

Yiduo Liu (刘一多)

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Research Interests

I study the structural geology and tectonics of East Asia, Tibetan Plateau, and North America at the outcrop, orogen, and plate scales. In particular, I am interested in:

- (1) Plate reconstruction in space and time;
- (2) Interactions between tectonics and surface processes;
- (3) Structural interpretation of seismic reflection and tomography data;
- (4) Deep subduction, intraplate volcanism, and deep carbon cycle.

Education

Ph.D. Geology, University of Houston, Houston, Texas, USA, 2016
M.S. Geology, Chinese Academy of Sciences, Beijing, China, 2011
B.S. Geology, Peking University, Beijing, China, 2007

Professional Appointment

Postdoctoral Fellow, University of Houston, Houston, Texas, USA, 2017-Present
Teaching Assistant, University of Houston, Houston, Texas, USA, 2012-2016
Research Assistant, University of Houston, Houston, Texas, USA, Fall 2015

Teaching Experience (Teaching Assistant)

Structural Geology (Spring 2012, 2013, 2014, 2015, 2016)
UH-YBRA Geology Field Camp (Summer 2013, 2014, 2015, 2016)
Mineralogy (Fall 2014, 2016)
Environmental Geology (Fall 2013)
Igneous and Metamorphic Petrogenesis (Fall 2012)

Publications (* corresponding author)

2021

18. **Liu, Y.**, Li, L., van Wijk, J.W., Li, A., and Fu, Y.V. Surface wave tomography of the Emeishan large igneous province: Magma storage system, hidden hotspot track, and its impact on the Capitanian mass extinction. *Geology*, *in press*.
17. Su, P., He, H.*, Tan, X.*, **Liu, Y.***, Shi, F., and Kirby, E. (2021). Initiation and Evolution of the Shanxi Rift System in North China: Evidence from Low-Temperature Thermochronology in a Plate Reconstruction Framework. *Tectonics*, e2020TC006298, doi: 10.1029/2020TC006298.
16. Wang, L., Cheng, F., Zuza, A.V., Jolivet, M., **Liu, Y.**, Guo, Z., Li, X., and Zhang, C. Diachronous growth of the northern Tibetan Plateau derived from flexural modeling. *Geophysical Research Letters*, *in press*.

15. Liu, Y., Wu, K., Cao, Y., Hao, F., Wang, X., Cao, Z., Liu, J., Suppe, J., and **Liu, Y.** Linkage and formation of strike-slip faults in deep basins and its implications for petroleum accumulation: A case study from the Shunbei area of the Tarim Basin, China. *AAPG Bulletin*, *accepted*.
14. Tan, X.-B., Lee, Y.-H., Xu, X.-W., **Liu, Y.-D.**, and Lu, R.-Q. (2021). Late-Cenozoic faulting history of the central Longmenshan thrust belt and its tectonic implications. In: Lo, C.-H., Xu, X., Chang, W.-Y., and Ando, M. (eds.) *Earthquake Geology and Tectonophysics around Eastern Tibet and Taiwan*, 43-62, Springer, Singapore, doi:10.1007/978-981-15-6210-5_3.

2020

13. **Liu, Y.**, Tan, X., Ye, Y., Zhou, C., Lu, R., Murphy, M.A., Xu, X., and Suppe, J. (2020). Role of erosion in creating thrust recesses in a critical-taper wedge: An example from Eastern Tibet. *Earth and Planetary Science Letters*, 540, 116270, doi:10.1016/j.epsl.2020.116270.
12. Wang, S., Tang, W., **Liu, Y.**, Liu, X., and Yao, X. (2020). Rushan-Pshart Paleo-Tethyan suture deduced from geochronological, geochemical, and Sr-Nd-Hf isotopic characteristics of granitoids in Pamir. *Lithos*, 364-365, 105549, doi:10.1016/j.lithos.2020.105549.
11. Tang, W., Wang, S., **Liu, Y.**, and Yao, X. (2020). Origin of Carboniferous intra-oceanic arc granitoids from the eastern Pamir and implications for the Paleo-Tethyan ocean. *Journal of Asian Earth Sciences*, 204, 104558, doi:10.1016/j.jseaes.2020.104558.
10. Liu, Z.-C., Wang, J.-G., Liu, X.-C., **Liu, Y.**, and Lai, Q.-Z. (2020). Middle Miocene ultrapotassic magmatism in the Himalaya: A response to mantle unrooting process beneath the orogen. *Terra Nova*, doi:10.1111/ter.12507.
9. Smith, T., Sundell, K., Johnston, S., Andrade, C. G., Andrea, R., Dickinson, J., **Liu, Y.**, Murphy, M., Lapen, T., and Saylor, J. (2020). Drainage reorganization and Laramide tectonics in north-central New Mexico and downstream effects in the Gulf of Mexico. *Basin Research*, 32(3), 419-452, doi:10.1111/bre.12373.

