

CURRICULUM VITAE



PROF DAVID E. LUMLEY

**Professor, Green Chair in Geophysics
Director, Center for Lithospheric Studies, UT Dallas**

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SHORT BIOGRAPHY

Dr. David E. Lumley is Professor, Green Chair in Geophysics, and Director of the Center for Lithospheric Studies at the University of Texas at Dallas. He was previously Professor, Chair in Geophysics, and founding Director of the Center for Energy Geoscience, jointly appointed to the Schools of Physics, and Earth & Environment, at the University of Western Australia. David has also held academic positions at Stanford and USC, and has served as an Adviser to the US National Academy of Sciences. Prof Lumley has been a Chief Investigator on over \$135 Million in competitive research grants, and co-authored over 150 peer-reviewed journal papers and expanded conference abstracts, including *JGR Solid Earth*, *Geophysical Research Letters*, *Geophysical Journal International*, and *Geophysics*, resulting in 2,100+ citations, an h-index of 24, and eight (8) Best Paper awards to date. He is the recipient of several awards and honors, including SEG's inaugural Karcher Award for his pioneering contributions to 4D Seismology, and has served as a Distinguished Lecturer and Instructor for several scientific societies. David has a PhD in Geophysics from Stanford University, and BSc (Hons) and MSc degrees from Geophysics & Astronomy at the University of British Columbia. His industry experience includes founder and leader of the 4D Seismic research team at Chevron, and founder and CEO of 4th Wave Imaging Corp (purchased by Fugro in 2007). David's expertise is wave-theoretic imaging and inversion, especially 3D seismic imaging, 4D time-lapse monitoring, and inverse theory estimation of physical properties in the earth and oceans, combining innovative physics, mathematics and high performance computing. His research interests include wavefield data recorded with 'Large N' sensor arrays, using manmade sources, or natural sources such as earthquakes and ambient seismic noise. Applications include earth science energy resources, subsurface fluid flow and reservoirs, CO2 injection and storage, natural and induced earthquake seismicity, and tectonics; at scales ranging from the near-surface, to ocean and shallow sediments, to reservoir depths, and the Moho crust-mantle boundary.

EDUCATION

- **Ph.D. Geophysics**, Stanford University, 1995.
PhD Thesis title: “Seismic time-lapse monitoring of subsurface fluid flow.”
PhD Supervisor: Prof. Jon Claerbout (PhD, Massachusetts Institute of Technology)
- **M.Sc. Geophysics**, University of British Columbia, 1989.
MSc Thesis title: “Generalized Kirchhoff-WKBJ depth migration theory for multi-offset seismic reflection data: reflectivity model construction by wavefield imaging and amplitude estimation.”
MSc Supervisor: Prof. Doug Oldenburg (PhD, U. California San Diego, Scripps Institute)
- **B.Sc. (Hons) Geophysics**, University of British Columbia, 1986.

POSITIONS HELD

- Professor; Green Chair in Geophysics; University of Texas at Dallas (2017-).
- Director, Center for Lithospheric Studies, University of Texas at Dallas (2017-).
- Adjunct Professor, Physics & Astrophysics, University of Western Australia (2017-).
- Professor; Chair in Geophysics; University of Western Australia (2009-2017).
- Director, Centre for Energy Geoscience, University of Western Australia (2009-2017).
- Director, UWA Reservoir Management research consortium, UWA (2009-2017).
- Geophysics Advisor, Fugro Corp. (2007-2008).
- Adjunct professor, Viterbi School of Engineering, University of Southern California, USA (2005-2008), research and teaching areas: advanced reservoir monitoring techniques, smart sensor monitoring technology.
- Founder, 4th Wave Imaging Corp., USA. Chairman (1999-2007), President and CEO (1999-2006), Chief Scientist (1999-2007). Company acquired in 2007 by Fugro (www.fugro.com). 4D time-lapse seismic monitoring research, software and services.
- Senior Staff Research Scientist, Chevron Research Lab (CPTC), USA (1995-1999). Founder and lead Chief Investigator (CI) of Chevron’s 4D Seismic reservoir monitoring research team (20+ staff: geophysics, geology, engineering);
- Adjunct professor, Dept. of Geophysics, Stanford University, USA (1995-2000), research and mentoring areas: seismic imaging, inversion and monitoring of subsurface fluid flow.
- PhD Candidate, Research Associate, Stanford Exploration Project, Dept. of Geophysics, Stanford University, USA (1991-1995), research areas: 4D seismic reservoir monitoring, 3D seismic imaging and inversion, high performance supercomputing (HPC).
- Research Geophysicist, ARCO Research Corp., Reservoir geophysics group, USA (1990-1991), research areas: pre-stack seismic inversion to estimate rock & fluid properties.
- MSc Candidate, Research Assistant, Dept. of Geophysics and Astronomy, University of British Columbia, Canada (1986-1989), research areas: geophysical inverse theory.
- Research Assistant, Mobil Research and Development Corp., USA, (research internships 1986, 1988), research areas: pre-stack seismic depth imaging, velocity analysis and inversion; Vibroseis source wavefield estimation; VSP data analysis, elastic wave propagation, field trial research.
- Research Assistant, Mobil Oil Canada, Canada (summer internship, 1985), research areas: Vibroseis source wavefield analysis, seismic image processing.
- Seismic Crew Leader, Western Geophysical Corp., various marine seismic data acquisition vessels, USA, Canada, (1982-84), supervised seismic crew, responsible for seismic recording room, 3D streamer deployment/retrieval, seismic data quality control.

