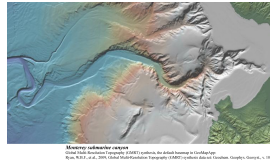


Newsletter

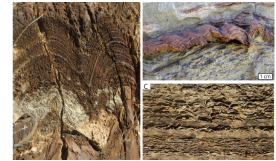
**SEDIMENTARY
GEOLOGY AND
GEOMORPHOLOGY
DISCIPLINE**



**NEW QCL LEADER
COVAULT, MONTEREY
SUBMARINE CANYON**



**STUDENT RESEARCH
HIGHLIGHT
NICHOLAS PEREZ**



**AUSTRALIAN
STROMATOLITES
ROWAN MARTINDALE**

STRATA

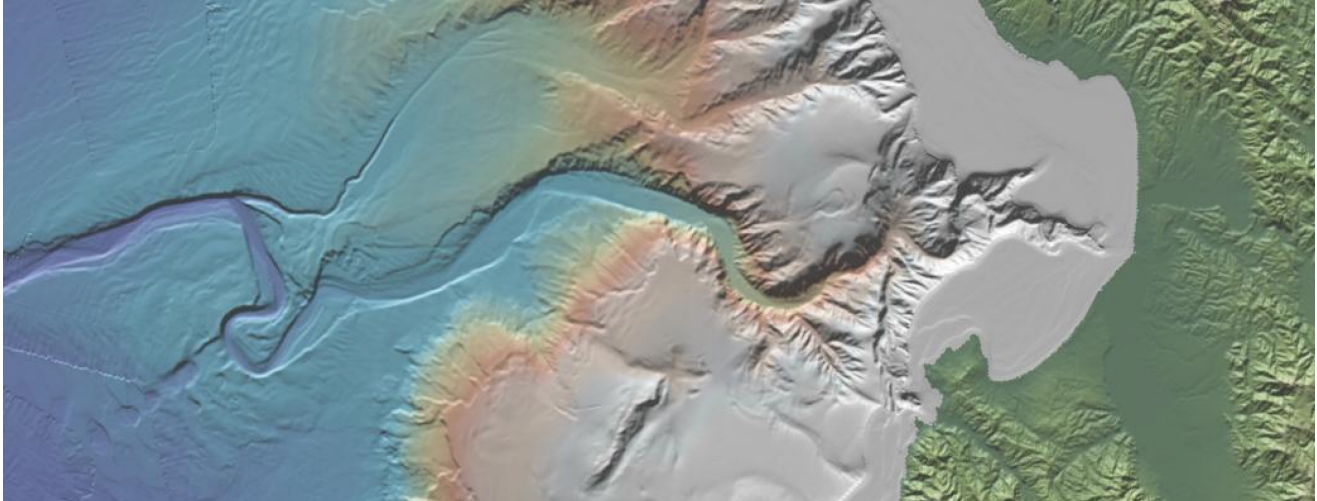


Trip to Andes

Professor Brian Horton led his Sedimentary Basin Analysis (GEO 383S) spring 2015 graduate course on a field trip to the Andes mountains and foreland basin system of Argentina.

Participants included a group of 20 UT graduate students and collaborating academic and industry researchers from the Universidad Nacional de San Juan and the national oil company, Yacimientos Petrolíferos Fiscales.

**Horton took a
group of 20
graduate students
to the Andes
Mountains**



Monterey Submarine Canyon

Dr. Covault and his colleagues study the morphodynamics of submarine canyon and channel systems, among other topics in sediment transport and the stratigraphic evolution of depositional systems. The image is from the Global Multi-Resolution Topography (GMRT) synthesis, the default basemap in GeoMapApp.

Ryan, W. B., Carbotte, S. M., Coplan, J. O., O'Hara, S., Melkonian, A., Arko, R., ... & Zemsky, R. (2009). Global multi-resolution topography synthesis. *Geochemistry, Geophysics, Geosystems*, 10(3), doi:10.1029/2008GC002332.

Stromatolites of Lower Paleoproterozoic Carbonate, Western Australia

Dr. Martindale and her colleagues published a paper about Australian Stromatolites in *Precambrian Research*.

