

# E. Ukar

## Professional Summary

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## Professional Preparation

### Academic Background

Ph.D. Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin, 2010

B.S. Geology, Euskal Herriko Unibertsitatea/Universidad del País Vasco, Spain, 2003

### Professional Appointments

Research Associate, Bureau of Economic Geology, The University of Texas at Austin (June 2013-Present)

Postdoctoral Fellow, Bureau of Economic Geology, The University of Texas at Austin (August 2011-June 2013)

Research Associate in the Division of Physical Sciences, American Museum of Natural History (2011 - 2013). The carbon cycle in subduction zones: insights from high-pressure graphitic mélange blocks.

Visiting Assistant Professor of Petrology, Colorado College, Colorado Springs, Colorado (2010 - 2011). GY445 Regional Studies, GY313 Metamorphic Petrology, GY140 Physical Geology, GY101 Catastrophic Geology, GY100 Geology in Film.

Graduate Research Assistant, Bureau of Economic Geology, The University of Texas at Austin (2009 - 2010).

Laboratory Research Assistant, Jackson School of Geosciences, The University of Texas at Austin (2004 - 2007). Microscopic examination, structural analysis, comparison, and geologic interpretation of igneous and metamorphic rocks from west New Guinea, Irian Jaya, Indonesia; an microprobe analysis of zoned feldspar phenocrysts in Grasberg samples, Irian Jaya, Indonesia; magma chamber dynamics.

Field Assistant, Jackson School of Geosciences, The University of Texas at Austin (June-August 2004)

Mapping and collection of samples for petrographical characterization and detrital zircon geochronology in Pacheco Pass, Diablo Range, Central California

### Dissertations

P-T-t paths and deformation of blueschist and associated graphite-schist blocks from the Franciscan mélange, San Simeon, California

## Areas of Expertise

### Areas of Expertise

DYNEL

EMPA  
GIS  
MOVE  
PERPLE\_X  
Petrology  
SEM  
Structural diagenesis  
Structural geology  
Structural geology  
Tectonics  
Tectonics  
THERMOCALC (basic)  
XRD

## Awards

### Awards and Honorary Societies

GDL Foundation Fellowship Grant, Structural Diagenesis research, 2012-Present  
2015 GDL Foundation Fellowship Grant, Structural Diagenesis Research  
R. L. Folk/E. F. McBride Petrography Award, Jackson School of Geosciences, The University of Texas at Austin, 2009  
Texas Exes Teaching Award, Senate of College Councils, The University of Texas at Austin, 2008  
Full Predoctoral Scholarship for the Education of Future Researchers from the Basque Government, Spain, 2004 - 2007  
Geological Society of America Research Grant, 2006  
Geology Foundation support, The University of Texas at Austin, 2005  
Off-Campus Research Scholarship, Geology Foundation, The University of Texas at Austin, 2005  
Geology Foundation support, The University of Texas at Austin, 2004  
William R. Muehlberger Field Geology Scholarship, The University of Texas at Austin, 2004  
TASSEP (US-EU Sciences) Scholarship from the BBK (Bilbao Bizkaia Kutxa), Spain, 2001

## Teaching and Advising

### University Courses Taught

GY445 Regional Studies in Geology: taught at Colorado College, Colorado Springs, Colorado, January 24-February 7 2011.  
GEO 320K Introduction to Field and Stratigraphic Methods: taught at The University of Texas at Austin, Austin, Texas, spring 2008.  
GEO327G/386G, GIS & GPS Applications in Earth Sciences: The University of Texas at Austin, Fall 2009.  
GEO347K Gems and Gem Minerals: The University of Texas at Austin, Spring 2009.

GEO416K Earth Materials: The University of Texas at Austin, Fall 2007.

GY100 Geology in Film: Colorado College, Nov. 29-Dec. 22, 2010.

GY101 Catastrophic Geology: Colorado College, April 4-27, 2011, and May 2-25, 2011.

GY140 Physical Geology, Colorado College, Sept. 6-29, 2010, and Nov. 1-24, 2010.

GY313 Metamorphic Petrology: Colorado College, March 7-30, 2011.

### Field Trips Leadership

Field trip co-leader, Fracture Spatial Organization Field Workshop, Pedernales State Park, Texas, September 14-17, 2014.