HONORS AND AWARDS

- Distinguished Instructor, “4D Seismic Reservoir Monitoring”, Australian Soc. Explor. Geophys. (ASEG) (2015-16).
- Best Student Paper Award (second author), Soc. Explor. Geophys. (SEG) (2013).
- Best Paper Award (second author), Australian Soc. Explor. Geophys. (ASEG) (2012).
- Best Student Paper Award (second author), Austral. Soc. Explor. Geophys. (ASEG) (2012).
- Vice President (elected), Soc. Explor. Geophys. (SEG) (30,000+ members) (2009-2010).
- Honored by the SEG on the History of Geophysics Timeline as one of the pioneers in developing the science of 4D seismic monitoring, 75th Anniversary of the Society (2005).
- Joint Society Distinguished Lecturer, SEG and AAPG, lecture title: “*The next wave in reservoir monitoring: the instrumented oilfield*”, visited 40+ international lecture sites (2000-2001).
- Distinguished Lecturer, Society of Petroleum Engineers, lecture title: “*Practical Aspects of 4D Seismic: What an Engineer Needs to Know*”, visited 30+ international lecture sites with co-author/co-lecturer Dr. Ronald Behrens (1998-99).
- Best Paper Award (first author), Society of Venezuelan Geophysicists, Caracas (1998).
- Best Paper Award (first author), *The Leading Edge*, SEG (1997).
- Best Paper Award (first author), SEG Conference, Dallas (1997).
- J. Clarence Karcher Award, SEG, inaugural award recipient with co-awardees Prof James Rector (UC Berkeley) and Prof Maarten de Hoop (Rice), awarded to recognize DL’s pioneering research contributions in the development of 4D Seismology (1996).
- Best Paper Award (sole author), SPIE Mathematical Geophysics, San Diego (1994).
- Best Student Paper Award (sole author), SEG Conference, Dallas (1989).
- Amoco Canada Scholarship (1989-1993), \$20,000 per annum (waived in order to attend Stanford University for PhD studies).
- CSEG/SEG Scholarships (1985-89), \$1,000 each year.
- Gillanders Memorial Award, Top BSc Hons Geophysics student, UBC (1986), \$2,000.

PROFESSIONAL SERVICE

- Scientific Reviewer: *Journal of Geophysical Research (A*)*, *Geophysical Research Letters (A*)*, *Geophysical Journal International (A)*, *Geophysics (A)*, *International Journal of Greenhouse Gas Control (A)*, *Australian Research Council (ARC)*, *US National Science Foundation (NSF)*, and others (1995-present).
- Faculty Performance (PPE) Review Committee, NS&M, UT Dallas (2017-18).
- Dean’s Task Force on Energy & Environment, UT Dallas (2017-18)
- UWA Faculty of Science Research Committee (2015-2017).
- Board Member, iVEC@UWA Pawsey High Performance Computing Research Center (2015-2016).
- Guest Editor, *Geophysics*, Special Issue on Geophysical Monitoring (2013-2015).
- Science Leader, ANLEC – Australian National Low Emissions Carbon (CCS) research and development (2013-2016).
- Chairman, Joint AGU-SEG Research Workshop, *Advances in Active+Passive Full Wavefield Seismic Imaging: from Reservoirs to Plate Tectonics* (2013-14).
- AGU-SEG Scientific Collaboration Committee (2012-2015).
- SPE Committee for awarding Early Career Professorial Research Grants (2012-2013).
- Scientific Organising Committee, 34th International Geological Conference (2011-12).
- Judges Panel, Western Australia “Innovator of the Year” Awards (2010-2013).
- Petroleum, Geothermal and CO2 Sequestration Advisory Committee, Dept. Mines and Petroleum, Western Australia State Govt. (2009-2015).
- Chief Scientist for CO2 Sequestration, University of Western Australia (2009-2017).
- Scientific Advisor, Geophysical monitoring, CO2CRC (2009-2016).
- Vice President (elected), Soc. Explor. Geophys. (SEG) (2009-2010).

