ADDRESS:

Purdue University
Department of Earth and Atmospheric Science
550 Stadium Mall Drive
West Lafayette, IN 47907
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PROFESSIONAL PREPARATION:

Ph.D. Geophysics, December 2004.
Thesis Title: Mechanics of Strain Partitioning at Convergent Margins.
Stony Brook University, Stony Brook, New York.

M.S., Geophysics, May 1997.
Thesis Title: The Effect of Terrane Migration Along Oblique Margins: Examples in The Sulaiman Fold-And-Thrust Belt, Pakistan.
Stony Brook University, Stony Brook, New York.

B.S., Geology, May 1994.
State University of New York at Stony Brook, Stony Brook, New York.

APPOINTMENTS:

Associate Professor of Practice: Purdue University, August 2023 – present.
Assistant Professor of Practice: Purdue University, August 2014 – August 2023.
Assistant Professor: Purdue University, August 2008 – August 2014.
Visiting Assistant Professor: Purdue University, August 2005 – July 2008.
Postdoctoral Fellow: Carnegie Institution of Washington, Department of Terrestrial Magnetism, January 2005 – July 2005.
Postdoctoral Associate: State University of New York at Stony Brook, August 2004 – December 2004.
Research Assistant: State University of New York at Stony Brook, May 1995 – May 1997 and June 1999 – August 2004.
Teaching Assistant: State University of New York at Stony Brook, August 1994 – May 1995 and August 1998 – May 1999.

STATEMENT OF RESEARCH

I investigate how the mechanical properties of mountain belts affect their fundamental attributes, including size, shape, and the rate, style and distribution of strain, using numerical and scale analog modeling. My work focuses on understanding the roles of such factors as bulk rheology of the crust, the influence of basement structures, and the role that margin geometry has on the localization of deformation. Much of my current research focuses on understanding how and when extension will be localized, in normal and oblique contractional settings, as patterns of faulting, and separately the evolution of out-of-sequence faulting in response to factors such as erosion and

mechanical strength variations at depth (i.e., along the décollement) in fold-belts. Analog modeling is conducted using a variety of apparatuses in conjunction with automated, quantitative analysis employing sophisticated remote sensing tools and techniques (e.g., PIV and SfM and strain analysis). The innovative analysis techniques that I have developed and use in my lab allow me to calculate the deformation occurring in analog models due to variations in obliquity, rheology, and boundary conditions in relation to the development of topography and the structures that accommodate deformation. When these techniques are integrated with 3D numerical modeling methods it gives me a powerful set of tools to address problems in active tectonics.

FUNDED PROPOSALS

NSF # 1813844, Collaborative research: Integrating tectonics, climate, and mammal diversity: 2018; $235,418, Co-PI

NSF # 1145223, Evaluating the Role of Glaciation on the Structural Configuration of the Southern Alaska Syntaxis, $ 318,968, PI: S. Haq

PRF Summer Faculty Grant, $8000; S. Haq

NSF #0738920, Extensional Deformation in Convergent Systems, $211,874, PI: S. Haq

TEACHING EXPERIENCE

EAPS (SCI) 360 Great Issues in Science and Society Fall, 2013, 2014, 2015, 2016, 2017, 2018

EAPS 352 (391) *(Structural Geology - majors),* Fall 2009, Fall 2010, Spring 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024

EAPS 100 *(Geology – non-majors)* - Spring 2018

EAPS 104 *(Oceanography – non-majors)* - Spring 2015

EAPS 111 *(Physical Geology – non-majors)* - Fall 2005, 2006, 2007, 2012, 2013; 2014, 2015, 2016 2017, 2018, 2019, 2020, 2021,2022, 2023; Spring 2006, 2008, 2010, 2011, 2012, 2014, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024

EAPS 116 Online *(Earthquakes and Volcanoes – non-majors),* Summer 2018, 2019, 2020, 2021, 2022, 2023 Fall 2018, 2019, 2020, 2021, 2022, 2023

