STRATA

Newsletter | Sedimentary Geology & Geomorphology Discipline

8th Best in Earth Sciences

U.S. News & World Report's 2015 edition of "Best Graduate Schools," released this morning ranks the Jackson School of Geosciences as #8 in Earth Sciences overall (up from #9 as previously ranked) and #4 for public universities. We are tied with Harvard and University of Michigan for #8.

Sedimentary Geology & Geomorphology

The discipline got a new name from "Sedimentary Geology and Stratigraphy" to better represent the current research and education in the discipline. The Jackson School of Geosciences is home to one of the largest and most diverse sedimentology & stratigraphy faculties in the nation. When U.S. News & World Report last ranked sedimentology & stratigraphy graduate programs, UT Austin was No. 1. The program has a long tradition of excellence.



Stacked hummocky stratification

One of the key results of RioMAR Research has been to show that thick, storm-wave generated strata are especially well developed on shorelines that reach the outermost shelf and shelf edge, i.e.,

Department of Geological Sciences



Flash floods

Flume experiment on sediment transport by flash floods, conducted in July 2013 by undergraduate Rebecca Rhodes and PhD student Kealie Goodwin, working with Prof. Joel Johnson. View is through the transparent flume sidewall; field of view width is approximately 0.5 meters. [Joel Johnson]

See videos at

- Flash flood bore in Experiment
- Flash flood bore Armor Layer

where incoming ocean waves meet the shelf. This outcrop from SE Trinidad is dominated by spectacular hummocky stratification and is part of a sand-belt up to 150m thick along parts of the paleo-Orinoco shelf edge. An important related result comes from Washakie basin, where we have documented that the storm-wave dominated segments of the shelf edge are very inefficient at dispersing sand across the shelf edge to the deepwater slope, but rather require a river-dominated re-entrant to achieve by-pass across the shelf edge. These results suggest that long, open reaches of shelf edges are unlikely to develop linked deepwater fans. [Ron Steel]

Temperature of the Andes

Taking the temperature of the Andes. Here we are collecting sediment cores from Laguna de la Plaza, Colombia at 4000 meters elevation for organic geochemical temperature changes. Our data demonstrate that the rapid retreat of glaciers from these catchments has been driven primarily by rapid increases in temperature, particularly over the past half century. [Tim Shanahan]





Variability of deep water deposits

Deep water deposits in Jurassic Los Molles Formation, Neuquen Basin, Argentina. A. Thin bedded sandstone and mudstone of channel levee deposits on the slope. Note persons for scale on the lower right. B. Normal graded coarse grained sandstone turbidite beds with mud clasts at the top. Scale on lower left is 10 cm. C. Debris flow deposits overlying relief forming turbidity beds below. The lens-cam on middle left is about 10 cm. D. Mud flow deposits in the basin floor. The stick on middle right is 1.25 m long. [Cornel Olariu]

Faculty Research Update

Joel Johnson, Assistant Professor

PhD 2007, MIT, Cambridge, MA

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.

2013 Two Selected Publications:

Menking JA, J Han, NM Gasparini, JPL Johnson (2013), Quantifying the effects of orographic precipitation gradients on river profile evolution in the Kohala peninsula of the Big Island, Hawai'i. GSA Bulletin 125, 594-608, DOI: 10.1130/ B30625.1

JPL Johnson, in review, A surface roughness model for predicting alluvial cover and bedload transport rate in bedrock channels, Journal of Geophysical Research-Earth Surface, submitted October 2013

Google Scholar: H-index = 9; Total Citation = 513 http://scholar.google.nl/citations?hl=en&user=NOpHYRMAAAAJ

2013 Two Selected Grants:

NSF Geomorphology and Land-Use Dynamics-Quantifying the coevolution of bedload transport and bed topography in mountain rivers: field and flume experiments using smartrocks. (\$322,276), 09/01/11-08/31/14 NSF Geomorphology and Land-Use Dynamics-Collaborative Research:

Modeling and monitoring of landscape evolution along a climate gradient: Kohala Peninsula, Hawaii. (\$202,417), 08/01/10-07/31/13

Department of Geological Sciences

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.

Wonsuck Kim, Assistant Professor

PhD 2007, University of Minnesota, Minneapolis

Dr. Kim' 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.