- Chairman, SEG Summer Research Workshop “*CO2 Sequestration Geophysics*” (2009).
- Co-Chairman, Joint AAPG/SPE/SEG Hedberg Conference on CO2 Sequestration (2009).
- SPE Organizing Committee for Applied Technology Workshop on 4D seismic reservoir monitoring (2008).
- Founding member, SEG Research sub-committee on CO2 sequestration (2007-present)
- SEG Research Committee (1998-present).
- SEG Distinguished Lecturer committee (2000-2011).
- Session Chairman, numerous scientific conferences, workshops... (1995-present).
- Technical Reviewer, SEG Technical Program Committee (1993-present)
- Advisor to the US National Academy of Sciences (2002), on the long-term geotechnical and civil engineering research needed to optimize major US city infrastructures.
- Chairman, SEG Summer Research Workshop (2001), “*Synergies in Geophysical, Medical and Space Imaging*”, USA.
- SEG Annual Technical Program Committee (1997, 1998, 1999).
- Joint SPE/SEG Research Forum Organizing Committee (1996).
- Associate Editor, *Geophysics* journal (1995-1999).

MAJOR COMPETITIVE RESEARCH GRANTS

\$135+ Million in competitive research grants awarded to date, the majority as Lead CI:

- Chief Investigator: *Passive Seismic Monitoring of the Otway 2C project: CO2 test injection at the Otway CCS research site, Australia*; CO2CRC; **\$1,092,128**; 2015-18.
- Chief Investigator: *Passive Seismic investigations at the SW Hub CCS site, West Australia*; ANLEC; **\$647,842**; 2015-17.
- Chief Investigator: *Stratigraphic architecture, reservoir rock properties and geophysical characteristics of cool-water carbonate ramps*; Total E&P Recherche Developpement SAS; **\$200,000**; 2015-16.
- Chief Investigator: *Western Australia Modelling (WAMO) research project*; various energy industry sponsors; **\$1,260,000**; 2015-18.
- Chief Investigator: *Feasibility of monitoring an injected CO₂ plume at the SW Hub CCS site*; including Lead CI for the *InSAR monitoring feasibility sub-project*, ANLEC; **\$730,716** total; 2015-16.
- Chief Investigator: *Elastic full waveform inversion for monitoring using field data and comparison with Acoustic FWI*; JOGMEC; **\$85,000**; 2015-16.
- Chief Investigator: *Passive Seismic Monitoring of the North Perth Basin Tight Gas Field Projects*; CSIRO; **\$48,000**; 2015-16.
- Chief Investigator: *Advanced 3D seismic processing at the SW Hub CCS site*; ANLEC; **\$657,675** total; 2014-15.
- Chief Investigator: *Passive seismic deployments at National CCS Flagship research sites*; Australian Geophysical Observing System (AGOS), ex AuScope; **\$250,000**; 2014-15.
- Chief Investigator: *Elastic Full Waveform Inversion for S-Wave Velocity Using Vector Potential*; JOGMEC; **\$65,000**; 2014-15.
- Chief Investigator: *Full Waveform Inversion of VSP data for Q Attenuation Estimation*; Chevron Australia; **\$50,000**; 2014-15.
- Chief Investigator: *Feasibility and design of robust passive seismic monitoring arrays for CO2 geosequestration*; ANLEC; **\$1,366,891** total; 2013-2015.
- Chief Investigator: *Woodside-Chevron Professorship in Palynology*; Woodside Energy; Chevron Australia; **\$900,000**; 2013-17.
- Chief Investigator: *Shipwrecks of the Roaring Forties: A Maritime Archaeological Reassessment of Some of Australia's Earliest Shipwrecks*; ARC Linkage Grant LP130100137; **\$489,368**; 2013-16.
- Chief Investigator: *Landmark Software grant*; **\$9,378,600 (in-kind)**; 2012-2017.
- Chief Investigator: *Schlumberger Software grant*; **\$1,801,285 (in-kind)**; 2012-2017.