2019

8. **Liu, Y.**, Murphy, M.A., van Wijk, J., Koning, D.J., Smith, T., and Andrea, R.A. (2019). Progressive opening of the northern Rio Grande rift based on fault structure and kinematics of the Tusas-Abiquiu segment in north-central New Mexico, U.S. *Tectonophysics*, 753, 15-35, doi:10.1016/j.tecto.2019.01.004.
7. Tan, X., **Liu, Y.***, Lee, Y.-H.*, Lu, R., Xu, X., Suppe, J., Shi, F., and Xu, C. (2019). Parallelism between the maximum exhumation belt and the Moho ramp along the eastern Tibetan Plateau margin: Coincidence or consequence?. *Earth and Planetary Science Letters*, 507, 73-84, doi:10.1016/j.epsl.2018.12.001.
6. Lu, R., **Liu, Y.**, Xu, X., Tan, X., He, D., Yu, G., Cai, M., and Wu, X. (2019). Three-dimensional model of the lithospheric structure of the eastern Tibetan Plateau: Implications for the active tectonics and seismic hazards. *Tectonics*, 38, 1292-1307, doi:10.1029/2018TC005239.
5. Li, Y., Lu, R., He, D., Wang, X., **Liu, Y.**, Xu, X., Tan, X., and Cai, M. (2019). Transformation of coseismic faults in the northern Longmenshan tectonic belt, eastern Tibetan Plateau: Implications for potential earthquakes and seismic risks. *Journal of Asian Earth Sciences*, 177, 66-75, doi:10.1016/j.jseaes.2019.03.013.

2018 and earlier

4. Tan, X., Yue, H., **Liu, Y.**, Xu, X., Shi, F., Xu, C., Ren, Z., Shyu, J. B. H., Lu, R., and Hao, H. (2018). Topographic loads modified by fluvial incision impact fault activity in the Longmenshan thrust belt, eastern margin of the Tibetan Plateau. *Tectonics*, 37, 3001-3017, doi:10.1029/2017TC004864.
3. Tan, X.-B., Xu, X.-W., Lee, Y.-H., Lu, R.-Q., **Liu, Y.**, Xu, C., Li, K., Yu, G.-H., and Kang, W.-J. (2017). Late Cenozoic thrusting of major faults along the central segment of Longmen Shan, eastern Tibet: Evidence from low-temperature thermochronology. *Tectonophysics*, 712-713, 145-155, doi:10.1016/j.tecto.2017.05.016.
2. Sun, D., Ji, J., **Liu, Y.**, Li, B., Chen, J., and Zhong, D. (2013). Detrital apatite fission track analysis and geomorphologic evolution of the Nujiang River area. *Chinese Journal of Geology*, 48(2), 501-514. (in Chinese)
1. Gong, J., Ji, J., Chen, J., Sang, H., Li, B., **Liu, Y.**, and Han, B. (2008). The $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology studies of rocks in eastern Himalayan syntaxis. *Acta Petrologica Sinica*, 24(10), 2255-2272. (in Chinese)

Manuscripts in revision, review, and preparation (* corresponding author)

