohrig, D., 2023, Quantifying the Spatial and Temporal Impact of Meander Bend Cutoffs on Planform Migration Rates and Patterns: Examples from the Trinity River, Texas, S02.15, ICFS, July 2-7, Riva del Garda, Italy.

Speed, C.M., Beckley, M., Crosby, C.J., Nandigam, V., Stoker, J., 2022, Enhancing Usability of USGS 3D Elevation Program (3DEP) Lidar Data Through Jupyter Notebook-Based Data Access and Processing, IN35A-05, AGU Fall Meeting, Dec. 11-16, Chicago, IL, USA.. DOI

Speed, C.M., Sylvester, Z., Morris, P., Mohrig, D., 2022, Tracking the Spatial and Temporal Impact of Bend Cutoffs on Planform Migration Patterns in Meandering Rivers: Examples from the Trinity River, Texas and Río Mamoré, Bolivia, EP42C-1637, AGU Fall Meeting, Dec. 11-16, Chicago, IL, USA.. DOI

Speed, C.M., Morris, P., Sylvester, Z., Mohrig, D., 2020, The Impact of Fluvial Meander Cutoff on Channel-Bend Migration Patterns: Implications for Predicting River Planform Evolution and Deposit Architecture, EP004-0012 , AGU Fall Meeting, Dec. 1-17, Virtual . DOI

Morris, P., **Speed, C.M.**, Sylvester, Z., Covault, J. A., 2020, Kinematic Evolution of a Deep-Water Channel-Levee System, Eastern Gulf of Mexico, EP005-08, AGU Fall Meeting, Dec. 1-17, Virtual . DOI

Speed, C.M., Sylvester, Z., Flaig, P.P., Durkin, P., Goudge, T.A., 2020, Relating the Geomorphology and Stratigraphy of an Ancient Fluvial Avulsion Node: An example from the Cretaceous Cedar Mountain Formation, Eastern Utah, Oral, SEPM ISGC Meeting, Flagstaff, AZ, USA, April 26-29 (postponed due to COVID-19 concerns).

Speed, C.M., Sylvester, Z., Flaig, P.P., Durkin, P., Goudge, T.A., 2019, Relating the Geomorphology and Stratigraphy of an Ancient Fluvial Avulsion Node: An example from the Cretaceous Cedar Mountain Formation, Eastern Utah, EP21D-2233, AGU Fall Meeting, Dec. 9-13, San Francisco, CA, USA. DOI

Speed, C.M., Sylvester, Z., Flaig, P.P., Durkin, P., Cardenas, B.T., Goudge, T.A., 2019, Stratigraphic Architecture of Exhumed Fluvial Channel-belts: Anatomy of an Avulsion, AAPG ACE Annual Meeting, May 19-22, San Antonio, TX, USA. DOI

Speed, C.M., Swartz, J.M., Gulick, S.P.S, Goff J.A., 2017, New Insights into Valley Formation and Preservation: Geophysical Imaging of the Offshore Trinity River Paleovalley, EP33A-1667, AGU Fall Meeting, Dec. 11-15, San Francisco, CA, USA. DOI

Layton, M.E., **Speed, C.M.**, Shukla, M., Vila, A., Chon, E., Kitamikado, C., Feucht, D.W., Bedrosian, P.,Pellerin, L., 2016, Electromagnetically inferred structure of the Caja del Rio Plateau, New Mexico, GP51A-1375, AGU Fall Meeting, Dec. 12-16, San Francisco, CA, USA. DOI

Speed, C.M., Gulick, S.P.S., Goff, J.A., Swartz, J.M., Fernandez, R., 2016, Characterizing Late Quaternary Paleochannel System Evolution on the East Texas Continental Shelf, EP53A-0924, AGU Fall Meeting, Dec. 12-16, San Francisco, CA, USA. DOI

Research Grants

2019 The Institut Français du Pétrole Grant
2018 Graduate Student Seed Proposal Grant, National Center for Airborne Laser Mapping
2018 University of Texas Provost Supplement Fellowship
2015 Wayne Franklin Bowman Endowed Presidential Scholarship

Professional Experience

May 2023 - Present **NASA Jet Propulsion Laboratory**, Pasadena, California
Intern, Observational Products for End-Users from Remote Sensing Analysis (OPERA)

- Developed computational Jupyter Notebook-based workflows for accessing and visualizing cloud-hosted data from the OPERA Surface Disturbance (DIST) product for quantifying vegetation cover dynamics.
- Applied workflows to produce real-time disaster response maps of vegetation cover loss due to Summer 2023 Canadian wildfires.
- Collaborated with JPL engineers and scientists to maintain and expand OPERA Applications Github for use by OPERA stakeholders and the general public.