2013 Selected Awards:

SSD (Services for Students with Disabilities) Appreciation Award, Spring 2013

2013 Two Selected Publications:

Kim, Y.*, Kim, W., Cheong, D., Muto, T., and Pyles, D., 2013, Piping coarsegrained sediment to a deep-water fan through a shelf-edge delta bypass channel: Tank Experiments: Journal of Geophysical Research – Earth Surface, v. 118, no. 4, p. 2279-2291, DOI: 10.1002/2013JF002813

Petter, A.L.*, Steel, R., Mohrig, D., Kim, W., and Carvajal, C., 2013, Estimation of the paleo-flux of terrestrial-derived solids across ancient basin margins using the stratigraphic record: GSA Bulletin, v. 125, no. 3-4, p. 578-593, DOI: 10.1130/B30603.1

Google Scholar: H-index = 11; Total Citation = 430

http://scholar.google.com/citations?user=5MYIjHEAAAAJ

2013 Two Selected Grants:

NSF - FESD Type II: A Delta Dynamics Collaboratory (\$5,000,000), 9/15/11-8/31/16

NSF - Sea-level rise and vegetation controls on delta landform evolution: A coupled experimental and numerical modeling study (\$534,126), 9/1/13-18/31/16

2013 Selected Awards:

2012 Outstanding Paper for Journal of Sedimentary Research, SEPM 2013 Faculty Overall Performance Award - Assistant Professor, Jackson School of Geosciences, UT-Austin, 2013

Students Graduated in 2013:

Jessica Kopp (MS) now at Shell Katie Delbecq (MS) now at Earlham College



University of Texas at Austin

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.

Timothy Shanahan, Assistant 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-xray fluorescence (for in-situ elemental variations in sediment cores) and compound specific organic molecular and isotopic (dD, d¹³C) approaches (e.g., "biomarkers")

2013 Two Selected Publications:

Santra, M., Steel, R.J., Olariu, C., and Sweet, M.L., (2013) Stages of sedimentary prism development on a convergent margin - Eocene Tyee Forearc Basin, Coast Range, Oregon, USA: Global and Planetary Change, v. 103, p. 207-231.

Jipa, D.C., and Olariu C., (2013), Sediment Routing in a Semi-enclosed Epicontinental Sea: Dacian Basin, Paratethys Domain (Late Neogene, Romania): Global and Planetary Change, v. 103, p. 193-206.

Google Scholar: H-index = 8; Total Citation = 280 http://scholar.google.com/citations?user=RKcNbFMAAAAJ&hl=en

2013 Two Selected Grants:

Statoil: W-MAP (Wilcox MArgine Project) (\$293,000), 1/1/13-12/31/15 Statoil: Channel to Lobe Transition (\$532,000), 1/1/12-6/1/14

Students Graduated in 2013:

Allison Ned (MS) Nataleigh Vann (MS)

2013 Two Selected Publications:

Shanahan, T.M., Hughen, K.A., Van Mooy, B.A.S. 2013, Temperature sensitivity of branched and isoprenoid GDGTs in Arctic lakes. Organic Geochemistry, v. 64, pp. 119-128.

Shanahan, T.M., K.A. Hughen, L. Ampel, P.E. Sauer. 2013, Environmental controls on the ${}^{2}H/{}^{1}H$ values of terrestrial leaf waxes in the Eastern Canadian Arctic. Geochimica et Cosmochimica, v. 119, pp. 286-301.

Google Scholar: H-index = 15; Total Citation = 1097 http://scholar.google.com/citations?user=UEOzEgEAAAAJ&hl=en

2013 Two Selected Grants:

NSF: Collaborative Research: Organic Geochemical and Isotopic Reconstructions of North Pacific Climate and Sea Ice Variability (\$276,012), 06/2010-05/2014

NSF: Evaluating Along-Strike Variations in Surface Uplift in the Andes: Constraints from Molecular Paleoaltimetry in the Eastern Cordillera of Colombia (\$246,578), 09/2010-08/2013

Students Graduated in 2013:

Travis Wicks (MS)

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.