Field trip leader, Fractured unconventional reservoirs in the Alberta Foothills, Canada, September 12-14, 2013.

Field trip co-leader, Franciscan Complex of California, June 6-10, 2013.

### Student Committee Supervision

Co-supervisor, M.S. Thesis, Romain Lacube, The University of Texas at Austin and Centre Europeen de Recherche et d'Enseignement des Geosciences de l'Environnement-CEREGE (Paris, France), 2015

Co-supervisor, M.S. Thesis, Canalp Ozkul, Fracture Abundance and Strain in Folded Cardium Formation, Alberta Fold-and-Thrust Belt, Canada, The University of Texas at Austin, 2014

### Student Committee Participation

Committee member, Peter Laciano, Fold-related brittle structures and associated strain in a limestone bed of the Carmel Formation, San Rafael Swell, Utah, The University of Texas at Austin, 2015

## Presentations

### Invited Presentations

Ukar, E., Laubach, S. E., and Marrett, R., 2016, How to measure fracture opening rates using quartz c-axis orientations: presented to Microanalysis Society, presented at EBSD, Tuscaloosa, Alabama, May 24-26, 2016.

Ukar, E., Laubach, S. E., and Gale, J. F. W., 2015, Synkinematic and postkinematic cementation of fractures in carbonate reservoirs: implications for porosity preservation: presented at 77th EAGE Conference and Exhibition, Workshop on Carbonate Diagenesis and Fractures-Controls on Reservoir Quality, Madrid, Spain, June 1-4, 2015.

Cloos, M., and Ukar, E., 2014, Blueschist blocks in the shale-matrix mélange of the Franciscan Complex of California: Metamorphic aureoles and subduction channel upwelling: presented at GSA Annual Meeting, Vancouver, British Columbia, October 19-22, 2014.

Ukar, E., Eichhubl, P., Fall, A., and Hooker, J. N., 2014, Distribución y características de fracturas naturales en reservorios siliciclásticos, Alberta, Canadá: presented to Asociación Mexicana de Geólogos Petroleros, Villahermosa, México, March 26, 2014-Present.

### Presentations

Deformation bands as fluid pathways in outcrops of Lajas Formation tight-gas sandstone, Neuquén Basin, Argentina: presented to Fracture Research and Application Consortium (FRAC), presented at Annual Sponsors' Meeting, Austin, Tex., November 2019.

SEM-based compositional and microtextural analysis of deformation bands--examples from the Lajas Fm. Tight Gas Sandstone: presented to Fracture Research and Application Consortium (FRAC), presented at Annual Sponsors' Meeting, Austin, Tex., November 2019.

Structural-diagenetic controls on fracture opening in tight gas sandstone reservoirs, Alberta Foothills: presented at 2012 AGU Meeting, The University of Texas at Austin, Austin, Texas, December 4, 2012.

Tectonic evolution of blueschist-facies blocks in the Franciscan mélange at San Simeon, California: insights into subduction zone evolution: presented at Geological Society of America International Meeting: Tectonic Crossroads, Ankara, Turkey, October 4-8 2010.

Mafic blueschist and associated graphite-schist blocks in the Franciscan Mélange, San Simeon, California: presented at Geological Society of America Annual Meeting, Portland, Oregon, 2009.

Origin and metamorphism of blueschist blocks in the Franciscan Mélange, San Simeon, California: presented at Geological Society of America Annual Meeting, Houston, Texas, 2008.

Petrology of blueschist and graphite-schist blocks from the Franciscan Mélange, San Simeon, California: presented at Geological Society of America Annual Meeting, Denver, Colorado, 2007.

## Activities of a Professional Nature

### Professional Societies

American Association of Petroleum Geologists

European Association of Geochemistry

Geological Society of America

Mineralogical Society of America

## Funding

### Research Support

Research Associate: Formation mechanism in the Ordovician carbonates in Halahatang area, Tarim Basin, China, CNPC USA Corporation (January 15, 2016-January 15, 2018; \$895,012.80).

Research Associate: Slip behavior of a subduction zone: Inferences from quartz-fille veins (hydrofractures) in an exhumed accretionary wedge, Shimanto Belt, Japan, GDL Foundation (January 15-November 4, 2016; \$2,000).