EAPS 116 in person *(Earthquakes and Volcanoes – non-majors)* Fall 2019

EAPS 191R *(Introduction to Physical Geology - majors),* Spring 2007

EAPS 591 *(Graduate Seminar – Oblique Convergent Tectonics),* Spring 2007

EAPS 591 (*Graduate Seminar - GAT Seminar*), Spring 2009

EAPS 497 (*Undergraduate Independent Research*), Tim Shackelford, Spring 2007; Nick Farny, Spring 2008 and Spring 2009, Fall 2009, Spring 2010; *Russell Martin,* Fall 2008 and Spring 2009, Fall 2009, Spring 2010. *Zach Umperovitch* Fall 2009, Spring 2010; Megan Neary, 2014; Rejith Raghavan, 2014 -2016, Austin Fiepel, 2017, Haziq Bin Abu Hasan Sazili*, 2017, Maisara Binti Sallelhhuddin, 2019 (Summer and Fall), Robert Asztalos, Fall 2022.*

EAPS 591 (*Topics in Structural Geology*), Spring 2012

TEACHING STATEMENT

While at Purdue I have regularly taught large service courses and a majors course in my area. I have focused my teaching effort on making labs inquiry driven allowing the students to directly apply material they have learned in lecture. I have worked to improve my lecturing technique and my course management skills each semester, partly through my participation in IMPACT. I feel have also gained an appreciation for an inquiry based teaching style, which I believe is essential for undergraduate learning, especially in large enrollment courses. I have applied these lessons in all the courses I have taught. I believe that involving undergraduates in research, when possible, is an important part of their learning and regularly mentor students in my lab.

INVITED TALKS

9.) Institute of Geophysics, China Earthquake Administration, Beijing, China September 2015
8.) Workshop: Advances in Quantitative Analogue Modeling, GFZ Potsdam, Germany, Invited Speaker, September 2013.
7.) Structural Geology and Tectonics Forum, Williams College, MA., 2012
6.) Department of Earth and Space Sciences, UCLA, Institute of Geophysics and Planetary Physics Invited Speaker, May 2011.
5.) Department of Geology, University of Illinois-Urban-Champaign, September 2010.
4.) Department of Earth Sciences Indiana University – Purdue University, April 2010.
3.) Department of Earth and Atmospheric Sciences, Purdue University, April 2008.
2.) Department of Earth Science Colloquium Rice University, February 2007.
1.) Department of Earth and Atmospheric Sciences, Purdue University, April 2004.

PUBLICATIONS

8) Bahadori, A., Holt, W. E., Feng, R., Austermann, J., Loughney, K. M., Salles, T., Moresi, L., Beucher, R., Lu, L., Flesch, L. M., Calvelage. C. M., Rasbury, E. T., Davis, E. M., Potochnik, A. R, Ward, W. B, Hatton, K., **Haq, S. S. B**, Smiley, T. M., Wooton, K.M., and Badgley, C., 2022, Coupled influence of tectonics, climate, and surface processes on landscape evolution in southwestern North America. Nature Communications volume 13, Article number: 4437

7) Marshak*, S., **Haq, S. S. B**., & Sen[G], P., 2019, Ramp initiation in fold-thrust belts: Insight from PIV analysis of sandbox models. *Journal of Structural Geology*, *118*, 308-323.
6) Cooke*, M. L., J. E. Reber, **S. Haq**, 2016, Physical experiments of tectonic deformation and processes: Building a strong community, Groundworks GSA Today, v.26, no.12, p. 36-37.
5) **Haq*, S. S. B**., 2012, Out-of-sequence thrusting in experimental Coulomb wedges: Implications for the structural development of mega-splay faults and forearc basins, *GRL, V39, L20306.*
4) **Haq*, S. S. B.,** and Davis[M], D. M., 2010**,** Mechanics of fore-arc slivers: Insights from simple analog models, Tectonics, 29, TC5015.
3) **Haq*, S. S. B.,** and Davis[M], D.M., 2009, Interpreting finite strain: Analysis of deformation in analog models, Journal of Structural Geology, V31, Issue 7, p. 654-661.

2) **Haq*, S. S. B.,** and Davis[M], D. M., 2008, Extension During Active Collision in Thin-skinned Wedges: Insights from Laboratory Experiments, Geology, v. 36, p. 475-478.