Current research involves documentation of global case histories and examples of ancient, shelfdissecting submarine canyons feeding the continental slope, and in many cases forming onlapping and backstepping basin floor fans, during times of regression and early highstand.

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.

2013 Two Selected Publications:

Fisher, W.L., 2013 Petroleum Liquids: in the World Scientific Handbook of Energy, G.M. Crawley, Editor, World Scientific Publishing Company, p. 41-58. Browning, J. Tinker, S. W., Fisher, W. L. et al, 2013 Barnett Shale Model-2: Oil & Gas Journal, v. 111.9, p. 88-95.

Google Scholar: H-index = 21; Total Citation = 2474 http://scholar.google.com/citations?user=jR5sK3wAAAAJ&hl=en

2013 Two Selected Grants:

Scientific Technologic Cooperation, Petrobras Training Program (\$442,101) Role of Shale Gas in the US Energy Transition, Sloan Foundation (\$202.585)

Students Graduated in 2013:

Masoumeh Kordi (PhD) Megan Leseberg (MS) Batur Isdiken (MS) Jeanne L. Eckhart (MS) Forrest Roberts (MS) Gordon Smith (MS) Juan Camilo Rodrigues (MS) Jinyu Zhang (MS) Hyukjoong Yi (MS)

2013 Two Selected Publications:

Sawyer, Derek E., Peter B. Flemings, and Maria Nikolinakou, 2014, Continuous deep-seated slope failure recycles sediments and limits levee height in submarine channels. Geology 42, 1, 15-18.

Day-Stirrat, Ruarri J., Flemmings, Peter B., You, Yao, and van der Pluijm, Ben A. 2013, Modification of mudstone fabric and pore structure as a result of slope failure: Ursa Basin, Gulf of Mexico. Marine Geology 341, 58-67.

Google Scholar: H-index = 28; Total Citation = 3330 http://scholar.google.com/citations?user=HINabBsAAAAJ&hl=en

2013 Two Selected Grants:

Industry: UT GeoFluids-Industrial Consortium (\$3,840,100), 2013-2019 DOE: Controls on Methane Expulsion During Melting if Natural Gas Hydrate Systems: Topic Area 2 (\$1,176,110), 2012-2015

Students Graduated in 2013:

Baiyuan Gao (MS) Yao You (PhD)

Brian K. Horton, Professor

PhD 1998, University of Arizona, Tucson

Dr. Horton'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 and ancient basins and associated structures.

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.

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2013 Two Selected Publications:

Caballero, V., Mora, A., Quintero, I., Blanco, V., Parra, M., Rojas, L.E., Lopez, C., Sánchez, N., Horton, B.K., Stockli, D., and Duddy, I., 2013, Tectonic controls on sedimentation in an intermontane hinterland basin adjacent to inversion structures: The Nuevo Mundo syncline, Middle Magdalena Valley, Colombia, Nemcok, M., Mora, A., and Cosgrove, J.W., eds., Thick-Skin-Dominated Orogens: From Initial Inversion to Full Accretion: Geological Society of London, Special Publication, v. 377, p. 315-342, DOI:10.1144/SP377.12.

Mora, A., Reyes-Harker, A., Rodriguez, G., *Tesón, E., Ramirez-Arias, J.C., Parra, M., Caballero, V., Mora, J.P., Quintero, I., Valencia, V., Ibañez, M., Horton, B.K., and Stockli, D.F., 2013, Inversion tectonics under increasing rates of shortening and sedimentation: Cenozoic example from the Eastern Cordillera of Colombia, in Nemcok, M., Mora, A., and Cosgrove, J.W., eds., Thick-Skin-Dominated Orogens: From Initial Inversion to Full Accretion: Geological Society of London, Special Publication, v. 377, p. 411-442. DOI:10.1144/SP377.6.