## Publications

### Peer Reviewed Journal Articles

Hooker, J. N., Katz, R. F., Laubach, S. E., Cartwright, J., Eichhubl, P., Ukar, E., Bloomfield, D., and Engelder, T., 2023, Fracture-pattern growth in the deep, chemically reactive subsurface: Journal of Structural Geology, v. 173, no. 104915, 21 p., <http://doi.org/10.1016/j.jsg.2023.104915>.

Kyle, J. R., Quintero, T. R., Ukar, E., Miller, N. R., Elliott, S. J., and Colbert, M., 2023, Dolomite cement microstratigraphy: a record of brine evolution and ore precipitation mechanisms, upper Knox Group, Tennessee and Kentucky, USA: Geology, v. 51, no. 4, p. 392-396, <http://doi.org/10.1130/G50689.1>.

Wang, J., Yang, X., Zhang, J., Wang, K., Zhang, R., Wang, Q., Ren, B., and Ukar, E., 2023, Subsurface fracture characterization in a folded ultra-deep tight-gas sandstone reservoir: a case study from the Keshen gas field, Tarim Basin, China: Journal of Structural Geology, v. 172, no. 104867, 13 p., <http://doi.org/10.1016/j.jsg.2023.104867>.

Corrêa, R. S. M., Ukar, E., Laubach, S. E., Aubert, I., Lamarche, J., Wang, Q., Stockli, D. F., Stockli, L. D., and Larson, T. E., 2022, Episodic reactivation of carbonate fault zones with implications for permeability--an example from Provence, Southeast France: Marine and Petroleum Geology, v. 145, no. 105905, 21 p., <http://doi.org/10.1016/j.marpetgeo.2022.105905>.