Martindale R.C., Strauss, J.V., Sperling, E.A., Johnson, J.E., Van Kranendonk, M.J., Flannery, D., French, K., Lepot, K., Mazumder, R., Rice, M.S., Schrag, D.P., Summons, R., Walter, M., Abelson, J., and Knoll, A.H. 2015. Sedimentology, chemostratigraphy, and stromatolites of lower Paleoproterozoic carbonates, Turee Creek Group, Western Australia. *Precambrian Research* 266, 194–211. doi:10.1016/j.precamres.2015.05.021

Faculty and Student Awards in SGG discipline



Brian Horton

Outstanding Research Award, University of Texas Institute for Geophysics

Wonsuck Kim

Faculty Annual Evaluation Award, Department of Geological Sciences

Nicholas Perez

JSG Best Student Paper Award, Jackson School of Geosciences

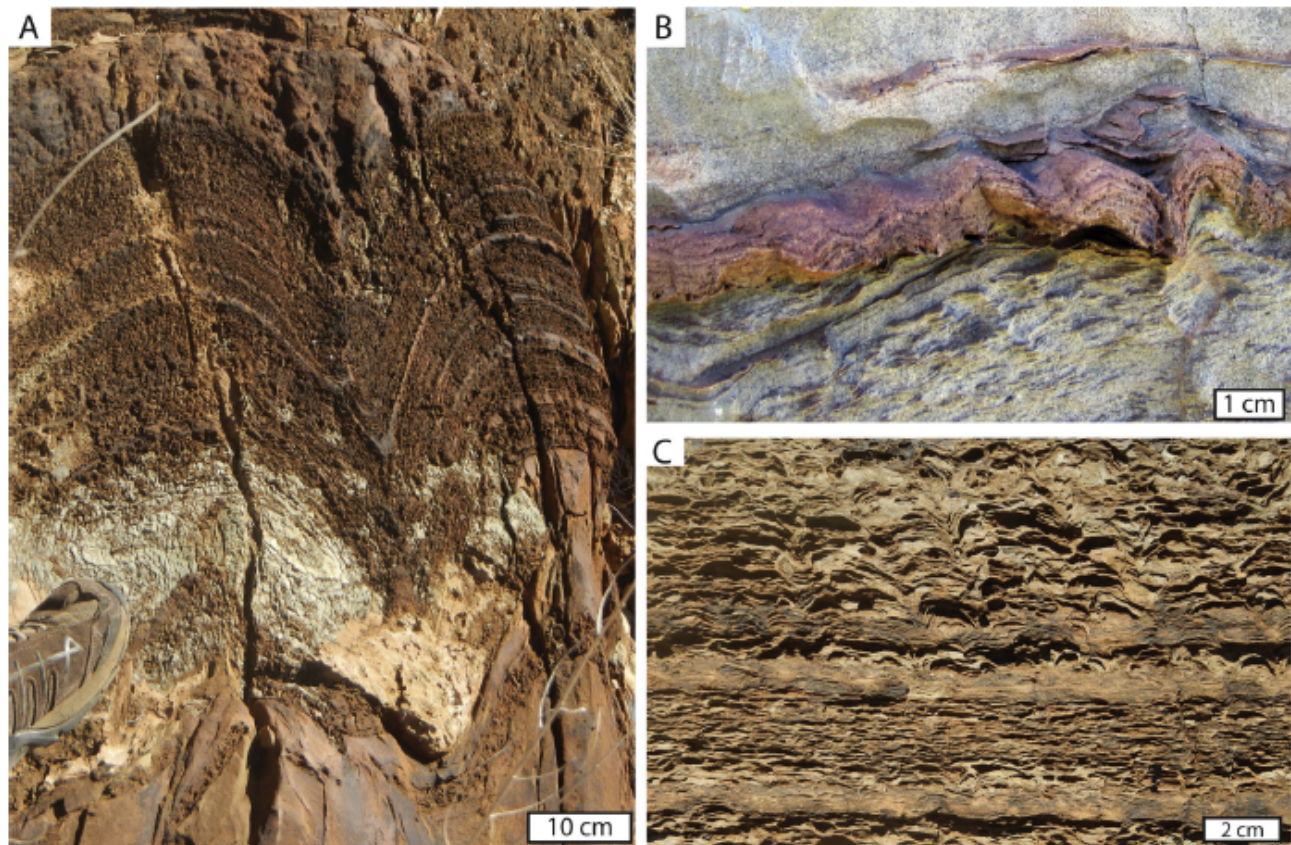


Figure (above). Kazput Fm. stromatolites (Paleoproterozoic). (A) Large domal stromatolites forming over relict topography. (B) Thin stromatolite layer within fine-grained micritic limestones; note the eroded base on which the stromatolite accreted. (C) Alternating layers of siliciclastic lamina-rich (resistant) and carbonate-rich (recessive) layers within the larger stromatolites; note the weathering difference between units.

Faculty Research Update

Jacob A. Covault
*Research Scientist
and Leader of the
Quantitative Clastic
Laboratory*

PhD 2008, Stanford University

Dr. Covault and his colleagues at the Quantitative Clastics Laboratory (QCL) carry out integrated sedimentary studies at multiple scales with subsurface, outcrop, Earth surface, and marine geology datasets to answer science questions related to source-to-sink sediment dispersal and the morphodynamic evolution of depositional systems. Dr. Covault and the QCL team are working to address key challenges in the exploration and development of natural resources, namely reservoir presence and quality prediction in frontier basins, and reservoir connectivity and heterogeneity. Dr. Covault is looking for graduate students and post-docs with whom to collaborate on source-to-sink

Covault

sediment routing and signal propagation, deciphering the stratigraphic record of continental margins, and the impact of facies models on reservoir performance.

2014-15 Two selected publications:

Romans, B. W., Castelltort, S., Covault, J. A., Fildani, A., & Walsh, J. P. (2015). Environmental signal propagation in sedimentary systems across timescales. *Earth-Science Reviews*, doi:10.1016/j.earscirev.2015.07.012.