Google Scholar: H-index = 26; Total Citation = 2545 http://scholar.google.com/citations?user=FcXBsz4AAAAJ&hl=en

2013 Two Selected Grants:

NSF: FESD Type I: The dynamics of mountains, landscapes, and climates in the distribution and generation of biodiversity of the Amazon/Andean Forest (\$348,530), 08/2013-07/2015

Industry Grant: Depositional and deformational history of the Zagros foldthrust belt and foreland basin, Kirkuk Embayment, Iraqi Kurdistan (\$415,000), 01/2013-12/2015

2013 Selected Awards:

Director's Circle of Excellence Award, Institute for Geophysics, UT-Austin

Students Graduated in 2013:

Levina, Mariya (MS) Calle, Amanda (MS)

2013 Two Selected Publications:

Blake D.F., Morris R.V., Kocurek G., Morrison S.M., Downs R.T., Bish D., Ming
D.W., Edgett K.S., Rubin D.M., Goetz W., Madsen M.B., Sullivan R., Gellert R.,
Campbell I., Treiman A.H., McLennan S.M., Yen A.S., Grotzinfer J., Vaniman
D.T., Chipera S.J., Achilles C.N., Rampe E.B., Sumner D., Meslin P.Y., Maurice S.,
Forni O., Gasnault O., Fisk M., Schmidt M., Mahaffy P., Leshin L.A., Glavin D.,
Steele A., Freissinet C., Navarro- Gonzales R., Yingst R.A., Kah L.C., Bridges N.,
Lewis K., Bristow T.F., Farmer J.D., Crisp J.A., Stolper E.M., DesMarais J.D.,
Sarrazin P. 2013. Curiosity at Gale Crater, Mars: Characterization and analysis
of the Rocknest sand shadow. Science 341, DOI:10.1126/science.1239505

Gary Kocurek

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.

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. Grotzinger J.P., Sumner D.Y., Kah L.C., Stack K., Gupta S., Edgar L., Rubin D.M., Lewis K., Schieber J., Mangold N., Milliken R., Conrad P., DesMarais D., Farmer J., Siebach K., Calef F., Hurowitz J., McLennan S.M., Ming D., Vaniman D., Crisp J., Vasavada A., Edgett K.S., Malin M., Blake D., Gellert R., Mahaffy P., Wiens R., Maurice S., Grant J.A., Wilson S., Anderson R., Beegle L., Arvidson R., Hallet B., Sletten R., Rice M., Bell J., Griies J., Ehlmann B., Bristow T., Palucis M., Dietrich, W., Dromart G., Eigenbrode J., Fraeman A., Hardgrove C., Herkenhoff K., Janura L., Kocurek G., Lee S., Leshin L.A., Leveille R., Limonadi D., Maki J., McCloskey S., Meyer M., Minitti M., Oehler D., Okon A., Newsom H., Parker T., Rowland S., Squyres S., Steele A., Stolper E., Summons R., Treiman A., Williams R. & Yingst A. 2013. A habitable fluvio-lacustrine environment at Yellowknife Bay, Gale Crater, Mars. Science, 343, DOI: 10.1126/science.1242777

Google Scholar: H-index = 37; Total Citation = 4062

http://scholar.google.com/citations?user=8b4kpvgAAAAJ&hl=en

2013 Two Selected Grants:

NASA - Aeolian Systems Source-to-Sink Analysis for MSL Landing Site and Basin (\$317,300), 2012-2015.

Shell - Development of the next generation of aeolian dune stratigraphic model with application to the Jurassic Norphlet Sandstone (\$581,291), 2011-2013.

2013 Two Selected Publications:

Shaw, J.B., and Mohrig, D., 2014, The importance of erosion in distributary channel network growth, Wax Lake Delta, Louisiana, USA: Geology 42(1), 31-34

Shaw, J.B., Mohrig, D., and Whitman, S.K., 2013, The morphology and evolution of channels on the Wax Lake Delta, Louisiana, USA: Journal of Geophysical Research - Earth Surface, 118 (3), 1562-1584

Google Scholar: H-index = 30; Total Citation = 2677 http://scholar.google.com/citations?user=lbf8s94AAAAJ&hl=en

2013 Two Selected Grants:

NSF: FESD Type II: A Delta Dynamics Collaboratory (\$5,000,000), 9/15/11-8/31/16

Statoil: Development of Channelized-Lobe Stratigraphy with the Goal of Generating Rules for Geologic Models Aimed at Producing Channelized-Lobe Reservoirs (\$339,150), 1/15/12-1/14/14

2013 Selected Awards:

Knebel Distinguished Teaching Award, Jackson School of Geosciences, UT-Austin, 2013

Faculty Overall Performance Award - Full Professor, Jackson School of Geosciences, UT-Austin, 2013

David Mohrig

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.