- Menzel, M. D., Urai, J. L., Ukar, E., Decrausaz, T., and Godard, M., 2022, Progressive veining during peridotite carbonation: insights from listvenites in Hole BT1B, Samail ophiolite (Oman): *Solid Earth*, v. 13, no. 8, p. 1191-1218, <http://doi.org/10.5194/se-13-1191-2022>.
- Menzel, M. D., Urai, J. L., Ukar, E., Hirth, G., Schwedt, A., Kovács, A., Kibkalo, L., and Kelemen, P. B., 2022, Ductile deformation during carbonation of serpentinized peridotite: *Nature Communications*, v. 13, no. 3478, 13 p., <http://doi.org/10.1038/s41467-022-31049-1>.
- Zhang, J., Ukar, E., Qu, J., Zhang, B., Zhao, H., Zhang, Y., and Wang, Z., 2022, Periclinal fold systems in thick-bedded mudstones: a case study of the Early Cretaceous Hekou Group, Lanzhou Basin, NW China: *Journal of Structural Geology*, v. 161, no. 104678, 14 p., <http://doi.org/10.1016/j.jsg.2022.104678>.
- Spruzeniece, L., Späth, M., Urai, J. L., Ukar, E., Selzer, M., and Nestler, B., 2021, Wide-blocky veins explained by dependency of crystal growth rate on fracture surface type: insights from phase-field modeling: *Geology*, v. 49, no. 6, p. 641-646, <http://doi.org/10.1130/G48472.1>.
- Spruzeniece, L., Späth, M., Urai, J. L., Ukar, E., Selzer, M., Nestler, B., and Schwedt, A., 2021, Formation of wide-blocky calcite veins by extreme growth competition: *Journal of the Geological Society*, v. 178, no. 2, article no. jgs2020-104, 17 p., <http://doi.org/10.1144/jgs2020-104>.
- Baqués, V., Ukar, E., Laubach, S. E., Forstner, S. R., and Fall, A., 2020, Fracture, dissolution, and cementation events in Ordovician carbonate reservoirs, Tarim Basin, NW China: *Geofluids*, v. 2020, no. 9037429, 28 p., <http://doi.org/10.1155/2020/9037429>.
- Ukar, E., Baqués, V., Laubach, S. E., and Marrett, R., 2020, The nature and origins of decametre-scale porosity in Ordovician carbonate rocks, Halahatang oilfield, Tarim Basin, China: *Journal of the Geological Society*, v. 177, no. 5, p. 1074-1091, <http://doi.org/10.1144/jgs2019-156>.
- Ferraro, F., Agosta, F., Ukar, E., Grieco, D. S., Cavalcante, F., Belviso, C., and Prosser, G., 2019, Structural diagenesis of carbonate fault rocks exhumed from shallow crustal depths: an example from the central-southern Apennines, Italy: *Journal of Structural Geology*, v. 122, p. 58-80, <http://doi.org/10.1016/j.jsg.2019.02.008>.
- Ukar, E., and Cloos, M., 2019, Cataclastic deformation and metasomatism in the subduction zone of mafic blocks-in-mélange, San Simeon, California: *Lithos*, v. 346-347, no. 105116, 26 p., <http://doi.org/10.1016/j.lithos.2019.06.018>.
- Ukar, E., Laubach, S. E., and Hooker, J. N., 2019, Outcrops as guides to subsurface natural fractures: example from the Nikanassin Formation tight-gas sandstone, Grande Cache, Alberta foothills, Canada: *Marine and Petroleum Geology*, v. 103, p. 255-275, <http://doi.org/10.1016/j.marpetgeo.2019.01.039>.
- Ukar, E., Lopez, R. G., Gale, J. F. W., Laubach, S. E., and Manceda, R., 2017, New type of kinematic indicator in bed-parallel veins, Late Jurassic-Early Cretaceous Vaca Muerta Formation, Argentina: E-W shortening during Late Cretaceous vein opening: *Journal of Structural Geology*, v. 104, p. 31-47, <http://doi.org/10.1016/j.jsg.2017.09.014>.
- Ukar, E., Lopez, R. G., Laubach, S. E., Gale, J. F. W., Manceda, R., and Marrett, R., 2017, Microfractures in bed-parallel veins (beef) as predictors of vertical macrofractures in shale: Vaca Muerta Formation, Agrio Fold-and-Thrust Belt, Argentina: *Journal of South American Earth Sciences*, v. 79, p. 152-169, <http://doi.org/10.1016/j.jsames.2017.07.015>.
- Fall, A., Ukar, E., and Laubach, S. E., 2016, Origin and timing of Dauphiné twins in quartz cement in fractured sandstones from diagenetic environments: Insight from fluid inclusions: *Tectonophysics*, v. 687, p. 195-209, <http://doi.org/10.1016/j.tecto.2016.08.014>.
- Ukar, E., and Cloos, M., 2016, Graphite-schist blocks in the Franciscan mélange, San Simeon, California: evidence of high-P metamorphism: *Journal of Metamorphic Geology*, v. 34, no. 3, p. 191-208, <http://doi.org/10.1111/jmg.12174>.

Ukar, E., and Laubach, S. E., 2016, Syn- and postkinematic cement textures in fractured carbonate rocks: Insights from advanced cathodoluminescence imaging: *Tectonophysics*, v. 690, no. A, p. 190-205, <http://doi.org/10.1016/j.tecto.2016.05.001>.

Ukar, E., Laubach, S. E., and Marrett, R., 2016, Quartz c-axis orientation patterns in fracture cement as a measure of fracture opening rate and a validation tool for fracture pattern models: *Geosphere*, v. 12, no. 2, p. 400-438, <http://doi.org/10.1130/GES01213.1>.

Ukar, E., Ozkul, C., and Eichhubl, P., 2016, Fracture abundance and strain in folded Cardium Formation, Red Deer River anticline, Alberta Foothills, Canada: *Marine and Petroleum Geology*, v. 76, p. 210-230, <http://doi.org/10.1016/j.marpetgeo.2016.05.016>.

Ukar, E., and Cloos, M., 2015, Magmatic origin of low-T mafic blueschist and greenstone blocks from the Franciscan mélange, San Simeon, California: *Lithos*, v. 230, p. 17-29, <http://doi.org/10.1016/j.lithos.2015.05.002>.

Ukar, E., and Cloos, M., 2014, Low-temperature blueschist-facies mafic blocks in the Franciscan mélange, San Simeon, California: field relations, petrology, and counterclockwise P-T paths: *Geological Society of America Bulletin*, v. 126, no. 5/6, p. 831-856, <http://doi.org/10.1130/B30876.1>.

