

RYAN J. HERRING
CURRICULUM VITAE

Institute for Geophysics and Department of Geological Sciences
Jackson School of Geosciences, The University of Texas at Austin

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EDUCATION

- 2023 (Anticipated) **Joint M.S. and Ph.D. in Earth System Sciences, Yonsei University**, Seoul, Republic of Korea
Adviser: Wonsuck Kim
- 2019 **B.S. in Geological Sciences, University of Texas at Austin**, Austin, USA
Major: Geosciences/Geology (Formerly: Petroleum Engineering)
Minor: Mathematics¹

RESEARCH EXPERIENCE

- Jun 2020 – Sep 2020 **Geological Research Scientist Intern**
Earth System Observations Group (EES-14)
Los Alamos National Laboratory (LANL)
Triad National Security
National Nuclear Security Administration (NNSA)
United States Department of Energy (DOE)
Advisers: Anastasia Piliouras
- Aug 2019 – Present **Researcher**
GOM/Chicxulub Research Group
Quantitative Sedimentology Research Group
Institute for Geophysics, The University of Texas at Austin
Advisers: John Goff, David Mohrig, Eric Prokocki, Dan Duncan
- Jun 2019 – Aug 2019 **GIS Programmer/Software Engineer Intern**
Railroad Commission of Texas (RRC) – Groundwater Advisory Unit (GAU)
Supervisors: Norman Gearhart, James Harcourt, Royce Massey
Faculty Adviser: Cornel Olariu
- Jan 2017 – Present **Undergraduate Researcher → Researcher**
Dynamic Stratigraphy Research Group
Morphodynamics and Quantitative Stratigraphy Research Group
Department of Geological Sciences, The University of Texas at Austin
Advisers: Cornel Olariu, Mark Helper, Wonsuck Kim, Ron Steel
- Jan 2017 – Mar 2017 **Undergraduate Research Collaborator**
Dynamic Stratigraphy Research Group
Department of Geological Sciences, The University of Texas at Austin
Advisers: Austin Clayton, Cornel Olariu, Logan West

RESEARCH OVERVIEW

Research primarily focuses on obtaining a quantitative understanding of fluvial and deltaic morphodynamics, geomorphology, stratigraphy, and marine geophysics. In the course of his research, he seeks to derive fundamental relationships in sediment transport using knowledge of mathematics to study through experiments and observations, the geomorphological processes of our world and others.

In 2020, will begin internship at Los Alamos National Laboratory (LANL), employing spectral and Synthetic Aperture Radar (SAR) data acquired by Sentinel satellites of the European Space Agency (ESA)'s Copernicus Programme, in conjunction with numerical modelling, in order to study arctic delta morphodynamics by investigating the effect that the timing of ice retreat relative to spring floods has on channel network and surface hydrologic connectivity.

Current research projects at the University of Texas are twofold. As a researcher at the University of Texas Institute for Geophysics, utilising multibeam echosounder (MBES) surveys of the Brazos River collected during two separate instances while the river was in flood stage, combined with seismic/CHIRP data, acoustic Doppler current profiler (ADCP) data for flow velocities,

¹ The Jackson School of Geosciences did not recognise minors on transcripts for the 2016-2018 catalogue, but all of the requirements for a mathematics minor were completed per the University of Texas' regulations.

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and sediment samples for grain size analysis, in order to investigate fluvial bedload transport during flood events and conduct a complete bedform morphology study of the Upper and Lower Brazos River during floods, the first study of its kind. This study also bears significant implications for coastal processes, as it will inform as to where the sand building the Brazos delta is coming from, as surveys under ambient conditions reveal almost no sand bedload to speak of. Gained further field experience in marine geophysics on the University of Texas Institute for Geophysics' Marine Geology and Geophysics expedition to the Gulf of Mexico to investigate the geomorphological effects of Hurricane Harvey and map the lowstand Nueces River valley.

