

## Derek Elsworth

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## Professional Preparation/Education

Portsmouth Polytechnic, Portsmouth, UK, Engineering Geology, B.Sc. (1979)  
Imperial College, London, UK, Engineering Rock Mechanics, M.Sc., DIC (1980)  
University of California, Berkeley, Engineering, Ph.D. (1984)

## Appointments/Professional Experience:

1997 - Pres. Professor, Energy and Mineral Engineering, Pennsylvania State University.  
2000 - 2003 Associate Dean for Research, College of Earth & Mineral Sciences, Penn State  
1991 - 1997 Associate Professor, Mineral Engineering, Pennsylvania State University.  
1985 - 1991 Assistant Professor, Mineral Engineering, Pennsylvania State University.  
1990 - 1993 Adjunct Professor, Earth Sciences and WCGR, University of Waterloo.  
1984 - 1984 Visiting Assistant Professor, Civil Engineering, University of Toronto.  
1984 Research Associate, Lawrence Berkeley Laboratory.  
1980 - 1982 Engineer D.R. Piteau and Assocs., and Komex Consultants. Calgary, Canada.

## Publications Related to Proposal

- Li, Z., Elsworth, D., Wang, C., EGS-Collab (2021) Constraining maximum event magnitude during injection-triggered seismicity. *Nat. Commun.* 12:1528. <https://doi.org/10.1038/s41467-020-20700-4>
- Sampath, K.H.S.M., Perera, M.S.A., Elsworth, D., Matthai, S.K., Ranjith, P.G., Li, D.-Y. (2021) Discrete fracture matrix modelling of fully-coupled CO<sub>2</sub> flow-deformation processes in fractured coal. *Int. J. R. Mech. Min. Sci.*, Vol. 138, 104644. <https://doi.org/10.1016/j.ijrmms.2021.104644>
- Yildirim, E. C., Im, K.J., Elsworth, D. and EGS-Collab (2020) The influence of fault reactivation on injection-induced dynamic triggering of permeability evolution. *Geophys. J. Int.*, Vol. 223, pp. 1481-1496. <https://doi.org/10.1093/gji/ggaa382>
- Shu, B., Zhu, R., Elsworth, D., Dick, J., Liu, S., Tan, J., Zhang, S. (2020) Effect of temperature and confining pressure on the evolution of hydraulic and heat transfer properties of geothermal fracture in granite. *Appl. Energy*. Vol. 272. 115290. <https://doi.org/10.1016/j.apenergy.2020.115290>
- An, M., Zhang, F., Chen, Z., Elsworth, D., Zhang, L. (2020) Temperature and fluid pressurization effects on frictional stability of shale faults reactivated by hydraulic fracturing in the Changning block, southwest China. *J. Geophys. Res.* Vol. 125. e2020JB019584. <https://doi.org/10.1029/2020JB019584>
- An, M., Zhang, F., Elsworth, D., Xu, Z., Chen, Z., Zhang, L. (2020) Friction of Longmaxi shale gouges and implications for seismicity during hydraulic fracturing. *J. Geophys. Res.* Vol. 125. e2020JB019885. <https://doi.org/10.1029/2020JB019885>
- Shokouhi, P., Jin, J., Wood, C., Rivière, Madara, B., Elsworth, D., Marone, C. (2020) Dynamic stressing of naturally fractured rocks: on the relation between transient changes in permeability and elastic wave velocity. *Geophys. Res. Lett.* Vol. 47. E2019GL083557. <https://doi.org/10.1029/2019GL083557>
- Im, K.J., Elsworth, D., Wang, C. (2019) Cyclic permeability evolution during repose then reactivation of fractures and faults. *J. Geophys. Res.*, Vol. 124, pp. 4492-406. <https://doi.org/10.1029/2019JB017309>

- Wang, C., Elsworth, D., Fang, Y. (2019) Ensemble shear strength, stability, and permeability of mixed mineralogy fault gouge recovered from 3D granular models. *J. Geophys. Res.* Vol. 124. <https://doi.org/10.1029/2018JB016066>
- Fang, Y., Elsworth, D., Wang, C., Jia, Y. (2018) Mineralogical controls on frictional strength, stability and shear permeability evolution of fractures. *J. Geophys. Res.* Vol. 123. <https://doi.org/10.1029/2017JB015338>
- Im, K.J., Elsworth, D., Fang, Y. (2018) The influence of preslip sealing on the permeability evolution of fractures and faults. *Geophys. Res. Lett.*, Vol. 45. <https://doi.org/10.1002/2017GL076216>
- Wang, C., Elsworth, D., Fang, Y. (2017) Influence of weakening minerals on the ensemble strength and slip stability of faults. *J. Geophys. Res.* Vol. 122. pp 7090-7110. <http://dx.doi.org/10.1002/2016JB013687>
- Guglielmi, Y., Cappa, F., Avouac, J.-P., Henry, P., Elsworth, D. (2015) Seismicity triggered by fluid-injection-induced aseismic slip. *Science.* Vol. 348, pp. 1224-1226. <http://dx.doi.org/10.1126/science.aab0476>

### Synergistic Activities

#### *Recent Keynotes: [2020]*

- 10<sup>th</sup> Int. Conf. on Field Exploration and Development, Chengdu, China.
- 4<sup>th</sup> China Intelligent Geological Equipment Technology Development Forum, Beijing, China
- GeoMEast, Cairo, Egypt. [postponed]
- 27<sup>th</sup> ISRM Online Lecture. <https://www.isrm.net/gca/?id=1385> [Invited]
- ARMA-CUPB Geothermal International Conference, Beijing (2019)
- Int. Conf. on Geothermal Development in China. Weifang, China (2019)
- [2019] *Nine*; [2018] *Six*; [2017] *Four*; [2016] *Five*; [2015] *Four*.

#### *Recently Convened Meetings:*

- Co-Convener, 6<sup>th</sup> *Unconventional Geomechanics Symposium*, CUMT-Beijing, China. 2019.
- Co-Convener, 4<sup>th</sup> *Unconventional Geomechanics Symposium*, Shenyang, China. 2017.
- Convener ARMA-AAPG-SedHeat Workshop on “*Sedimentary Geothermal Systems*.” June 2016.
- Co-Convener Penrose Conference on “*Geothermal Fluids in Deep Sedimentary Basins*.” October 2013.

#### *Recent Advisory Activities:*

- Stanford University – DOE - Energy Frontiers Research Center, External Advisory Board (2018-).
- China Jinping International Physics Laboratory, International Advisory Committee (2016-).
- National Academy (NASEM) Committee on Geological and Geotechnical Engineering (2016-2018).
- President, ARMA Foundation (2014- ).
- ARMA, Chair of Fellows (2011-2018).
- Mine Safety and Health Research Advisory Committee, DHHS (2011-2013).

#### *Honorary Appointments:*

- 2019 – Adjunct Professor, Shandong University, Jinan, China
- 2018 – Visiting Professor, IROAST, Kumamoto University, Japan
- 2018 – Adjunct Professor, China University of Mining and Technology, Beijing
- 2017 – Adjunct Professor, Henan Polytechnic University, Jiazhou, China
- 2016 Darcy Professor, Utrecht University, Netherlands
- 2016 – 2023 Adjunct Professor, Northeastern University, Shenyang, China
- 2014 – 2020 Adjunct Professor, Chinese Academy of Sciences, Wuhan, China