- Liu, Y.**, Murphy, M.A., Snow, J., van Wijk, J.W., and Cannon, J.M. Post-breakup magmatism in the northern Gulf of Mexico. *Earth-Science Reviews*, *in revision*.
- Liu, Y., **Liu, Y.***, Hao, F.*, Cao, Y., Suppe, J., Wu, K., and Cao, K. Retroarc intra-cratonic deformation accommodated by coeval fold-and-thrust belts and strike-slip faults: Insights from structural relief analysis in central Tarim Basin, NW China. *Earth and Planetary Science Letters*, *in review*.
- Liu, Y., **Liu, Y.***, Cao, J., Wu, K., Luo, B., and Shi, Z. Impact of fold-and-thrust belts on the deformation and petroleum accumulation of deep-seated structures in sedimentary basins: a case study from the northern Longmen Shan of Sichuan Basin, China. *Journal of the Geological Society*, *in review*.
- Wu, J., Lin, Y.-A., Flament, N., Wu, T.-J., and **Liu, Y.** Northwest Pacific-Izanagi plate tectonics since Cretaceous times from imaged and predicted mantle structure. *Earth and Planetary Science Letters*, *in revision*.
- Ye, Y., Tan, X.*, **Liu, Y.***, Zhou, C., Shi, F., Lee, Y.-H., and Murphy, M.A. Erosion's impact on fault segmentation in thrust belts: Low-temperature thermochronology and fluvial shear stress analyses on an aftershock gap along eastern margin of Tibetan Plateau. *International Geology Review*, *in revision*.
- Shi, F., Tan, X., Zhou, C., and **Liu, Y.** What controls mountain asymmetry: Uplift gradient, or ratio of uplift rate?. *Earth and Planetary Science Letters*, *in review*.
- Shi, F., He, H., **Liu, Y.**, Wei, Z., and Sun, H. Active tectonics of the Nantinghe fault in Southeastern Tibetan Plateau and its implications for dynamics of continental collision. *Lithosphere*, *in review*.
- Tan, X., Zhou, C., **Liu, Y.**, and Shi, F. How drainage morphology influences drainage divide of a mountain belt. *Geology*, *in review*.
- Zhou, C., Tan, X., **Liu, Y.**, Murphy, M.A., Ye, Y., He, H., Han, Z., and Xu, X. Westward divide migration in eastern Tibet: Evidence from topographic analysis. *Earth and Planetary Science Letters*, *in review*.
- Liu, Y.**, and Suppe, J. A giant flat-slab subduction event in Northeast Asia in Mesozoic. *In prep*.
- Liu, Y.**, Murphy, M.A., and Suppe, J. Subduction polarity and history of the Meso-Tethyan Bangong-Nujiang Ocean constrained by seismic tomography and magmatism. *In prep*.

Conference Abstracts (presenting author only)