Pre Purdue (below)

1) **Haq*, S. S. B.,** and Davis[M], D. M, 1997, Oblique Convergence and the Lobate Mountain Belts of Western Pakistan, Geology, v. 25, No. 1, p. 23-26

Non-Refereed books and chapters

1.) Riggs, E., and **Haq, S**. Physical Geology Lab Manual, Kendell Hunt, 2011

PUBLICATIONS SUBMITTED AND PREPARATION

Newman, P.*, ***Haq, S. S B.*** The Influence of Localized Glacial Erosion on Exhumation Paths in Accreting Coulomb Wedges Spring, 2024

ABSTRACTS

41) **Haq, S.S.B**, and Newman, P.* Quantifying the Impact of Mechanical Stratigraphy on Development and Maintenance of Taper and Fault Slip in Frictional Wedges: Analysis of Finite Strain Using PIV and PTV, American Geophysical Union, Fall Meeting, 2023.

40) **Haq, S.S.B**, The Role of Forearc Basin Sedimentation in Determining the Locus, Magnitude and Timing of Faulting in Accretionary Prisms: Insights from Quantified Analog Models, American Geophysical Union, Fall Meeting, 2019.

39) Newman, P.*, Davis, K., **Haq**, **S.S.B**, and Ridgway, K., The Influence of Localized Glacial Erosion on Exhumation Paths in Accreting Coulomb Wedges: Insights from Particle Velocimetry Analysis of Sandbox, American Geophysical Union, Fall Meeting, T33A-2924, 2015.

38) **Haq, S.S.B**., Using particle velocimetry to quantify the activity on out-of-sequence thrusting in coulomb wedges, Analog Modeling of Tectonic Processes Workshop, May 13-15 Amherst, Massachusetts, 2015.

37) **Haq, S.S.B**., Marshak, S., and Sen, P., Initiation of ramp faults in fold-thrust belts: Insight from quantitative image analysis of sandbox models, Analog Modeling of Tectonic Processes Workshop, May 13-15 Amherst, Massachusetts, 2015.

36) Newman, P.*, Davis, K. and. **Haq, S.S.B.**, Comparing Uplift Versus Erosion in Critical Wedges using Particle Tracking Velocimetry, Analog Modeling of Tectonic Processes Workshop, May 13-15 Amherst, Massachusetts, 2015.

35) Davis, D M., **Haq, S.S.B.**, and Kraner, M., Tracking thrust histories in thin-skinned analog models, Analog Modeling of Tectonic Processes Workshop, May 13-15 Amherst, Massachusetts, 2015.

34) Davis, K.,*, **Haq**, **S.S.B**, and Ridgway, K., Evaluating The Links Between Mountain Building, Climate And Flat Slab Subduction Along The Southern Alaska Convergent Margin: An Experimental Approach, Geological Society of America Abstracts with Programs, Vol. 46, No. 6, p. 364, 2014.

33) **Haq**, **S.S.B**. Out of Sequence Thrusting in Coulomb Wedges, Structural Geology and Tectonics Forum, Colorado School of Mines, Golden, CO, 2014.

32) Sen, P.*; **Haq**, **S.S.**; Marshak, S., The Nucleation and Propagation of Thrust Ramps: Insights from Quantitative Analysis of Frictional Sandbox Models, Colorado School of Mines, Golden, CO, 2014.

31) Davis, D. M.; **Haq**, **S.S.**, and Grady, C., Tracking Fault History in Sandbox Models, Colorado School Of Mines, Golden, CO, 2014.

30) **Haq**, **S.S.**, Out-Of-Sequence Thrusting In Coulomb Wedges: Implications For The Structural Development Of Mega-Splay Faults And Forearc Basins, American Geophysical Union, Fall Meeting, abstract #T13B-2592, 2012.

29) Sen, P.*; **Haq**, **S.S.**; Marshak, S., The Nucleation and Propagation of Thrust Ramps: Insights from Quantitative Analysis of Frictional Analog (Sandbox) Models, American Geophysical Union, Fall Meeting, abstract # T23D-2711, 2012

28) Davis, D. M.; **Haq**, **S.S.**, Evolution of Strain in Obliquely Convergent Analog Doubly-Vergent Wedges, American Geophysical Union, Fall Meeting, abstract #T31G-0, 2012.