Research conducted within the Department of Geological Sciences primarily focuses on studying the fluvial/deltaic response to changing boundary conditions. Currently leading an investigation on the effect of base level change due to glacio-eustatic sea level rise driven by changing climate conditions on deltaic deposition, the project being centred on the Late Quaternary Mississippi River delta, with hopes to expand to a globe encompassing database of similar aged river deltas in the future. Therein, examining the delta's sediment dispersal during transgression and regression by means of determining how the locus of deposition of the Mississippi has fluctuated since the last glacial maximum (LGM) via mapping and calculations of the volume of sediment deposited on-shelf by the Mississippi since the LGM. Further developed a model by which to determine when ancient river deltas are undergoing progradation and retrogradation. Model was created by modelling the volumetric flooding rate and modelling the Mississippi River's sediment discharge since the LGM, derived through the integration of models for water discharge since the LGM with a water flow velocity to sediment transport relationship for the modern Mississippi River. Model was able to not only determine the timing of progradational events, but also the volumetric magnitude of the progradational rate. Model predicted that Mississippi retrogradation was delayed until 16 ka, 2 ka after the LGM at 18 ka, due to a relatively low volumetric flooding rate as a result of basin morphological effects, leading to this interval having the highest volumetric rate of progradational magnitude in the post-LGM period. From this model, deltaic progradation is predicted to have resumed at ~8 ka, which is consistent with age dating of the Holocene-Pleistocene Surface. Distinct Holocene progradational events can be seen in this model, which approximate the growth of different deltaic lobes.

Previously worked with gamma ray and neutron porosity well logs from the Yoakum Canyon on Austin Clayton's Master's Thesis about linking Gulf of Mexico submarine canyons with regional tectonics associated with the Laramide Orogeny. Additional experience working as a GIS computer programmer within the Groundwater Advisory Unit of the Railroad Commission of Texas, an oil and gas regulatory agency, where Python was employed in conjunction with ArcGIS to create models and execute complex transformation scripts on large agency wide databases. Further work was undertaken in developing relational databases to normalise the large data set.

CONFERENCE PRESENTATIONS

2020

Herring, R.*, Olariu, C., Helper, M., 2020. Deducing the Timing and Magnitude of Late Quaternary Mississippi River Deltaic Progradation and Retrogradation Coeval with the Waning Phase of the Last Glacio-eustatic Cycle by Modelling Volumetric Flooding Rate and Sediment Discharge Since the Cessation of the Late Wisconsin Glacial Stage, *9th Annual Jackson School Student Research Symposium*.

2019

Herring, R.*, Olariu, C., Helper, M., 2019. The Fate of the Mississippi River Sediment Amidst the Waning Phase of the Last Glacio-eustatic Cycle: A Volumetric Quantification and Modelling of Late Quaternary Deposition Coeval with the Cessation of the Late Wisconsin Glacial Stage, *American Geophysical Union 2019*, Abstract EP32A-07. **(Oral Presentation)**

Herring, R.*, Olariu, C., Helper, M., 2019. The Fate of the Mississippi River Sediment Amidst the Waning Phase of the Last Glacio-eustatic Cycle: A Volumetric Quantification and Modelling of Late Quaternary Deposition Coeval with the Cessation of the Late Wisconsin Glacial Stage, *RioMAR 2019*.

Herring, R.*, Olariu, C., Helper, M., 2019. The Fate of the Mississippi River Sediment During the Last Glacio-eustatic Cycle: a Volumetric Quantification, *American Association of Petroleum Geologists SWS 2019*. Abstract 90343.

Herring, R.*, Olariu, C., Helper, M., 2019. The Fate of the Mississippi River Sediment During the Last Glacio-eustatic Cycle: A Volumetric Quantification, *8th Annual Jackson School Student Research Symposium*.

2018

Herring, R.* and Olariu, C., 2018. The Fate of the Mississippi River Sediment During the Last Phase of the Last Glacio-eustatic Cycle: A Volumetric Quantification, *RioMAR 2018*, Abstract P-1.

Herring, R.* and Olariu, C., 2018. Calculation of the Volume of Late Quaternary Mississippi River Off Shelf Deposits, *7th Annual Jackson School Student Research Symposium*, Abstract SHP-U.