Covault, J. A., Kostic, S., Paull, C. K., Ryan, H. F., & Fildani, A. (2014). Submarine channel initiation, filling and maintenance from sea-floor geomorphology and morphodynamic modelling of cyclic steps. *Sedimentology*, 61(4), 1031-1054, DOI: 10.1111/sed.12084.

Google Scholar: H-index = 18; Total Citations = 832

<https://scholar.google.com/citations?user=un1p5KcAAAAJ&hl=en&oi=sra>

Joel Johnson

Assistant Professor

PhD 2007, MIT, Cambridge

Within the field of geomorphology, key research interests of Dr. Johnson's are (1) to understand how climate affects landscape evolution over geological timescales, (2) to understand internal feedbacks between water flow, sediment transport and channel morphology in mountain rivers, and (3) to better predict sediment transport, sorting, and deposition by rapidly changing hydrographs.

Research conducted by Dr. Johnson and his research group incorporates both field work and laboratory flume experimentation. Dr. Johnson research also emphasizes novel applications of new technologies for making unique measurements.

2014-15 Two selected publications:

Han, J. W., N. M. Gasparini, J. P. L. Johnson, and B. P. Murphy (2014), Modeling the influence of rainfall gradients on discharge, bedrock erodibility, and river profile evolution, with application to the Big Island, Hawai'i, *J. Geophys. Res.-Earth Surf.*, 119(6), 1418-1440, doi:10.1002/2013JF002961.

Johnson

DeLong, S. B., J. P. L. Johnson, and K. X. Whipple (2014), Arroyo channel head evolution in a flash-flood-dominated discontinuous ephemeral stream system, *Geol. Soc. Am. Bull.*, 126(11-12), 1683-1701, doi:10.1130/B31064.1.

Google Scholar: H-index = 9; Total Citations = 714

<http://scholar.google.nl/citations?hl=en&user=NOpHYRMAAAAJ>

Wonsuck Kim Associate Professor

PhD 2007, University of
Minnesota, Minneapolis

Dr. Kim's research seeks to advance our understanding of stratigraphic responses to sediment transport processes and imposed boundary conditions in depositional basins. The research interest lies in improving tools for predicting subsurface spatial architecture across a range of scales using an understanding of sediment transport and surface flow dynamics and their time-integrated preservation in depositional systems.