- Chief Investigator: *Woodside Professorship in Computational Geoscience*; Woodside Energy; **\$650,000**; 2012-17.
 - Chief Investigator: *A new seismic facility for investigating tectonic collision zones, earthquake hazard and passive exploration techniques*; ARC LIEF Grant LE120100061, **\$795,000** total; 2012.
 - Chief Investigator: *Advanced Geophysical Data Analysis for the SW Hub Harvey-1 Data Well*; ANLEC; **\$345,073**; 2012.
 - Chief Investigator: *UWA Campus Borehole Passive Seismic Station*; Australian Geophysical Observing System (AGOS), ex AuScope; **\$40,000**; 2012.
 - Chief Investigator and UWA Science Leader: *National Geosequestration Lab Infrastructure Project*; Australian Govt. Education Investment Fund (EIF) Funding Agreement; **\$48,400,000**; 2011-2015.
 - Chief Investigator: *Southwest Hub CCS Flagship Project*; Australian Govt. (DRET) Funding Agreement #002249; **\$52,000,000**; 2011-2015.
 - Chief Investigator: *Seismic monitoring with permanent sensor arrays*; CGG Veritas; **\$450,000**; 2011-2014.
 - Chief Investigator: *4D seismic wave-equation inversion for monitoring gas reservoirs*; Chevron Australia; **\$345,000**; 2012-14.
 - Chief Investigator: *Feasibility of using time-lapse seismic to monitor and quantify gas production in clastic reservoirs*; Woodside Energy; **\$230,000**; 2011-12.
 - Chief Investigator: *Characterization of Canning Basin (Western Australia) for exploration of unconventional energy and CO2 sequestration storage*; WA Government (DMP-GSWA); **\$1,644,476**; 2011-2013.
 - Chief Investigator: *Tight Gas Reservoir Modelling*; WA Energy Research Alliance WAERA ex Geological Survey of Western Australia; **\$758,000**; 2010-11.
 - Chief Investigator, Director: *UWA Reservoir Management (UWA:RM) research consortium*; various energy industry sponsors; *Research Areas: 3D and 4D Seismic modeling, imaging, and inversion (including RTM and FWI), high performance computing (HPC); characterization and monitoring of reservoirs for hydrocarbon exploration and recovery, CO2 sequestration. Includes 30+ research staff and PhD students in geophysics, geology and engineering*; **\$4,000,000+** (2010-2017).
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- Chief Investigator: *Time-lapse 3D Ground Penetrating Radar (GPR) characterization and monitoring of near-surface groundwater and contaminant flows*, US Department of Energy, SBIR Phase I and II, **\$850,000** (2005-2008).
 - Chief Investigator: *Time-lapse P- and S-wave monitoring of fluid flow with application to CO2 sequestration monitoring and verification*, US National Science Foundation, SBIR Phase I, II and IIB, **\$850,000** (2002-2006).
 - Chief Investigator: *Time-lapse seismic modeling and inversion of CO2 saturation for sequestration and enhanced oil recovery*, US Department of Energy, National Energy Technology Lab, **\$624,000** (2003-2006).
 - Chief Investigator: *Enhanced 3D multi-component seismic imaging for lithology and fluid characterization*, US Department of Energy, SBIR Phase I, II, **\$740,341** (2001-5).
 - Chief Investigator: *Parallel processing of time-lapse seismic data via the internet*, US National Science Foundation, SBIR Phase I and II, **\$708,459** (2000-2005).
 - Chief Investigator: *Imaging Subsurface Fluid Flow with Time-Lapse Seismic Data*, US National Science Foundation, SBIR Phase I and II, **\$526,625** (2000-2003).
 - Chief Investigator: *4th Wave Imaging research consortium*, research area: Inversion of time-lapse seismic data to estimate reservoir pressure and saturation changes, research funds of **\$1,000,000+** total for 3-year project life-span (2000-2003).

