Atilla Aydin
Professor (Research) of Geological and Environmental Sciences, Emeritus
Geological Sciences

Bio

ACADEMIC APPOINTMENTS
• Emeritus Faculty, Acad Council, Geological Sciences

HONORS AND AWARDS
• Fellow, Geological Society of America (2000)

PROFESSIONAL EDUCATION
• Ph.D., Stanford University, Geology (1978)
• M.S., Stanford University, Geology (1974)
• B.S., Technical University of Istanbul, Geological Engineering (1968)

LINKS
• Structural Geology and Geomechanics: http://pangea.stanford.edu/research/geomech/index.html

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS
Research
I am interested in the formation, geometric patterns, and fluid flow properties of fractures and faults in a broad range of scales. My students and I are involved in projects that require both a strong field component and modeling. The field component is similar to a detective's work, which aims to establish temporal and spatial relationships among various elements of a structure. The modeling component is like the moral of the story, enabling one to see through the rationale and use it for guidance in the future.

Professional Activities
Fellow, Geological Society of America; Member, American Geophysical Union and American Association of Petroleum Geologists

PROJECTS
• Rock Fracture Knowledgebase - Stanford University

Publications

PUBLICATIONS
• Rock Fracture Knowledgebase
Aydin, A., Zhong, J.
rockfracture.com.2017

  Deng, S., et al
  2017

- The influence of resolution on scale-dependent clustering in fracture spacing data *INTERPRETATION-A JOURNAL OF SUBSURFACE CHARACTERIZATION*
  Roy, A., Aydin, A., Mukerji, T.
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- Structural and statistical characterization of joints and multi-scale faults in an alternating sandstone and shale turbidite sequence at the Santa Susana Field Laboratory: Implications for their effects on groundwater flow and contaminant transport *JOURNAL OF STRUCTURAL GEOLOGY*
  Cilona, A., Aydin, A., Likerman, J., Parker, B., Cherry, J.
  2016; 85: 95-114

- Mechanism of formation of wiggly compaction bands in porous sandstone: 1. Observations and conceptual model *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Liu, C., Pollard, D. D., Deng, S., Aydin, A.
  2015; 120 (12): 8138-8152

- The role of mechanical stratigraphy on normal fault growth across a Cretaceous carbonate multi-layer, central Texas (USA) *ITALIAN JOURNAL OF GEOSCIENCES*
  Agosta, F., Wilson, C., Aydin, A.
  2015; 134 (3): 423-441

- The dynamics and interaction of compaction bands in Valley of Fire State Park, Nevada (USA): Implications for their growth, evolution, and geostatistical property *TECTONOPHYSICS*
  Torabi, A., Aydin, A., Cilona, A., Jarsto, B. E., Deng, S.
  2015; 657: 113-128

- Cross-bedding related anisotropy and its interplay with various boundary conditions in the formation and orientation of joints in an aeolian sandstone *JOURNAL OF STRUCTURAL GEOLOGY*
  Deng, S., Cilona, A., Morrow, C., Mapeli, C., Liu, C., Lockner, D., Prasad, M., Aydin, A.
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- Permeability of a fault zone crosscutting a sequence of sandstones and shales and its influence on hydraulic head distribution in the Chatsworth Formation, California, USA *HYDROGEOLOGY JOURNAL*
  Cilona, A., Aydin, A., Johnson, N. M.
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- The strength anisotropy of localized compaction: A model for the role of the nature and orientation of cross-beds on the orientation and distribution of compaction bands in 3-D *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Deng, S., Aydin, A.
  2015; 120 (3): 1523-1542

- Permeability characterization of natural compaction bands using core flooding experiments and 3D image-based analysis: Comparing and contrasting the results from two different methods *American Association of Petroleum Geologists Bulletin*
  Deng, S., Zuo, L., Aydin, A., Dvorkin, J., Mukerji, T.
  2015; 99 (1): 27-49

- Failure modes of shales and their implications for natural and man-made fracture assemblages *AAPG BULLETIN*
  Aydin, A.
  2014; 98 (11): 2391-2409

- The relationship between normal and strike-slip faults in Valley of Fire State Park, Nevada, and its implications for stress rotation and partitioning of deformation in the east-central Basin and Range *JOURNAL OF STRUCTURAL GEOLOGY*
  Aydin, A., de Joussineau, G.
  2014; 63: 12-26
• Fluid flow through porous sandstone with overprinting and intersecting geological structures of various types. Advances in the Study of Fractured Reservoirs, Special Publications, 374

• Is there a link between faulting and magmatism in the south-central Aegean Sea? GEOLOGICAL MAGAZINE
Kokkalas, S., Aydin, A.
2013; 150 (2): 193-224