- Liu, Y.,** Li, L., van Wijk, J.W., Li, A., Li, Y., and Fu, Y.V. (2020). Magma Storage System and Hidden Hotspot Track of the Emeishan Large Igneous Province and its Impact on the Unusual Timing of the Capitanian Mass Extinction. AGU Fall Meeting, San Francisco, CA. (Poster)
- Liu, Y.,** and Suppe, J. (2019). Tomographic and magmatic records of the 5000-km-long East Asian margin in Jurassic-Cretaceous: a giant flat-slab subduction event in the Izanagi slab and roll-back of the Hunan slab. AGU Fall Meeting, San Francisco, CA. (Oral)
- Liu, Y.,** and Suppe, J. (2019). A Mesozoic flat-slab subduction event in Northeast Asia from top to bottom. GSA Annual Meeting, Phoenix, AZ. (Oral)
- Liu, Y.,** Tan, X., Murphy, M.A., Lu, R., and Xu, X. (2019). Dynamic interactions between heterogeneous erosion and crustal deformation in a three-dimensional compressional wedge: the Duijiangyan recess in central Longmen Shan, eastern Tibetan Plateau margin. GSA Annual Meeting, Phoenix, AZ. (Poster)
- Liu, Y.** and Suppe, J. (2018). What exactly is the “Paleo-Pacific plate” in East Asia? 3-D mapping of the remnant slabs in the lower mantle and their connections with the Mesozoic subduction and accretion history in East Asia. AGU Fall Meeting, Washington, D.C. (Oral)
- Liu, Y.** and Suppe, J. (2018). Subduction polarity and history of the Meso-Tethyan Bangong-Nujiang Ocean between the Qiangtang and Lhasa blocks. GSA Annual Meeting, Indianapolis, IN. (Poster)
- Liu, Y.** and Suppe, J. (2018). 3-D mapping of the remnant slabs: The “Paleo-Pacific Plate” in the lower mantle under East Asia and implications for plate reconstruction of the Mesozoic East Asia. GSA Annual Meeting, Indianapolis, IN. (Oral)
- Liu, Y.,** Murphy, M.A., Snow, J.E., van Wijk, J.W., Cannon, J.M., and Parsons, C. (2017). Tectonic Mechanism for the Mid-Cretaceous – Early Paleogene Intraplate Magmatism from the Gulf of Mexico to Northwestern Canada. AGU Fall Meeting, New Orleans, LA. (Poster)
- Liu, Y.,** Murphy, M.A., van Wijk, J.W., and Andrea, R.A. (2017). Rift initiation and evolution recorded in the oblique Tusas-Abiquiu segment of the Rio Grande rift, north-central New Mexico. GSA Annual Meeting, Seattle, WA. (Oral)
- Liu, Y.,** and Murphy, M.A. (2017). Initiation and evolution of the northern Rio Grande rift, north-central New Mexico. GeoPRISMS Rift Initiation and Evolution Workshop, Albuquerque, NM. (Poster)
- Liu, Y.,** Murphy, M.A., and Andrea, R.A. (2015). Slip re-orientation in the oblique Abiquiu embayment, northern Rio Grande rift. AGU Fall Meeting, San Francisco, CA. (Poster)
- Liu, Y.,** Andrea, R.A., and Murphy, M.A. (2015). Using topology to characterize fracture network in a normal fault splay zone in the Rio Grande rift, New Mexico. GSA Annual Meeting, Baltimore, MD. (Oral)
- Liu, Y.,** Murphy, M.A., van Wijk, J.W., Cannon, J.M., Snow, J.E., Anderson, P.Z., and Yao, Y. (2015). Origin of Late Cretaceous igneous activity in the northern Gulf of Mexico basin. GSA Annual Meeting, Baltimore, MD. (Poster)
- Liu, Y.,** Murphy, M.A., van Wijk, J., Snow, J.E., Anderson, P.Z., Cannon, J.M., Yao, Y., and Luebbert, C. (2015). Slab tearing as an alternative mechanism for the Cretaceous igneous activity in the northern Gulf of Mexico region. GCAGS Annual Meeting, Houston, TX. (Poster)
- Liu, Y.,** Murphy, M.A., Cannon, J.M., van Wijk, J., Yao, Y., Snow, J.E., and Anderson, P.Z. (2015). Post-rift magmatism at passive margins: an integrated study of Late Cretaceous igneous activity in the northern Gulf of Mexico. AAPG Annual Convention & Exhibition, Denver, CO. (Poster)

- Liu, Y.,** Murphy, M.A., and Cannon, J.M. (2014). Post-rift alkaline magmatism along the northern Gulf of Mexico margin. AGU Fall Meeting, San Francisco, CA. (Oral)
- Liu, Y.,** Murphy, M.A., and O’Keeffe, K. (2014). The Influence of pre-existing structures on the initiation of an oblique rift: the Cañones fault zone in north-central New Mexico. AAPG Annual Convention & Exhibition, Houston, TX. (Poster)
- Liu, Y.,** Murphy, M.A., O’Keeffe, K., and Khadeeva, A. (2013). Oblique extension and basinward tilting along the Cañones fault zone, west margin of the Rio Grande rift. GSA Annual Meeting, Denver, CO. (Oral)