Dr. Kim's research group conducts laboratory experiments to study sedimentation over space and time scales that are inaccessible in the field, and use the experimental data to motivate and constrain theoretical models of morphodynamics and depositional patterns. Dr. Kim's group also applies insight gained from physical and mathematical models to field data in order to improve interpretation of paleoenvironments using the stratigraphic record.

2014-15 Two selected publication:

Leva López, J.*, Kim, W., and Steel, R.J., 2014, Autoacceleration of clinoform progradation in foreland basins: Theory and experiments: *Basin Research*, v. 26, no. 4, p. 489-504, DOI: 10.1111/bre.12048

Piliouras, A.*, Kim, W., Kocurek, G.A., Mohrig, D., and Kopp, J., 2014, Sand on salt: Control on dune subsidence and determining salt substrate thickness: *Lithosphere*, v. 6, no. 3, p. 195-199, DOI: 10.1130/L323.1

Google Scholar: H-index = 12; Total Citations = 620

<https://scholar.google.com/citations?user=5MYIjHEAAAAJ>

Kim

2014-15 Two selected grants:

NSF - Sea-level rise and vegetation controls on delta landform evolution: A coupled experimental and numerical modeling study (\$534,126), 9/1/13-8/31/16

NSF - Building a sediment experimentalist network (\$440,559), 8/1/13-7/30/16

2014-15 Selected awards:

Faculty Annual Evaluation Award, Department of Geological Sciences, University of Texas

2014 Editor's Choice Award in Water Resources Research "Kenney et al., 2013, Cost analysis of water and sediment diversions to optimize land building in the Mississippi River delta, Water Resources Research, v. 49, p. 3388–3405, DOI: 10.1002/wrcr.20139.", AGU (American Geophysical Union)

Students graduated in 2014:

Julio Leva (PhD) now Assistant Prof. at Lamar University



Vegetation delta experiment was conducted by a PhD student, Anastasia Piliouras in Summer 2015. This experiment investigated the effect of vegetation on the fluviodeltaic channel dynamics [Wonsuck Kim].

**Rowan C.
Martindale**
Assistant Professor

PhD 2012, University of
Southern California

I am interested in marine paleoecology and the geobiology of carbon cycle perturbation events (e.g. mass extinctions, ocean anoxic events, and ocean acidification events) in deep time. My research includes carbonate sedimentology and the paleontology/paleobiology of reef builders (e.g corals and sponges). I am currently working on the Pliensbachian-Toarcian (Early Jurassic, ~183 Ma) reef crisis and Toarcian Ocean Anoxic Event, but previous work focused on the reef demise and extinction at the Triassic-Jurassic boundary. The Late Triassic and Early Jurassic events will help us understand what environmental conditions cause massive ecosystem collapse, and what conditions marine biota can survive. A large part of my research involves the study of Upper Triassic and Lower Jurassic reef ecosystems, the newly evolved scleractinian corals, and reef variations geographically and temporally. I have also begun research on an Early Jurassic Lagerstätte, which preserves both pelagic and benthic communities across the Toarcian OAE.