POSTDOCTORAL RESEARCH STAFF SUPERVISED:

1. Dr. Wei Zhou, PhD Geophysics, Grenoble; Full waveform inversion (2018-19).
2. Dr. Julian Drew, PhD Geophysics, Cambridge U.; Passive seismology (2015-17).
3. Dr. Erdinc Saygin, PhD Geophysics, ANU; Earthquake seismology (2016-17).
4. Dr. Beau Whitney, PhD Civil Eng., UWA; Earthquake geo-hazards (2015-16).
5. Dr. Mohammad Niri, PhD Geophysics, UWA; Reservoir geophysics (2015).
6. Dr. Taka Miyoshi, PhD Eng., Kyoto U.; High performance computing (2013-17).
7. Dr. Rie Kamei, PhD Geophysics, U.W. Ontario; Full waveform inversion (2013-17).
8. Dr. Toby Potter, PhD Physics, UWA; HPC computational seismology (2013-17).
9. Dr. UGeun Jang, PhD Eng., Seoul Nat. U.; Full waveform inversion (2012-16).
10. Dr. Tatiana Rodriguez, PhD Physics, U. Penn.; Reverse-time wavefield imaging (2012).
11. Dr. Nader Issa, PhD Physics, Sydney; Permanent sensor array monitoring (2012-16).
12. Dr. Jeffrey Shragge, PhD Geophysics, Stanford; Wave-equation imaging and velocity estimation (2009-2013).

GRADUATE STUDENTS SUPERVISED:

1. Mengli Zhang, PhD Geophysics, UTD (2017-); Compressive sensing with applications to 3D and 4D seismic.
2. Chenglong Duan, PhD Geophysics, UTD (2017-); Full waveform inversion of microseismic events.
3. Jaewook Lee, PhD Geophysics, UTD (2017-); 4D seismic monitoring of shale reservoirs with Machine Learning.
4. Sophie Monnier, PhD Geophysics, UWA (2015-17); Wave equation imaging and inversion of innovative crust-mantle Ocean Bottom Seismometer (OBS) data.
5. Paul Connolly, PhD Mech. Eng., UWA (2015-); Lab measurements and rock physics analysis of cores undergoing CO₂ flooding at reservoir pressure and temperature.
6. Aaron Girard, PhD Geophysics, UWA (2014-); Reservoir imaging and monitoring with passive seismic ambient noise data.
7. Ben Witten, PhD Geophysics, UWA (2013-17); Image-domain adjoint-state wave-equation velocity estimation with passive seismic data.
8. Rafael Medeiros de Souza, PhD Geophysics, UWA (2012-17); 4D seismic history matching and fluid flow model selection
9. Mohammad Emami Niri, PhD Geophysics, UWA (2011-15); 4D reservoir model updating by multi-objective nonlinear stochastic optimization
10. Jillian Young, MSc Geoscience, UWA (2011-13); Portfolio analysis of CO₂ sequestration options and barriers to adoption.
11. James Deeks, PhD Geophysics, UWA (2011-); Computational waves and rock physics.
12. Lisa Gavin, PhD Geophysics, UWA (2011-16); Stress-induced seismic azimuthal anisotropy.
13. Matthew Saul, PhD Geophysics, UWA (2010-13); Non-elastic pressure-dependent rock physics of porous saturated sandstones.
14. Wendy Young, MSc Geophysics, UWA (2010-12); Time-lapse gravity monitoring of gas depletion and CO₂ sequestration.
15. Amir Nejad*, M.Eng. Petrol. Eng., USC (2007-9); Ensemble Kalman filtering and particle swarm optimization applied to reservoir production history matching.
16. Richard Wright*, PhD Geophysics, Memorial U. (2000-5); Hibernia 4D seismic analysis.
17. James Rickett*, PhD Geophysics, Stanford (1996-2001); Spectral factorization of wavefields and wave operators.
18. Christine Ecker*, PhD Geophysics, Stanford (1993-1998); Seismic characterization of methane hydrates.

* co-supervised thesis chapter(s) as an Adjunct professor.