Ukar, E., and Cloos, Mark, 2013, Actinolitic rinds on low-T mafic blueschist blocks in the Franciscan shale-matrix mélange near San Simeon: Implications for metasmatism and tectonic history: *Earth and Planetary Science Letters*, v. 377-378, p. 155-168.

Ukar, E., 2012, Tectonic significance of low-temperature blueschist blocks in the Franciscan mélange at San Simeon, California: *Tectonophysics*, v. 568-569, p. 154-169

Ukar, E., and Vasconcelos, P., 2012, First <sup>40</sup>Ar-<sup>39</sup>Ar ages from low-T blueschist blocks in the Franciscan mélange near San Simeon: implications for initiation of subduction: *Journal of Geology*, v. 120, p. 543-556

## Peer Reviewed Book Chapters

Ukar, E., López, R. G., Hryb, D., Gale, J. F. W., Manceda, R., Fall, A., Brisson, I., Hernandez-Bilbao, E., Weger, R. J., Marchal, D. A., Zanella, A., and Cobbold, P. R., 2020, Natural fractures: from core and outcrop observations to subsurface models, in Minisini, D., Fantín, M., Lanusse Noguera, I., and Leanza, H. A., eds., *Integrated geology of unconventional: the case of the Vaca Muerta play, Argentina*: Tulsa, Okla., American Association of Petroleum Geologists, AAPG Memoir, v. 121, p. 377-416, <http://doi.org/10.1306/13682234M1203837>.

Ukar, E., López, R. G., Hryb, D., Gale, J. F. W., Manceda, R., Fall, A., Brisson, I., Hernandez-Bilbao, E., Weger, R. J., Marchal, D. A., Zanella, A., and Cobbold, P. R., 2020, Natural fractures: from core and outcrop observations to subsurface models, in Minisini, D., Fantín, M., Lanusse Noguera, I., and Leanza, H. A., eds., *Integrated geology of unconventional: the case of the Vaca Muerta play, Argentina*: Tulsa, Okla., American Association of Petroleum Geologists, Memoir, v. 121, p. 377-416, <http://doi.org/10.1306/13682234M1203837>.

## Guidebooks

Gale, J. F. W., Marrett, R., and Ukar, E., 2014, Fracture spatial organization field workshop, Pedernales Falls State Park.

Ukar, E., Fermor, P., and Eichhubl, P., 2013, Fractured unconventional reservoirs in the Alberta Foothills, Canada: Guidebook for the FRAC IA Consortium Annual Meeting September 12-14, 2013 Field Trip, with contributions by D. Meloche and R. Marrett 59 p.

## Conference Proceedings

Ukar, E., 2020, Importance and applications of diagenesis in naturally fractured reservoirs,

Fourth European Association of Geoscientists and Engineers Naturally Fractured Reservoirs Workshop, Ras Al Khaimah, United Arab Emirates, 5 p.

Ukar, E., Lopez, R. G., Gale, J. F. W., and Manceda, R., 2019, Outcrop to core comparison of natural fractures in the Vaca Muerta Formation, Argentina., Sixth European Association of Geoscientists and Engineers Shale Workshop, Bordeaux, France, 5 p.

Gale, J. F. W., Ukar, E., and Laubach, S. E., 2018, Gaps in DFN models and how to fill them, 2nd International Discrete Fracture Network Engineering Conference, American Rock Mechanics Association, no. DFNE 18-857, Seattle, Wash., 9 p.

Ukar, E., Lopez, R. G., Fall, A., Manceda, R., Gale, J. F. W., and Laubach, S. E., 2017, Vertical fractures and a new type of kinematic indicator in bed-parallel veins (beef) at Arroyo Mulichinco, Neuquen Basin, XX Congreso Geologico Argentino, 3 p.

## Contract Reports

Fall, A., Laubach, S. E., Elliott, S. J., and Ukar, E., 2015, Fractures in Devonian sandstone reservoirs, Subandean fold and thrust belt, Northern Bolivia: Final Report prepared for TOTAL, France, 59 p.