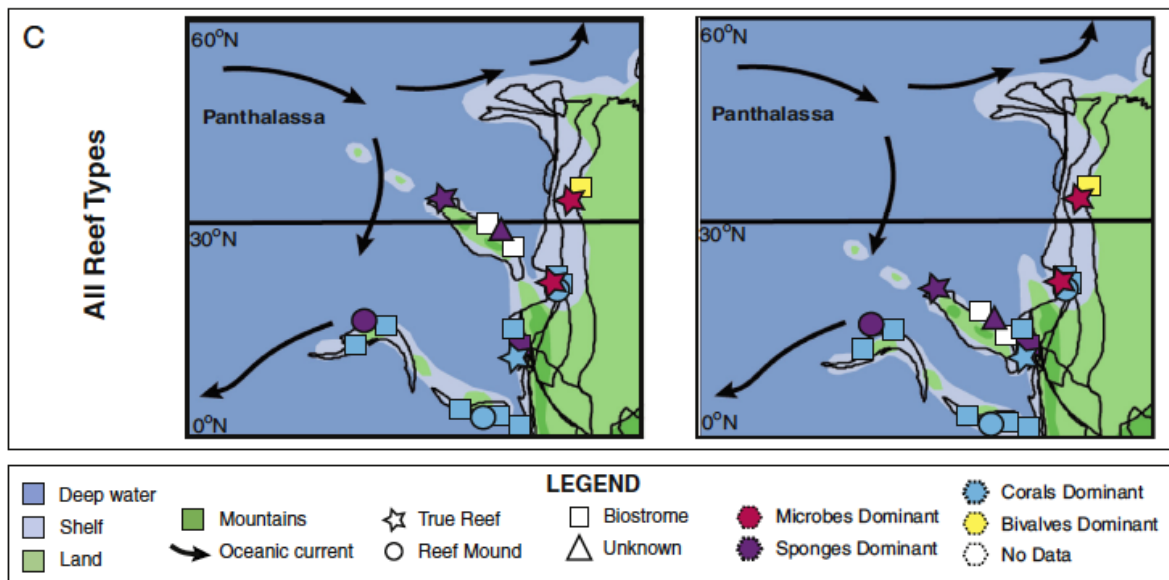
2014-15 Two selected publications:

Martindale R.C., Strauss, J.V., Sperling, E.A., Johnson, J.E., Van Kranendonk, M.J., Flannery, D., French, K., Lepot, K., Mazumder, R., Rice, M.S., Schrag, D.P., Summons, R., Walter, M., Abelson, J., and Knoll, A.H. 2015. Sedimentology, chemostratigraphy, and stromatolites of lower Paleoproterozoic carbonates, Turee Creek Group, Western Australia. *Precambrian Research* 266, 194–211. doi:10.1016/j.precamres.2015.05.021

Martindale R.C., Corsetti, F.A., James, N.P., and Bottjer, D.J., 2015. Paleogeographic trends in Late Triassic reef ecology from northeastern Panthalassa. *Earth Science Reviews*. 142, 18–37. doi:10.1016/j.earscirev.2014.12.004

Google Scholar: H-index = 7; Total Citations = 349

<https://scholar.google.com/citations?user=1r9sFjgAAAAJ&hl=en>



Classifications of the Late Triassic reef localities from the PaleoReefs database and their paleogeographic location in northeastern Panthalassa. Map on the left corresponds to a moderate displacement paleogeographic reconstruction, map on the right corresponds to a major displacement reconstruction or a possible Baja–B.C. scenario. Reef classifications from the PaleoReefs database (Kiessling et al., 2003) and Martindale et al. (2010, 2012a,b). C) All entries in the PaleoReefs database.

Cornel Olariu *Research Associate*

PhD 2005, University of Texas,
Dallas

Dr. Olariu studies the architecture and stratigraphy of clastic sedimentary deposits with emphasis on shallow water depositional systems. He also studies the transfer of sediment along depositional profile from shallow to deeper parts of the basins, controls on stratigraphy that operate at different time scales, short (climatic) vs. long (tectonic), as well as autocyclic and allocyclic processes.

2014-15 Two selected publications:

Olariu, C., D. C. Jipa, R. J. Steel, and M. C. Melinte-Dobrinescu (2014), Genetic significance of an Albian conglomerate clastic wedge, Eastern Carpathians (Romania), *Sediment. Geol.*, 299, 42-59, doi:10.1016/j.sedgeo.2013.10.004.

Gong, C. L., Y. M. Wang, R. J. Steel, C. Olariu, Q. Xu, X. N. Liu, and Q. H. Zhao (2015), Growth Styles of Shelf-Margin Clinoforms: Prediction of Sand- and Sediment-Budget Partitioning into and across the Shelf, *J. Sediment. Res.*, 85(3), 209-229, doi:10.2110/jsr.2015.10.