CONFERENCES

Feb 2020	9th Annual Jackson School Student Research Symposium (Presenter)
Dec 2019	100th American Geophysical Union (AGU) Annual Meeting (Speaker)
Dec 2018	RioMAR Annual Meeting (Presenter)
Apr 2019	American Association of Petroleum Geologists (AAPG) SWS (Presenter)
Mar 2019	University of Texas Institute for Geophysics (UTIG) PLATES Symposium
Mar 2019	50th Lunar and Planetary Science Conference (LPSC)
Feb 2019	8th Annual Jackson School Student Research Symposium (Presenter)

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Dec 2018 **RioMAR Annual Meeting** (Presenter)
 Nov 2018 **Applied Geodynamics Laboratory (AGL) Annual Meeting**
 Jun - Jul 2018 **University of Texas Planetary Habitability Pop-Up Institute**
 Feb 2018 **7th Annual Jackson School Student Research Symposium** (Presenter)

WORKSHOPS

Apr 2019 **EU-In-Time-Rise Workshop on Geochronology and Mars Exploration** (Session Chair)
 Chaired session on Martian analogues.

FIELD EXPERIENCE

May – Jun 2019 **UTIG, Marine Geology and Geophysics Expedition in the Gulf of Mexico**
 Collected, processed, and interpreted multibeam echosounder (MBES) sonar, side-scan sonar, multichannel seismic (MCS), and CHIRP data, in addition to collecting and performing sedimentological analyses on piston/push/box cores and grab samples. Combined these in order to investigate the geomorphological effects of Hurricane Harvey in and offshore of the Corpus Christi Bay and map the lowstand Nueces River valley from the LGM. Presented findings as team to sponsors.

Jan – May 2018 **Central Texas**

EXTERNSHIPS

Jan 2019 **ConocoPhillips**
 Jan 2019 **Weatherford International**
 Jan 2019 **Marathon Oil**
 Jan 2019 **Roxanna Oil**

ACADEMIC HONOURS AND AWARDS

2019 **Global Leader Fellowship**
 Yonsei University
 Most prestigious fellowship, given to only 7 newly admitted graduate students per application period. Covers full entrance and tuition fees, and provides a ₩500,000 per month stipend.

2019 **Fellow of the Geological Society of London (FGS)**

2019 **William S. Flores Sr. Field Scholarship**

2019 **2nd Annual Undergraduate Geological Society Scholarship, 1st Place**
 For “embodying the values of the Jackson School of Geosciences” and for being “heavily involved in research, seminars, as well as connecting with fellow undergraduates and faculty of our department.”

2018 **1st Annual Undergraduate Geological Society Scholarship, 1st Place**
 For “embodying the values of the Jackson School of Geosciences” and for being “heavily involved in research, seminars, as well as connecting with fellow undergraduates and faculty of our department.”

2016 & 2017 **University Honours (2x)**
 The University of Texas at Austin

2015 **Foresters Competitive Scholarship**

2015 **West Point Bridge Design Competition, Top 50**
 National structural engineering competition with several thousand competitors. Sponsored by The U.S. Military Academy at West Point, and the American Society of Civil Engineers.

2014 **Texas A&M University’s Engineering 12EE Energy Contest, 1st Place**
 Led team in designing the most efficient wind turbine which was more than twice as efficient as the 2nd place design through proper application of Betz’s law.

2014 **Eagle Scout**
 Boy Scouts of America, Troop 440

TECHNICAL SKILL SET

Computer Software:

Remote Sensing: Harris Geospatial ENVI, Google Earth Engine.
Geophysical Acquisition/Processing/Interpretation: Fledermaus, Landmark, Teledyne CARIS (HIPS & SIPS), Paradigm, QINSy, EdgeTech Discover, Fugawi, WinRiver II, Okular, Omniviewer.
GIS: Esri ArcGIS (Pro, ArcMap, ArcScene, ArcCatalog, Online, Collector), Blue Marble Geographics Global Mapper.
Engineering CAD: Autodesk (AutoCAD, Inventor), Solidworks, PTC Creo, Google SketchUp (Pro, Studio).
Particle Analysis: GRADISTAT, Femto PSS.
Miscellaneous: PyCharm (Professional, Community), GeoGebra, Wolfram|Alpha Pro, Neuralog, Schlumberger BlueView, Adobe (Photoshop, Illustrator), Vernier Logger Pro, MS Access.