Terrence Quinn, Professor

PhD 1989, Brown University, Providence

Dr. Quinn's research interests focus on paleoclimate and paleoceanography. Specifically he uses the geochemistry of coral reefs, marine sediments and stalagmites to investigate climate variability in the geologic record. Most recently he and his students have investigated modern and Holocene and Quaternary climate in the western Pacific Ocean, tropical Atlantic Ocean and the Gulf of Mexico.

Students Graduated in 2013:

Yao You (PhD) now at Hess Corporation John Shaw (PhD) now NSF Post-doctoral Fellow, University of Wyoming



2013 Two Selected Publications:

Partin, J.W., Quinn, T.M., Shen, CC., Taylor, F.W., Banner, J.L., Maupin, C.R., Lin, K., Sincl air, D.J., Huh, C-A., 2013, Multi- Decadal Rainfall Variability under the South Pacific Convergence Zone from 1570-2005, Geology, DOI:10:1130/G34718.1. Maupin, C.R., Partin, J.W., Quinn, T.M., Shen, C-C., Lin, K., Emile-Geay, J., Taylor, F.W., Banner, J.L., Sinclair, D.J. 2013, Rainfall variability in the south Pacific convergence zone through the past six centuries. Climates of the Past

Google Scholar: H-index = 30; Total Citation = 2475

http://scholar.google.com/citations?user=vouGfd8AAAAJ&hl=en&oi=ao

2013 Two Selected Grants:

NSF: ENSO and West Pacific Warm Pool Climate Variability over the Last Three Centuries, 06/11-12/13

NOAA: Trace Element Analyses of Coral Material for Paleoclimate Study in the Western Pacific Warm Pool, 9/12-7/13

2013 Selected Awards:

Lead Author Chapter 5, Information from Paleoclimate Archives, Working Group I Contribution to the IPCC Fifth Assessment Report, Climate Change 2013: The Physical Science Basis Fellow, Weeks Centennial Professorship

Students Graduated in 2013:

Chris Maupin (PhD)

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 is also Chair of the Department of Geological Sciences in the Jackson School at UT Austin. He was previously Chief Geologist for Norsk Hydro (1983-1990), Professor of Reservoir Geology at the University of Bergen (1990-1995), and Wold Professor of Energy at the University of Wyoming (1995-2003). 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. He is Associate Editor for Marine and Petroleum Geology, on evaluation panel for Norwegian Research Council, was SEPM Councilor for Sedimentology and convener for SEPM conferences. His current research interests focus on the processes, sediment transport and construction of shelf margins, the bridge between terrestrial and deepwater sediment accumulation

2013 Two Selected Publications:

STEEL, R. J. and MILLIKEN, K. L., 2013, Major advances in siliciclastic sedimentary geology, 1960-2012. Geological Society of America, Special Paper 500

*SANTRA, M., STEEL, R. J. and OLARIU C., 2013, Stages of sedimentary prism development on a convergent margin- Eocene Tyee Forearc Basin, Coast Range Oregon, USA. Global and Planetary Change, 103, 207-231

Google Scholar: H-index = 49; Total Citation = 7573

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

2013 Two Selected Grants:

Statoil: GOM Wilcox Feeder Systems (\$292,500), 2012-2013 Diverse Industry Sponsors: RioMAR Consortium (\$297,000), 2013

Students Graduated in 2013:

Josh Dixon (PhD) Allison Ned (MS) Nataleigh Vann (MS)



Autoacceleration of clinoforms in foreland basins: 1D flume experiment in the Sediment Transport and Earth-surface Processes basin [Wonsuck Kim]



Curiosity

The rover *Curiosity* at the Rocknest sand shadow in Gale Crater, Mars. The sand shadow is a sedimentological enigma. The dune is pristine with a sharp crestline and the surface is completely armored with 1 – 2 mm grains. As seen in the inset, the surface coarse grains are completely coated by dust and form a cohesive crust. The interior, however, is composed entirely of fine sediment – probably mostly dust. How could the coarse grains be transported over the surface without eroding the fine interior? Why are there no coarse grains in the interior? [Gary Kocurek]