Google Scholar: H-index = 9; Total Citations = 461

<http://scholar.google.com/citations?user=RKcNbFMAAAAJ&hl=en>

**Timothy
Shanahan**
Associate Professor

PhD 2006, University of
Arizona, Tucson

Dr. Shanahan is interested in understanding the nature and cause of past climate changes, and their impact on the environment, particularly as they pertain to future climate change. To do so, he focuses primarily on sedimentological, geochemical and isotopic changes in the sediment record. He is especially interested in the use of annual sediment records in the development of high resolution climate reconstructions. He utilizes a variety of geochemical and isotopic approaches including scanning m-x- ray fluorescence (for in-situ elemental variations in sediment cores) and compound specific organic molecular and isotopic (dD, d¹³C) approaches (e.g., "biomarkers")

2014-15 Two selected publications:

Anderson, V. J., T. M. Shanahan, J. E. Saylor, B. K. Horton, and A. R. Mora (2014), Sources of local and regional variability in the MBT '/CBT paleotemperature proxy: Insights from a modern elevation transect across the Eastern Cordillera of Colombia, *Org Geochem*, 69, 42-51, doi:10.1016/j.orggeochem.2014.01.022.

Fornace, K. L., K. A. Huguen, T. M. Shanahan, S. C. Fritz, P. A. Baker, and S. P. Sylva (2014), A 60,000-year record of hydrologic variability in the Central Andes from the hydrogen isotopic composition of leaf waxes in Lake Titicaca sediments, *Earth and Planetary Science Letters*, 408, 263-271, doi: 10.1016/j.epsl.2014.10.024.

Google Scholar: H-index = 16; Total Citations = 1540

<http://scholar.google.com/citations?user=UEOzEgEAAAAJ&hl=en>

William L. Fisher
Professor

PhD 1961, University of
Kansas, Lawrence

Fisher's research has focused in the areas of stratigraphy, sedimentology, and oil and gas assessment. In 1967 he introduced the concept of depositional systems-now a fundamental part of modern stratigraphy and sedimentology. In 1977 he and Frank Brown introduced the concept of systems tracts, now a basic part of sequence stratigraphy.

Google Scholar: H-index = 22; Total Citations = 2997

<http://scholar.google.com/citations?user=jR5sK3wAAAAJ&hl=en>

Peter B. Flemings
Professor

PhD 1990, Cornell, Ithaca

Dr. Flemming's studies fluid flow in sedimentary basins through experiments, field study and theory. At the kilometer scale, he addresses fundamental questions: What controls submarine landslides and submarine mud volcanoes? How are methane hydrates formed? At the grain scale and smaller, he explores what controls permeability, and the thermodynamics of hydrate solidification. More practically, he addresses how pressures are distributed in the subsurface, how to safely drill wells, and how to predict where hydrocarbons are trapped.

2014-15 Two selected publications:

Smith, A. J., P. B. Flemings, and P. M. Fulton (2014), Hydrocarbon flux from natural deepwater Gulf of Mexico vents, *Earth and Planetary Science Letters*, 395, 241-253, doi: 10.1016/j.epsl.2014.03.055.

Nikolinakou, M. A., M. R. Hudec, and P. B. Flemings (2014), Comparison of evolutionary and static modeling of stresses around a salt diapir, *Marine and Petroleum Geology*, 57, 537-545, doi:10.1016/j.marpetgeo.2014.07.002.

Google Scholar: H-index = 29; Total Citations = 4084

<http://scholar.google.com/citations?user=HlNabBsAAAAJ&hl=en>

Brian K. Horton
Professor

PhD 1998, University of
Arizona, Tucson

Brian's research focuses on the tectonics of sedimentary basins, evolution of orogenic systems, sediment provenance and routing systems, and nonmarine depositional processes. He combines field-based basin analysis with sedimentology, geologic mapping, geochronology, magnetostratigraphy, petrography, geochemistry, and basin modeling to address the evolution of modern/ancient basins and associated geologic structures. Current projects involve UT team members (8 Ph.D. students, several undergraduates) and diverse external collaborators working on geoscience problems concentrated in the Andes/Amazon systems of South America (Argentina, Bolivia, Peru, Ecuador, Colombia), as well as sedimentary basin systems in the Middle East (Zagros), central Asia (Tibetan plateau, Mongolia), and western North America (Rocky Mountains).