Ukar, E., Eichhubl, Peter, and Laubach, S. E., 2013, Distribution and characteristics of natural fractures in outcrop and core, Nikanassin Formation, Alberta Foothills, Canada: Implications for natural and hydraulic fracture interaction: Shell / UT Unconventional Research, Interim Report, SUTUR Task 5, 91 p + figures and tables.

## Published Abstracts

Stefano, G. D., Ferraro, F., Agosta, F., Ukar, E., Cavalcante, F., Belviso, C., and Prosser, G., 2018, Diagenetic evolution of carbonate fault rocks associated to extensional normal faults of central and southern Apennines (abs.): 2018 Meeting of the Italian Geological Society, Catania, Italy.

Baques, V., Ukar, E., Zhang, L., Yuan, W., Laubach, S. E., Forstner, S., Fall, A., and Sun, C., 2017, Decameter-scale bit drops at 7 km depth in the Yijianfang Formation, Halahatang Oilfield, Tarim Basin, China: fault-related deep-seated dissolution (abs.): Geological Society of America Abstracts with Programs, v. 49, no. 6, <http://doi.org/doi: 10.1130/abs/2017AM-305841>.

Cloos, M., and Ukar, E., 2017, Tectonic flow mélange and olistostromes in the Franciscan Complex: which is more abundant? (abs.): Geological Society of America Abstracts with Programs, v. 49, no. 6, <http://doi.org/doi: 10.1130/abs/2017AM-301300>.

Elliott, S. J., Fisher, D. M., Ukar, E., Ramirez, G., and Forstner, S., 2017, Slip behavior of a subduction zone: preliminary inferences from quartz and calcite filled veins (hydrofractures) in an exhumed accretionary wedge, Shimanto belt, Japan (abs.): Geological Society of America Abstracts with Programs, v. 49, no. 6, <http://doi.org/doi: 10.1130/abs/2017AM-306581>.

Fall, A., Ukar, E., Lopez, R. G., Gale, J. F. W., Manceda, R., and Laubach, S. E., 2017, Bed-parallel beef veins and cross-cutting vertical fractures in the Vaca Muerta Formation, Argentina: a fracture opening and cementation history (abs.): ECROFI 2017.

Fall, A., Ukar, E., Lopez, R. G., Gale, J. F. W., Manceda, R., and Laubach, S. E., 2017, Combined effects of overpressure and bed-parallel contraction on the formation of bed-parallel and vertical fractures in the Vaca Muerta Formation, Argentina (abs.): Geological Society of America Abstracts with Programs, v. 49, no. 6, <http://doi.org/doi: 10.1130/abs/2017AM-301560>.

Fall, A., Ukar, E., Lopez, R. G., Gale, J. F. W., Manceda, R., and Laubach, S. E., 2017, Timing of opening and cementation of bedding-parallel and vertical fractures, Vaca Muerta Formation, Argentina (abs.): AAPG Annual Meeting, no. 2606490.

Ukar, E., Lopez, R. G., Fall, A., Manceda, R., Gale, J. F. W., and Laubach, S. E., 2017, New type of kinematic indicator in bedding-parallel veins and vertical fracture abundance and timing

in Vaca Muerta Formation, Argentina (abs.): AAPG Annual Meeting, no. 2608925.

Ukar, E., Lopez, R. G., Fall, A., Manceda, R., Gale, J. F. W., and Laubach, S. E., 2017, Vertical fractures and a new type of kinematic indicator in bed-parallel veins (beef) at Arroyo Mulichinco, Neuquen Basin (ext. abs.): XX Congreso Geologico Argentino Extended Abstracts, p. 163-165.

Gale, J. F. W., Ukar, E., Wang, Q., and Elliott, S.J., 2016, Bedding-parallel fractures in shales (abs.): AAPG Search and Discovery Article, no. 90259.

Ukar, E., Laubach, S. E., and Marrett, R., 2016, How to measure fracture opening rates using quartz c-axis orientations (abs.): EBSD Conference.

Cloos, M., and Ukar, E., 2015, Blueschist blocks in the shale-matrix mélange and San Simeon, California: Metamorphism, deformation, age (abs.): Geological Society of America Annual Meeting, Baltimore, November 1-4.