• Distribution of compaction bands in 3D in an aeolian sandstone: The role of cross-bed orientation TECTONOPHYSICS
Deng, S., Aydin, A.
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• Spatial Statistical Properties of Pressure Solution Seams in Clastic Rocks in Southwest Ireland MATHEMATICAL GEOSCIENCES
Nenna, F., Zhou, X., Aydin, A.
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• Mechanics of the formation of orthogonal sets of solution seams, and solution seams and veins and parallel solution seams and veins TECTONOPHYSICS
Zhou, X., Aydin, A.
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• Growth processes, dimensional parameters and scaling relationships of two conjugate sets of compactive shear bands in porous carbonate grainstones, Favignana Island, Italy JOURNAL OF STRUCTURAL GEOLOGY
Tondi, E., Cilona, A., Agosta, F., Aydin, A., Rustichelli, A., Renda, P., Giunta, G.
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2011; 33 (4): 633-643

• From outcrop to flow simulation: Constructing discrete fracture models from a LIDAR survey AAPG BULLETIN
2011; 95 (11): 1883-1905

• Use of outcrop observations, geostatistical analysis, and flow simulation to investigate structural controls on secondary hydrocarbon migration in the Anacacho Limestone, Uvalde, Texas AAPG BULLETIN
Wilson, C. E., Aydin, A., Durlofsky, L. J., Boucher, A., Brownlow, D. T.
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• The formation and growth of pressure solution seams in elastic rocks: A field and analytical study JOURNAL OF STRUCTURAL GEOLOGY
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• Mechanics of pressure solution seam growth and evolution JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH
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• Analysis of the growth of strike-slip faults using effective medium theory JOURNAL OF STRUCTURAL GEOLOGY
Aydin, A., Berryman, J. G.
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• Quasi-static analysis of elastic behavior for some systems having higher fracture densities INTERNATIONAL JOURNAL FOR NUMERICAL AND ANALYTICAL METHODS IN GEOMECHANICS
Berryman, J. G., Aydin, A.
2010; 34 (16): 1687-1724

• Oblique normal faulting along the northern edge of the Majella Anticline, central Italy Inferences on hydrocarbon migration and accumulation JOURNAL OF STRUCTURAL GEOLOGY
Agosta, F., Alessandroni, M., Tondi, E., Aydin, A.
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- Deformation along the leading edge of the Maiella thrust sheet in central Italy *JOURNAL OF STRUCTURAL GEOLGY*
  Aydin, A., Antonellini, M., Tondi, E., Agosta, F.
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- Bed-parallel compaction bands in aeolian sandstone: Their identification, characterization and implications *TECTONOPHYSICS*
  Aydin, A.; Ahmadov, R.
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- Segmentation along Strike-Slip Faults Revisited *PURE AND APPLIED GEOPHYSICS*
  de Joussineau, G., Aydin, A.
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- Oblique normal faulting along the northern edge of the Majella Anticline, central Italy: Inferences on hydrocarbon migration and accumulation *JOURNAL OF STRUCTURAL GEOLGY*
  Agosta, F., Alessandroni, M., Tondi, E., Aydin, A.
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- Failure modes in deep-water carbonates and their impact for fault development: Majella Mountain, Central Apennines, Italy *MARINE AND PETROLEUM GEOLOGY*
  Antonellini, M., Tondi, E., Agosta, F., Aydin, A., Cello, G.
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  Gonzales, J., Aydin, A.
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- Structural characterization of deep-water deposits in a foreland basin, Silla Syncline (Chilean Patagonia), with applications to depositional processes *JOURNAL OF STRUCTURAL GEOLGY*
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- Physical properties of carbonate fault rocks, fucino basin (Central Italy): implications for fault seal in platform carbonates *GEOFLUIDS*
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• Using an elastic dislocation model to investigate static Coulomb stress change scenarios for earthquake ruptures in the eastern Marmara Sea region, Turkey  International Meeting on Analogue and Numerical Modelling of Geological Processes
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• The role of deformation bands, stylolites and sheared stylolites in fault development in carbonate grainstones of Majella Mountain, Italy  JOURNAL OF STRUCTURAL GEOLOGY
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• Architecture and deformation mechanism of a basin-bounding normal fault in Mesozoic platform carbonates, central Italy  JOURNAL OF STRUCTURAL GEOLOGY
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• Structural evolution of fault zones in sandstone by multiple deformation mechanisms: Moab fault, southeast Utah  GEOLOGICAL SOCIETY OF AMERICA BULLETIN
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• Distribution and nature of fault architecture in a layered sandstone and shale sequence: An example from the Moab fault  Faults, fluid flow, and petroleum traps
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• Evolution of a strike-slip fault network, Valley of Fire State Park, southern Nevada GEOLOGICAL SOCIETY OF AMERICA BULLETIN
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• Computational modeling of deformation bands in granular media. I. Geological and mathematical framework COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING
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• The formation of conjugate normal fault systems in folded sandstone by sequential jointing and shearing, Waterpocket monocline, Utah JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH
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  Koledoye, B. A., Aydin, A., May, E.
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