Horton

2014-15 Two selected publication:

Saylor, J.E., and Horton, B.K., 2014, Nonuniform surface uplift of the Andean plateau revealed by deuterium isotopes in Miocene volcanic glass from southern Peru: *Earth and Planetary Science Letters*, v. 387, p. 120-131, doi:10.1016/j.epsl.2013.11.015.

Horton, B.K., Perez, N.D., Fitch, J.D., and Saylor, J.E., 2015, Punctuated shortening and subsidence in the Altiplano plateau of southern Peru: Implications for early Andean mountain building: *Lithosphere*, v. 7, p. 117-137, doi: 10.1130/L397.1.

Google Scholar: H-index = 30; Total Citations = 3360

<https://scholar.google.com/citations?user=FcXBSz4AAAAJ&hl=en>

2014-15 Two selected grants:

NSF Tectonics, Rapid Miocene thrust propagation and wholesale basin partitioning along the central and southern Andes, Argentina, \$298,481 (7/1/2014-6/30/2016)

Statoil: Exploring source-to-sink linkages between Laramide basins and the Gulf of Mexico, \$78,327, (9/1/2014-8/31/2016)

2014-15 Selected awards:

Outstanding Research Award, Institute for Geophysics, UT-Austin

Students graduated in 2014:

Veronica J. Anderson, Ph.D: Uplift and exhumation of the Eastern Cordillera of Colombia and its interactions with climate, Current position: Foundation Geologist, Hess Corporation.

Nicholas D. Perez, Ph.D: Cenozoic deformation history of the Andean plateau in southern Peru: Stratigraphic, structural, and geochronologic constraints, Current position: Assistant Professor, Texas A&M University

Gary Kocurek *Professor*

PhD 1980, University of
Wisconsin

Dr. Kocurek's research interests are in the sedimentology, geomorphology and stratigraphy of aeolian and related systems. His interests range from fluid flow and grain transport, to bedform dynamics and pattern evolution of dune fields, to the stratigraphic record of aeolian and related systems at the basinal scale on Earth and Mars.

2014-15 Two selected publication:

Baitis E., Kocurek G., Smith V., Mohrig D., Ewing R.C., Peyret A.-P. B., 2014. Definition and origin of the dune-field pattern at White Sands, New Mexico. *Aeolian Research* 15: 269-287. Doi:10.1016/j.aeolia.2014.06.004.

Pedersen A., Kocurek G., Mohrig D. & Smith V. 2015. Dune deformation in a multi-directional wind regime: White Sands Dune Field, New Mexico. *Earth Surface Processes and Landforms* 40: 925-941. Doi:10.1002/esp.3700.

Google Scholar: H-index = 48; Total Citations = 6029

<https://scholar.google.com/citations?user=8b4kpvgAAAAJ&hl=en>

2014-15 Two selected grants:

Aeolian Systems Source-to-Sink Analysis for MSL Landing Site and Basin. 2012 -2014. NASA (\$317,300)

Development of the next generation of aeolian dune stratigraphic model with application to the Jurassic Norphlet Sandstone. 2011 – 2016. Shell Exploration & Production Company (\$907,899).

Students graduated in 2014:

Anine Pedersen. MS. Hess Corporation, Houston.

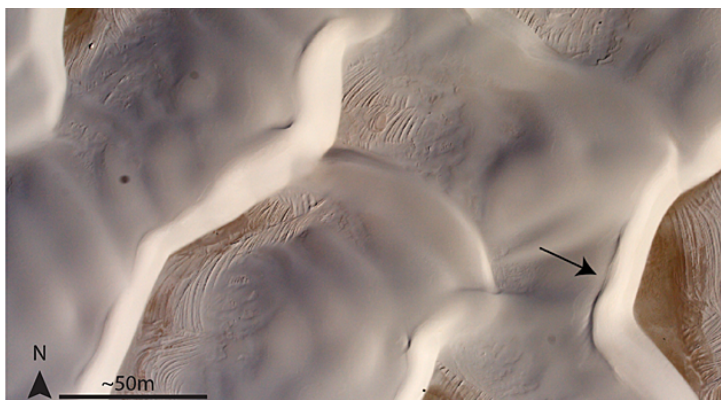


Figure (Left) Aerial image of crescentic dunes with local crestal reversed slipfaces (arrows), referred to as 'Chinese walls'. These features form with winds from the SSE mode. [Pedersen et al., 2015]