Cloos, M., and Ukar, E., 2015, Blueschist blocks in the shale-matrix mélange of the Franciscan Complex of California: Metamorphic aureoles and subduction channel upwelling (abs.): Geoprisms Meeting, California, October 12-14.

Fall, A., Ukar, E., Marrett, R., and Laubach, S. E., 2015, Dauphiné twin planes in quartz trap fluid inclusions and indicate paleostress in deeply buried sandstones (ext. abs.): 23rd European Current Research on Fluid Inclusions, Leeds, United Kingdom, Abstract volume, p. 61-61.

Gale, J. F. W., Ukar, E., Elliott, S.J., and Wang, Q., 2015, Bedding-parallel fractures in shales: characterization, prediction and importance (abs.): AAPG Annual Meeting, Denver, Colorado.

Cloos, M., Ukar, E., 2014, Blueschist blocks in the shale-matrix mélange of the Franciscan Complex of California: metamorphic aureoles and subduction channel upwelling (abs.): European Geophysical Union General Assembly 2014, Vienna, Austria, April 27-May 2.

Ukar, E., Laubach, S. E., Fall, A., and Eichhubl, P., 2014, Synkinematic quartz cementation in partially open fractures in sandstones (abs.): European Geophysical Union General Assembly, Vienna, Austria, April 27-May 2.

Ukar, E., Ozkul, C., Eichhubl, Peter, Fall, Andras, 2014, Structural-diagenetic evolution of fractures in folds: Nikanassin and Cardium Formations, Alberta Foothills, Canada (abs.): AAPG Annual Convention and Exhibition, Houston, Texas, April 7-9.

Cloos, M., Ukar, E., 2013, Subduction channels and the incorporation of blueschist blocks in the shale-matrix mélange of the Franciscan Complex of California (abs.): Geological Society of America Bulletin Abstracts with Programs, v. 45, 1 p., p. 886.

Ukar, E., Eichhubl, P., and Fall, A., 2013, Structural-diagenetic evolution of fractures in folds: A TGS example from the Alberta Foothills, Canada (abs.): Goldschmidt Conference, Italy, Mineralogical Magazine, v. 77, p. 2375.

Ukar, E., Eichhubl, P., Fall, A., and Hooker, J. N., 2013, Outcrop to core comparison of natural fractures in a tight gas sandstone reservoir, Alberta Foothills, Canada (abs.): American Association of Petroleum Geologists Annual Convention and Exhibition, Pittsburgh, Pennsylvania, May 19-22, abstracts, CD-ROM.

Ukar, E., Eichhubl, Peter, and Fall, A., 2013, Structural-diagenetic evolution of fractures in folds: A TGS example from the Alberta Foothills, Canada (abs.): Goldschmidt Conference 2013, Italy, Mineralogical Magazine, v. 77, no. 5, p. 2375.

Ukar, E., Eichhubl, Peter, Fall, A., and Hooker, J. N., 2013, Structural-Diagenetic Controls on Fracture Opening in Tight Gas Sandstone Reservoirs, Alberta Foothills (abs.): European Geosciences Union General Assembly 2013, Vienna, Austria, 07-12 April 2013, Geophysical Research Abstracts, v. 15, EGU2013-13327.

Eichhubl, Peter, Fall, Andras, Prodanovic, M., Weisenberger, T., Ukar, E., Laubach, S. E., and Gale, Julia F. W., 2012, Chemical-mechanical interactions during fracture growth in tight-gas



and oil reservoirs: implications for flow during reservoir charge and production (abs.), in Fall Meeting, AGU, San Francisco, California, December 3-7, Abstract 1502338.

Eichhubl, Peter, Gale, Julia F. W., Olson, J., Laubach, S. E., Hooker, John N., Fall, Andras, Weisenberger, T., and Ukar, E., 2012, What can outcrop and core based observations tell us about natural fractures in unconventional reservoirs? (abs.): American Association of Petroleum Geologists, Annual Convention, Abstract 1236894, 1 p.

Ukar, E., Eichhubl, P., Fall, A., Hooker, J. N., and Laubach, S. E., 2012, Structural-diagenetic controls on fracture opening in tight-gas sandstone reservoirs, Alberta Foothills (abs.): Fall Meeting, AGU, San Francisco, California, December 3-7, no. 1476703.

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