Invited Talks

- Extinction first, eruption later? Insights from surface wave tomography of the Emeishan Large Igneous Province. Wuhan University Interdisciplinary Forum (online), Wuhan, China, 03/25/2021.
- Emeishan Large Igneous Province: Magma Storage System, Hidden Hotspot Track, and the Unusual Timing of the Capitanian Mass Extinction. University of Kentucky, International Geophysics & Tectonics Seminar (online), Kentucky, USA, 02/24/2021.
- Dujiangyan Recess: a critical-taper Coulomb wedge under heterogeneous erosion. The 3rd Young Scholars Symposium in Structural Geology, Tectonics, and Geodynamics (online), Hangzhou, Zhejiang, China, 09/06/2020.
- A structural geology approach to the Earth system science: Longmen Shan fold-and-thrust belt and Emeishan Large Igneous Province. Peking University International Young Scholars Geo-Symposium (online), Beijing, China, 06/22/2020.
- Structural geology’s role in the Earth system science: Two examples from the Longmen Shan fold-and-thrust belt and the Emeishan Large Igneous Province. Tongji University International Young Scholar Conference (online), Shanghai, China, 05/30/2020.
- 3-D mapping of the “Paleo-Pacific” slabs in the lower mantle and its implications for Mesozoic East Asian tectonics. UCLA Tectonics & Seismology Seminar, Los Angeles, California, USA, 04/03/2019.
- Tectonic mechanism for the Cretaceous intraplate volcanism across the central North American continent. Sun Yat-sen University, Zhuhai, Guangdong, China, 08/31/2018.
- Post-breakup magmatism in the northern Gulf of Mexico. Hess Corporation, Houston, Texas, USA, 09/23/2016.
- Mid-Cretaceous intraplate volcanism in northern Gulf of Mexico. BP China, Beijing, China, 01/10/2016.

Field Experience

- Tectonics and volcanism of western North America, California-Nevada-Utah-Wyoming, 08/2019
- Brittle deformation in the Danba Anticlinorium, eastern Tibetan Plateau, Sichuan, China, 09/2018
- Stratigraphy of the Galisteo-El Rito Basin in north-central New Mexico, 09/2016
- Kinematics of normal and reverse faults in the Tusas Mountains, northern New Mexico, 08/2016
- Structural analysis of the South Tibetan normal fault system in central Himalaya, Nepal, 05~06/2016
- Geometry and kinematics of normal faults and fractures in the northern Rio Grande rift, New Mexico, 06/2015
- Geologic mapping along the Cañones fault, Rio Grande rift, New Mexico, 05/2013
- Yellowstone-Bighorn Research Association geology field camp, Montana-Wyoming, 2013, 2014, 2015, 2016

Geologic mapping in Big Bend National Park, Texas, 2012, 2013, 2014, 2015, 2016
Ductile deformation in eastern Sierra Nevada, California, 07~08/2012
Fault damage zone analysis along the Cañones fault, north-central New Mexico, 05/2012
Cenozoic crustal deformation along the Ailao Shan-Red River Shear Zone, Yunnan, China, 10/2008
Fluvial geomorphology and OSL dating in SE Tibetan Plateau, Xizang, China, 05/2008
Intraplate volcanism in the Changbai Shan volcanic field, NE China, 07~08/2007
Crustal deformation in western Yunnan, SW China, 12/2006

Laboratory Experience

Seismic-based structural geology modeling in StructureSolver, University of Houston, 2019-2020
Gocad seismic tomography interpretation and modeling, University of Houston, 2017-2020
In situ analysis of zircon U-Pb and Lu-Hf isotopes using MC-LA-ICPMS, Chinese Academy of Sciences, 2010
Zircon U-Pb dating, Beijing SHRIMP Center, 2009
Apatite fission track dating, Peking University, 2007
Conventional step-heating $^{40}\text{Ar}/^{39}\text{Ar}$ laboratory, Peking University, 2005-2007

External Training

Tutorial on machine learning and deep learning for environmental and geosciences, AGU, 2020.
Tectonics modeling tutorial workshop, Computational Infrastructure for Geodynamics (CIG), 2020.
StraboSpot virtual workshop for structural geology, NSF-EarthCube, 2020.
Structure from Motion (SfM) photogrammetry for Earth science, GSA, 2017.
Practical salt tectonics, AAPG, 2015.
Statistical treatment of structural geology data using R, GSA, 2015.
Petroleum system of the Laramide Rockies, Wyoming, AAPG, 2015.
Seismic amplitude interpretation, AAPG, 2015.
Rock/fluid interactions and natural fracture development, AAPG, 2014.
Practical geomechanics, AAPG, 2014.
Balanced cross-sections and kinematic restorations using 2D Move, AAPG Wildcatters, 2014.
ArcGIS data management, PetroSkills, 2014.
Geophysical methods for estimating geomechanical properties, AAPG, 2014.
Move software training, Midland Valley, 2013.