David Mohrig *Professor*

PhD 1994, University of
Washington, Seattle

Dr. Mohrig's research group focuses on the application of sedimentary deposits and transport processes to unraveling the evolutions of terrestrial and submarine landscapes. They study the behavior of topography generated at the interface between a granular material and a moving fluid from very short to very long time and space scales, with particular emphasis on processes controlling channel formation, both on land and in the deep ocean. Research methods include carefully designed laboratory and natural experiments on sediment-transporting flows, field studies of modern and ancient sediment-dispersal systems, theoretical modeling of evolving granular-bed topography, and the remote sensing of subsurface sedimentary deposits using seismic data.

2014-15 Two selected publication:

Shaw, J., Y. You, D. Mohrig, and G. Kocurek (2015), Tracking hurricane-generated storm surge with washover fan stratigraphy, *Geology*, 43(2), 127-130, doi:10.1130/G36460.1.

You, Y., P. Flemings, and D. Mohrig (2014), Mechanics of dual-mode dilative failure in subaqueous sediment deposits, *Earth and Planetary Science Letters*, 397, 10-18, doi:10.1016/j.epsl.2014.04.024.

Google Scholar: H-index = 35; Total Citations = 3653

https://scholar.google.com/citations?hl=en&user=lbf8s94AAAAJ&view_op=list_works&sortby=pubdate

Ron Steel *Professor*

PhD 1971, University of
Glasgow, Scotland

Ron Steel is Professor and Davis Centennial Chair at UT Austin and Sixth-Century Chair of Sedimentary Geology at University of Aberdeen, Scotland. He was a Chair of the Department of Geological Sciences in the Jackson School at UT Austin. He has some 170 published papers, edited 9 books, received 6 best paper or poster awards, and graduated 100+ MS and PhD students from the universities of Bergen, Wyoming and UT Austin. He has received > \$10m in external grants since 1985, while in Universities of Bergen, Wyoming and Texas. He has held Distinguished and Endowed Lectureships for AAPG, Japan Society for Promotion of Science, and University of Texas at Austin. His current research interests focus on the processes, sediment transport and construction of shelf margins, the bridge between terrestrial and deepwater sediment accumulation.

Steel

2014-15 Two selected publications:

Zhang, Q., X. M. Zhu, R. J. Steel, and D. K. Zhong (2014), Variation and mechanisms of clastic reservoir quality in the Paleogene Shahejie Formation of the Dongying Sag, Bohai Bay Basin, China, *Petrol Sci*, 11(2), 200-210, doi:10.1007/s12182-014-0333-6.

Chen, S., R. J. Steel, J. F. Dixon, and A. Osman (2014), Facies and architecture of a tide-dominated segment of the Late Pliocene Orinoco Delta (Morne L'Enfer Formation) SW Trinidad, *Marine*

Google Scholar: H-index = 54; Total Citations = 8854

<http://scholar.google.com/citations?user=mGF3gIQAAAAJ&hl=en&oi=sra>

Student Research Highlight

Ph.D. student Nicholas Perez received this year's JSG Best Student Paper Award for his 2014 article published in *Tectonics* (Perez and Horton, 2014, *Oligocene-Miocene deformational and depositional history of the Andean hinterland basin in the northern Altiplano plateau, southern Peru*), completed his Ph.D. under the supervision of Brian Horton, and accepted a tenure-track Assistant Professor position in Basin Tectonics in the Department of Geology & Geophysics at Texas A&M University starting in Fall 2015. Nick will begin advising undergraduate and graduate students in basin analysis and tectonics research integrating sedimentology, structural geology, geochronology, thermochronology, and geomorphology. Nick is particularly excited about new research areas focused on the Andes, the Cascades in the Pacific Northwest, the Rio Grande Rift, the Atlas mountains of Morocco, and West Texas.

(Below) Oligocene-Miocene growth strata adjacent to a major thrust fault along the Altiplano-Eastern Cordillera boundary in southern Peru (from Perez and Horton, 2014).