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Programming Languages:

Python, MATLAB, R, JavaScript, VBA, Wolfram, Mathematica, LaTeX.

Operating Systems:

Linux/UNIX.

Other Technical Skills:

- Skilled in mathematics, including vector calculus and differential equations, as well as proof writing for higher dimensional non-Euclidean geometries. Obtained a minor in mathematics.
- Skilled in collecting, processing, and interpreting multibeam echosounder (MBES), side-scan sonar, multichannel seismic (MCS), and CHIRP data.
- Skilled in conducting flume experiments and basic numerical modelling.
- Skilled in interpretation of remote sensing data via ENVI, including spectral mineralogy, environmental metrics such as NDVI/EVI from Landsat, and spectral mixture analysis.
- Skilled in analysis of multispectral and hyperspectral data from the Earth, the moon, Mars, and Titan from wavelengths across the electromagnetic spectrum, including VNIR, thermal infrared, ultraviolet, and radar.
- Skilled in deriving topography from Lidar and stereogrammetry, and in use of SAR and InSAR data.
- Skilled in optical mineralogy and petrographic microscope use.
- Skilled in collecting and performing sedimentological analyses on piston/push/box cores and grab samples.
- Skilled in processing and interpretation of data obtained via wireline logging.
- Skilled in various forms of engineering CAD software, 3D modelling software, and 3D printing.
- Possesses knowledge of palaeontology and skilled at identifying fossils.

PUBLIC OUTREACH, COMMUNITY SERVICE, AND LEADERSHIP

Aug 2003 – Present	<p>Boy Scouts of America, Troop/Crew 440 Eagle Scout currently giving back to scouting as an Assistant Scoutmaster at Troop 440. Held many leadership positions in both Boy Scouts and Venture Scouts teaching outdoor skills and lead thousands of hours of community service. Achieved rank of Brotherhood in the Order of the Arrow, scouting's honour society. <u>Leadership positions held:</u> Assistant Scoutmaster, Junior Assistant Scoutmaster, Vice President of Programme, Vice President of Administration, Assistant Senior Patrol Leader, Patrol Leader, Assistant Patrol Leader, Quartermaster, Secretary, Scribe, Denner, Assistant Denner.</p>
Sep 2019 – Present	<p>Geoscience Ambassadors As an ambassador, working to develop my story on how I became a geoscientist to share with my home community in order to educate the members of my community on what the geosciences are and get people interested in studying geosciences, by conducting interviews with members of my community, organising and giving presentations to my community, and creating a video of my personal journey.</p>
Oct 2019 – Present	<p>Ambassador for Marine Geology and Geophysics Field Course Serving as an ambassador to the public and the media for the UTIG Marine Geology and Geophysics Field Course in order to raise funds to support future expeditions, by shooting videos and publishing media about my experience, and working to educate the public about the importance of the expedition.</p>
Jan 2016 – Present	<p>Volunteer Tutor Hosted informal weekly review lectures for engineering classmates in sedimentary geology course covering the material learned during the official lecture time due to popular request after helping classmates understand course concepts. Prepared notes over course lectures and study guides to help students prepare for exams.</p>
Sep 2018	<p>GLOW Undergraduate Research Panel Panellist for the Geoscience Leadership Organization for Women's undergraduate research panel. Spoke to undergraduate students about how to get involved in research, what doing research was like, and how to have good time management in order to properly balance their work life with their personal and school lives.</p>
May 2019	<p>OnRamps Gave presentations to high school students in the OnRamps programme about why they should pursue a university education in STEM and a degree in the geosciences.</p>
Oct 2017	<p>Palaeontological Society of Austin's 27th Annual Fossil Fest Ran the University of Texas' exhibit at the event and educated children and parents about dinosaur evolution into birds and why, phylogenetically, certain organisms are classified as dinosaurs while others are not.</p>
May 2014 – Sep 2015	<p>Northwest Assistance Ministries</p>

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Office in Administration and Development, managed volunteer recruitment and coordination of volunteer activities related to poverty alleviation.