COURSES TAUGHT:

- Exploration Seismology, MSc/PhD levels, UTD (2018-).
- Exploration Seismology, BSc/MSc levels, UWA (2014-).
- Advanced Seismology, MSc/PhD levels, UWA (2010-).
- Geophysical Inverse Theory, MSc/PhD levels, UWA (2010-).
- 4D Seismic Monitoring; MSc/PhD levels, UWA, Industry, Govt (1999-).
- Seismic Monitoring and Smart Sensor Arrays; MSc/PhD levels, USC (2005-8).
- 3D Seismic Imaging, BSc/MSc/PhD levels, UWA, Industry, Govt (2007-).
- Guest lectures in Geophysics, Seismology, BSc/MSc levels, UWA (2012-)
- Guest lectures in Earth & Environmental Science at BSc/MSc levels, UWA (2009-).

SCIENTIFIC SOCIETY MEMBERSHIPS:

- American Geophysical Union (AGU)(Life Membership)
- Australian Society of Exploration Geophysicists (ASEG)
- European Association of Geoscientists and Engineers (EAGE)
- Society of Exploration Geophysicists (SEG)(Life Membership)
- Society of Industrial and Applied Mathematics (SIAM)
- Society of Petroleum Engineering (SPE)
- Seismological Society of America (SSA)

VOLUNTEER AND CHARITABLE SERVICE:

- **Permanently endowed two (2) scholarships**, each awarded annually since 2008:
 - ***AGU Lumley Scholarship in Energy & Environment:*** to encourage outstanding young AGU scientists engaged in environmental/climate geophysics research to consider energy aspects in their work (Amer. Geophys. Union, 2008-).
 - ***SEG Lumley Scholarship in Energy & Environment:*** to encourage outstanding young SEG scientists engaged in energy geophysics research to consider environment/climate aspects in their work (Soc. Explor. Geophys., 2008-).
- **Advanced Coach**, *American Youth Soccer Association (AYSO)*, (1999-2008). Selected as Head Coach U18 Division for USA National AYSO Tournaments in Chicago (2006), and Hawaii (2008).
- **Musician** (guitars, vocals), *Relay for Life, American Cancer Society, SEG Presidential Jam*, and various other charity fundraising events, (2000-present).

REFERENCES:

- Provided upon request.

PUBLICATIONS*

SUMMARY:

- 150+ refereed publications and expanded conference abstracts.
- Total citations=2,160+, h-index=24, i10-index=40; Google Scholar.
- Eight (8) Best Paper awards.
- A full list of publications is available online at Google Scholar.

TEN CAREER-BEST PUBLICATIONS (ordered by number of citations):

1. **Lumley, D.E.**, 2001, Time-lapse seismic reservoir monitoring: *Geophysics*, 66, 50-53. *This invited paper was published in a special “Millennium” issue of Geophysics, in which top scientists in various geophysical research topics were invited to discuss the state of the art and road ahead in their respective areas of research expertise (304 citations on Google scholar).*

2. **Rickett, J.** and **D.E. Lumley**, 2001, Cross-equalization data processing for time-lapse seismic reservoir monitoring - A case study from the Gulf of Mexico: *Geophysics*, 66, 1015-1025. *This paper was among the first to present a coherent theory and data examples to perform time-lapse image processing of multiple seismic data sets for reservoir monitoring using statistical filter theory and nonlinear non-stationary image processing operators (197 citations on Google scholar).*

3. **Lumley, D.E.**, R.A. Behrens, and Z. Wang, 1997, Assessing the technical risk of a 4-D seismic project: The Leading Edge, 16, no. 09, 1287-1291. *This paper was awarded Best Paper at the 1997 Annual SEG Conference, and the method described therein is now widely known as the “Lumley 4D seismic feasibility method” in the geophysical community (134 citations on Google scholar).*

4. Tura, A., and **D.E. Lumley**, 2000, Estimating pressure and saturation changes from time-lapse AVO data: Expanded Abstracts, Offshore Technology Conference, SPE #12130 *This paper was among the first to present a method to estimate fluid saturation and pressure changes from time-lapse 4D seismic AVO data (131 citations on Google scholar).*

5. **Lumley, D.E.**, Claerbout, J. F., and Bevc, D., 1994, Anti-aliased Kirchhoff 3-D migration: Expanded Abstracts, 64th Annual Internat. Mtg., Soc. Expl. Geophys., 1282-1285. *Designated as an Outstanding Paper, this work quantifies the effect of imaging operator aliasing and presents a computationally efficient solution for high performance computer algorithms (111 citations on Google scholar).*