May 2022 - Aug. 2022 **OpenTopography**, Boulder, Colorado
Data Science Intern, EarthScope Consortium

- Developed Python workflows for programmatically accessing, processing, analyzing, and visualizing cloud-hosted (AWS) USGS 3DEP lidar point cloud and raster data. (Link to Jupyter Notebooks)
- Deployed workflows on Google Colaboratory (Google's cloud platform) to enhance ease-of-use and accessibility for users regardless of experience level in Python programming language.
- Wrote and tested Python routines for programmatically colorizing USGS 3DEP lidar point cloud data with National Agriculture Imagery Program (NAIP) 1-meter multispectral imagery.

June 2021 - Aug. 2021 **Chevron**, Gulf of Mexico Business Unit, Houston, Texas
Earth Science Intern, Exploration & Appraisal

- Identified and characterized resource and potential of two prospects in the deepwater Gulf of Mexico
- Worked with SMEs to analyze reservoir, seal, and charge and constructed risk profiles for prospects
- Develop scoping-level economics and provided final recommendation to exploration team

June 2020 - Aug. 2020 **Chevron**, Gulf of Mexico Business Unit, Covington, Louisiana
Earth Science Intern, Geology & Geophysical Operations

- Constructed structural and petrophysical models of key fields across the U.S. Perdido Fold Belt in the Alaminos Canyon protraction area, Gulf of Mexico, using 3-D seismic and petrophysical log data
- Performed model refinement and quality control using blind well test to ensure model accuracy for petrophysical property prediction
- Applied model results to generate pore pressure and fracture gradient curves to support current and upcoming well planning and drilling

May 2017 - Aug. 2017 **EOG Resources**, San Antonio, Texas
Geophysics Intern

- Integrated 3D seismic data, well logs, and seismic inversion products to characterize the morphology, distribution, and lithologic properties of key subsurface formations across acreage
- Performed statistical analysis of fracture parameters and well performance in the Eagle Ford Fm., TX
- Combined geophysical characterization with well performance data to inform future well planning

Teaching Experience

Fall 2022 **Teaching Assistant**, Python for Geoscience Research, UT-Austin

Spr. 2022 **Teaching Assistant**, Introduction to Remote Sensing for Geoscientists, UT-Austin

Fall 2021 **Teaching Assistant**, GIS/GPS Applications in Earth Sciences, UT-Austin

Fall 2020 **Teaching Assistant**, GIS/GPS Applications in Earth Sciences, UT-Austin

Workshops and Short Courses

Oct. 2022 **Field course in river dyanamics and stratigraphy**, Utah, USA
Co-instructor
Provided instruction on modern remote sensing and field approaches for outcrop characterization

Oct. 2019 **From point clouds and full-waveform data to DEM analysis**, Potsdam, Germany
Participant
Processing and analyzing lidar/SfM point clouds and derivatives applied to earth surface processes

Oct. 2019 **Salt and Extensional Tectonics in the Paradox Basin**, Utah, USA
Participant
Hands-on training in recognition and interpretation of salt tectonic structures and their implications

May. 2019 **SEPM Deep-water Depositional Environments: Processes and Products**, Austin, Texas
Participant
Classroom instruction and exercises related to turbidity currents and their deposits in the subsurface

Field Experience

Oct. 2018 Stratigraphic section mapping and surveying in the Cedar Mountain Fm., Green River, Utah
Oct. 2018 Shallow marine and continental slope sedimentary systems, Cape Arago, Oregon
Jul. 2016 Geophysical surveying in the Española Basin, New Mexico
Jun. 2016 Marine Geology and Geophysics (MG&G) field course, R/V Manta, Gulf of Mexico

Organizational Leadership

2018-2020 **President**, AAPG Student Chapter
2016-2018 **Treasurer**, SEG Student Chapter

Current Research Group Affiliations

Quantitative Clastics Laboratory Consortium | Quantitative Sedimentology and Morphodynamics Research Group