27) Yin, A.; Reith, R. C*.; **Haq**, **S.S.**, (Invited), A new analogue-experimental apparatus incorporating thermal weakening and basal shear for investigating lithospheric deformation of the Indo-Asian collision, American Geophysical Union, Fall Meeting, abstract # T31G-04, 2012.

26) Koster, K. L. *; **Haq**, **S.S.**; Flesch, L M., A Numerical Study of Strain Partitioning and the Development of Forearc Slivers at Obliquely Convergent Margins, American Geophysical Union, Fall Meeting, abstract # T33F-2713, 2012.

25) **Haq**, **S.S.**; (Invited), The Mechanical Response of Glacially Eroded Wedges: Possible Implications for Southern Alaska, Structural Geology and Tectonics Forum, Williams College, MA, 2012.

24) **Haq**, **S.S.**, and Umperovitch, Z.*, Modeling the Mechanical Response of Glacially Eroded Wedges: Implications for Southern Alaska, American Geophysical Union, Fall Meeting 2011, abstract # T33A-2369, 2011.

23) Martin, R.S. * and **Haq, S.S**., The Role of Margin Geometry and Rheology in the Structural Development of Curved Convergent Margins: Implications for the Bolivian Orocline, American Geophysical Union, Fall Meeting 2011, abstract #T13C-2394, 2011.

22) Koster, K.*, **Haq**, **S.S.**, Flesch, L. M., Comparing Numerical and Analog Models of Oblique Convergence With Nature, American Geophysical Union, Fall Meeting 2011, abstract #T13C-2395, 2011.

21) Umperovitch, Z.* and **Haq, S.S**., Glacial Erosion in Brittle Wedges: Insights Using Quantified Analog Models, American Geophysical Union, Fall Meeting 2010, abstract #T53A-2112, 2010.

20) **Haq, S.S**.; Koster, K.; Martin, R. S.; Flesch, L. M., Analysis of Oblique Wedges Using Analog and Numerical Models, American Geophysical Union, Fall Meeting 2010, abstract #T53A-2111, 2010.

19) **Haq, S.S.B.**, Investigating the Role of Rheology in Localizing Margin Parallel Shear in Oblique Wedges: Insights Using Deformation Analysis in Analog Models. Structural Geology and Tectonics Forum Madison, WI., May 2010

18) **Haq**, **S.S.B**., and Flesch, L. M., The Influence of Margin Geometry on Extensional Deformation in Orogens, Eos Trans. AGU, Fall Meet. Suppl., Abstract #T33A-1869, 2009.

17) **Haq**, **S.S.B.**, Analysis of Strain Partitioning in Analog Oblique Convergent Wedges, Geological Society of America Abstracts with Programs, Vol. 41, No. 7, p. 291, 2009.