RELEVANT COURSEWORK

Geology:

Marine Geology and Geophysics Field Course*, Remote Sensing in Geosciences*, Morphodynamics/Quantitative Stratigraphy*, Geomorphology*, GIS/GPS Applications in Geosciences*, Structural Geology*, Field/Stratigraphic Methods, Sedimentary Geology (2x), Igneous/Metamorphic Petrology (2x), Palaeontology (2x)*, Research Design/Data Analysis*, Ethics in Geosciences

Mathematics:

Structure of Modern Geometry* (Proof writing for higher dimensional non-Euclidean geometries), Advanced Calculus for Applications II (Vector Calculus)*, Ordinary and Partial Differential Equations with Linear Algebra*, Differential Calculus, Integral Calculus, Multivariable Calculus

Engineering/Physics:

Engineering/Energy and the Environment, Petroleum Engineering, Geosystems Engineering MATLAB, Mechanical Engineering, Engineering Mechanics, Engineering Physics I (Mechanics, Heat, Wave Phenomena) & Engineering Physics II (Electricity and Magnetism, Optics, Atomic Phenomena) with laboratories

Biochemistry/Chemistry:

Astrobiology*, Chemistry I & II with laboratories

* graduate-level coursework

PROFESSIONAL AFFILIATIONS & STUDENT ORGANISATIONS

Sep 2019 – Present	UT Math Club
Sep 2019 – Present	Geoscience Ambassadors Ambassador
Aug 2019 – Present	Quantitative Sedimentology Research Group University of Texas Department of Geological Sciences Research Group
Aug 2019 – Present	GOM/Chicxulub Research Group University of Texas Institute for Geophysics Research Group
Feb 2019 – Present	Society of Petrophysicists and Well Log Analysts UT Student Chapter
Nov 2018 – Present	American Geophysical Union (AGU)
Aug 2018 – Present	Texas Geophysical Society (TGS)
Aug 2018 – Present	American Association of Petroleum Geologists (AAPG) UT Student Chapter
Aug 2018 – Present	Geoscience Leadership Organization for Women (GLOW)
Jun 2018 – Present	University of Texas Centre for Planetary Systems Habitability Interdisciplinary effort to establish a Centre for Planetary Systems Habitability
Oct 2017 – Present	Morphodynamics and Quantitative Stratigraphy Research Group University of Texas Department of Geological Sciences Research Group
Oct 2017 – Present	The Geological Society of London Fellow (FGS)
Jun 2017 – Present	The Undergraduate Geological Society (UGS)
Jan 2017 – Present	RioMAR Consortium Research consortium between Colorado School of Mines and The University of Texas
Jan 2017 – Present	Steel Research Group (Dynamic Stratigraphy Workgroup) University of Texas Department of Geological Sciences Research Group
Jan 2016 – Jun 2017	Texas State Parks Club
Aug 2015 – Jun 2017	American Association of Drilling Engineers (AADE) UT Student Chapter
Aug 2015 – Jun 2017	Society of Petroleum Engineers (SPE) UT Student Chapter
Aug 2015 – Jun 2017	University of Texas Polo Team Club team member

REFERENCES

Dr. Wonsuck Kim , Associate Professor Yonsei Dept. Earth System Sciences Email: delta@yonsei.ac.kr	Dr. David Mohrig , Associate Dean for Research UT Austin Dept. Geological Sciences Email: mohrig@jsg.utexas.edu
Dr. Cornel Olariu , Research Scientist, Lecturer UT Austin Dept. Geological Sciences Email: cornelo@jsg.utexas.edu	Dr. Mark Helper , Distinguished Senior Lecturer UT Austin Dept. Geological Sciences Email: helper@jsg.utexas.edu
Dr. John Goff , Senior Research Scientist UT Institute for Geophysics Email: goff@utig.ig.utexas.edu	Dr. Timothy Goudge , Asst. Professor UT Austin Dept. Geological Sciences Email: tgoudge@jsg.utexas.edu