Services

Reviewer for *Geology* (1), *Earth and Planetary Science Letters* (1), *Tectonics* (1), *Journal of Structural Geology* (1), *Geophysical Research Letters* (1), *Journal of Geophysical Research: Solid Earth* (1), *GSA Bulletin* (1), *Journal of the Geological Society* (1), *Lithos* (1), *International Geology Review* (2), *Journal of Geology* (1), *International Journal of Disaster Risk Reduction* (1), *Palaeogeography, Palaeoclimatology, Palaeoecology* (4), *Frontiers in Earth Science* (2), *Geosciences* (1).
Guest Editor, Journal of the Geological Society, thematic collection on “Fold-and-thrust belts and associated basins: structure, sedimentation, and dynamics”, 2020-2021.
Convener, Session T039/T044/T045 “Fold-and-Thrust Belts and Associated Basins on Earth and Other Planets”, AGU Fall Meeting, online, 2020.

Co-convener, Session T009/T014 “East Asia Tectonic and Geodynamic History”, AGU Fall Meeting, online, 2020.

Coordinator, Center for Tectonics and Tomography Seminar, University of Houston, 2019-2021.

Convener, Session T53 “Present-Day and Ancient Flat-Slab Subduction in Rock Records, Geophysical Images, and Geodynamic Models”, GSA Annual Meeting, Phoenix, AZ, 2019.

Co-convener, Sessions T14C & T21H, “Structure, Sedimentation, and Dynamics of Fold-and-Thrust Belts and Associated Basins on Earth and Other Planets”, AGU Fall Meeting, San Francisco, CA, 2019.

Co-convener, Session T51E “East Asia Tectonic and Geodynamic History since the Mesozoic III Posters”, AGU Fall Meeting, San Francisco, CA, 2019.

OSPA Judge, AGU Fall Meeting, Washington, D.C., 2018, 2019, 2020.

Co-convener, Session T31D “East Asia Tectonic and Geodynamic History since the Mesozoic III Posters”, AGU Fall Meeting, Washington, D.C., 2018.

Co-convener, Session T51A & T54A “Beyond Rigid Plates: Investigating mechanisms, processes, and products of intraplate deformation”, AGU Fall Meeting, New Orleans, LA, 2017.

Communications Chair, AAPG Petroleum Structure & Geomechanics Division (PSGD), 2015-2016.

President, AAPG Student Chapter at University of Houston, 2015-2016.

Vice President, AAPG Student Chapter at University of Houston, 2014-2015.

Abstract reviewer & poster judge, AAPG Annual Conference, 2014, 2015, 2016.

Student Research Day Committee, University of Houston, 2013-2015.

Grants

2016 GSA Student Research Grant, Robert D. Hatcher Research Award
Geometry and kinematics of the oblique border faults in the Tusas Mountain segment, Rio Grande rift, northern New Mexico, \$2314.

2016 AAPG Foundation Grants-in-Aid, J. Elmer Thomas (Past-Presidents) Memorial Grant
Topological and geometrical characterization of fracture networks in the Sheep Mountain Anticline, Wyoming, \$1750.

2015 AAPG Foundation Grants-in-Aid, SEAPEX Named Grant
Fault kinematics and extension direction in the oblique Rio Grande rift, north-central New Mexico, \$1000.

2015 GCAGS (Gulf Coast Association of Geological Societies) Student Grant
Origin of the Late Cretaceous igneous rocks along the northern Gulf of Mexico margin, \$1500.

Honors and Awards

17th & 18th Annual Robert E. Sheriff Lecture, Best Poster Award, 2015 & 2016.

GCAGS Student Poster Contest Award, Third Place, 2015.

Estwing Award for Outstanding Field Geology, University of Houston, 2015 & 2013.

BP Scholarship for Graduate Work in Geosciences, University of Houston, 2015.

Hess Corporation Scholarship for Graduate Work in Geosciences, University of Houston, 2014.

Marathon Oil Scholarship for Graduate Work in Geosciences, University of Houston, 2013 & 2012.