16) **Haq**, **S.S.B.**, and Flesch, L. M., Investigating the Role of Extensional Deformation at Convergent Margins Using a Combined Analog and Numerical Approach, Eos Trans. AGU, Fall Meet. Suppl., Abstract T23B-2012, 2008.
15) Flesch L. M.*, Dimitrova, L.L., Haines, A. J., Holt, W. E., Haines, M., **Haq**, **S.S.B.**, Dynamical Modeling for Generally Shaped, Layered Lithospheric Geometries Using Continuous Field Variables, Eos Trans., Fall Meet. Abstract DI31A-1785, 2008.
14) **Haq**, **S.S.B.**, and Davis, D. M., Extension During Active Collision in Thin-skinned Wedges: Insights from Laboratory Experiments, Geological Society of America Abstracts with Programs, Vol. 40, No. 1, p. 76, 2008.
13) **Haq**, **S.S.B.**, and Davis, D. M., Rigid Basement and the Evolution of the Pakistani Convergent Margin, Eos Trans. AGU, 88(52), Fall Meet. Suppl., Abstract T23D-1644, 2007.
12) **Haq**, **S.S.B.**, and Davis, D. M., High Resolution Analysis of Evolving Horizontal Deformation Fields in Model Wedges: EOS (Transactions, American Geophysical Union), Fall AGU 2006.
11) Davis, D. M., and **Haq**, **S.S.B.**, Analog Models of Contractional Wedges: Opportunities and Limitations in Testing Theory: EOS (Transactions, American Geophysical Union), Fall AGU, 2006.
10) **Haq**, **S.S.B.**, 2006; Rheologic Dependence of Strain Partitioning During Oblique Convergence: MyRes Meeting Verbani Italy, July 2006.
9) **Haq**, **S.S.B.**, and Davis, D. M., Modeling the Rheological Dependence of Strain Partitioning in Oblique Wedges During Active Collision and "Post-Tectonic" Relaxation: EOS, Transactions, American Geophysical Union, 86 (52, Suppl.), Fall AGU 2005.
8) **Haq**, **S.S.B.**, and Davis, D. M., Understanding the Mechanics of Strain Partitioning in Frictional Oblique Wedges Using Quantified Analogue Models, Spring AGU, 2004
7) **Haq**, **S.S.B.**, and Davis, D. M., Geodetics in a sandbox; implications for measuring strain at convergent margins Eos, Transactions, American Geophysical Union, 83(47, Suppl.):F366, 2002.
6) **Haq**, **S.S.B.**, and Davis, D. M., and Holt, W. E., Modeling independent aspects of strain partitioning at obliquely convergent margins, Eos, Transactions, American Geophysical Union, 79(45, Suppl.):848, 1998.
5) Davis, D. M., Bernard, M., Holt, W. E., and **Haq**, **S.S.B.**, The complex relationship between plate convergence and fold-belt geometry; examples from Pakistan. Eos, Transactions, American Geophysical Union, 79(17, Suppl.):350, April 1998.
4) **Haq**, **S.S.B**., and Davis, D. M., and Mutter, D. M., Role of terranes in oblique margin strain partitioning. Eos, Transactions, American Geophysical Union 78(17, Suppl.):320, April 1997.
3) Davis, D. M., **S.S.B. Haq**, M. Bernard, and Holt W. E., Strain partitioning in the structures, seismicity, and tectonics of western Pakistan. Eos, Transactions, American Geophysical Union, 78(17, Suppl.):320, (April 1997)
2) **Haq**, **S.S.B**., and Davis, D. M., and Holt, W. E., Oblique convergence; modeling examples in Pakistan, Eos, Transactions, American Geophysical Union, 76(46, Suppl.):567, November 1995.
1) **Haq**, **S.S.B**., and Davis, D. M., and Holt, W. E., Oblique convergence and strain partitioning in Pakistan; finite element and mechanical analog modeling. Eos, Transactions, American Geophysical Union, 76(17, Suppl.):280, April 1995.

SERVICE

Student Committees

Christie Lindemann MS
Tonya Richardson MS
Juan Herrera Ph.D.
Julie Bell Ph.D.

Faculty Advisor - Purdue Undergraduate Geology Club (PUGS), 2011 to Present.

OTHER ACTIVITIES

- Short Course organizer for a NSF Funded Structural Geology and Tectonics Forum in Sonoma, CA. Sonoma State University 2016.
- Co-organized a NSF funded Summer Conference on Analog Modeling at the University of Massachusetts, Amherst, Summer 2015.
- Finance committee member for a NSF Funded Structural Geology and Tectonics Forum in Golden, CO. at the Colorado School of Mines, 2014
- Co-convened a special session at American Geophysical Union meeting: **"***Mechanics of Obliquely Convergent and Divergent Deformation I and II" (*T31F and T33F) - 2012 AGU Fall Meeting
- Co-organized an NSF Funded workshop on Analog Modeling at the Structural Geology and Tectonics Forum at UMASS Amherst in June 2012
- Co-convened a special session at American Geophysical Union meeting: "*T44: Advances in 2D and 3D Numerical and Analog Modeling of Mountain Building and Plate Deformation*" - 2010 AGU Fall Meeting

Graduate Students Advised

Phiala Newman – Ph.D. (Summer 2022)
Kimberle Davis – M.S. (co-advised with Dr. Ridgway) – Spring 2015
Russell Martin – M.S. – Spring 2013
Kelvin Koster – M.S. (co-advised with Dr. Flesch) – Spring 2013