6. **Lumley, D.E.**, 2010, 4D seismic monitoring of CO₂ sequestration: The Leading Edge, 29 (2), 150-155. *This invited paper incorporates many years of the author’s research using 4D time-lapse seismology to image injected CO₂, and proposes the future research breakthroughs needed to advance the science of monitoring CO₂ sequestration projects (109 citations on Google scholar).*

7. Audebert, F., D.E. Nichols, T. Rekdal, B. Biondi, **D.E. Lumley**, and H. Urdaneta, 1997, Imaging complex geologic structures with single-arrival Kirchhoff prestack depth migration: *Geophysics*, 5, 1533-1543. *This paper is highly regarded in the geophysical community for quantifying the stability and accuracy of 3D seismic imaging methods using various Kirchhoff integral approximations to the wave equation and image enhancement operators (87 citations on Google scholar).*

* PhD students and Postdocs are underlined

8. **Lumley, D.E.**, 1995, Seismic time-lapse monitoring of subsurface fluid flow, Ph.D. Dissertation, Stanford University, USA. *On the basis of this PhD Thesis and related publications and presentations, DL was jointly co-awarded the first Karcher Award by SEG in 1996 to recognize his pioneering research in the development of the time-lapse 4D seismic imaging technique (72 citations on Google scholar).*

9. **Lumley, D.E.**, and R.A. Behrens, 1998, Practical issues of 4D seismic reservoir monitoring: What an engineer needs to know: SPE Reservoir Evaluation and Engineering, SPE #38696, Soc. Petrol. Eng., **1**, 6, 528-538. *This paper received an Outstanding Paper designation, and was selected for the SPE Distinguished Lecture Series; Lumley and Behrens gave Distinguished Lecture presentations at 30+ international locations during 1998-99 (64 citations on Google scholar).*

10. **Lumley, D.E.**, 2001, The next wave in reservoir monitoring – the instrumented oil field: The Leading Edge, 20, no. 6, 640-648. *This paper received Honorable Mention (runner-up) for Best Paper; it discusses the novel use of permanent sensor arrays to instrument and monitor subsurface reservoirs and is often credited for helping to accelerate the development of next generation smart sensors and remote automated monitoring systems (53 citations on Google scholar).*

REFEREED JOURNAL ARTICLES

1. Potter, T., J. Shragge, and **D. Lumley**, 2018, Performance and stability of the Double Absorbing Boundary Method for acoustic wave propagation: *J. Computational Physics*, in review.
2. Gavin, L., and **D. Lumley**, 2018, The effects of seismic azimuthal anisotropy on 3D and 4D AVO responses: *Geophysics*, in review.
3. Shragge, J., **D. Lumley**, N. Issa, T. Hoskin, A. Paterson, and J. Green, 2017, Surveying Batavia's graveyard: geophysical controlled experiments and subsurface imaging of archaeological sites on an Indian Ocean coral island: *Geophysics*, 82 (4), B147-163. <https://doi.org/10.1190/geo2016-0531.1>
4. Issa, N., **D. Lumley**, and R. Pevzner, 2017, Passive seismic imaging at reservoir depths using ambient seismic noise recorded at the Otway CO₂ geological storage research facility: *Geophys. J. Internat.*, 209 (3), 1622-1628. <https://doi.org/10.1093/gji/ggx109>
5. Kamei, R., and **D. Lumley**, 2017, Full waveform inversion of repeating seismic events to estimate time-lapse velocity changes: *Geophys. J. Internat.*, 209 (2), 1239-1264. <https://doi.org/10.1093/gji/ggx057>
6. Gavin, L., and **D. Lumley**, 2017, Stress-induced seismic azimuthal anisotropy, sand-shale content and depth trends offshore NW Australia: *Geophysics*, 82(2), C77-90. <https://doi.org/10.1190/geo2015-0709.1>
7. Saygin, E., P. Cummins, and **D. Lumley**, 2017, Retrieval of the P-wave Reflectivity Response from Autocorrelation of Seismic Noise: Jakarta Basin, Indonesia: *Geophys. Res. Letters*, doi: 10.1002/2016GL071363.
8. de Souza, R., **D. Lumley**, and J. Shragge, 2016, Estimation of reservoir fluid saturation from 4D seismic data: effects of noise on seismic amplitude and impedance attributes: *J. Geophys. Eng.*, 14 (1), 51.
9. **Lumley, D.**, King, A., Pevzner, R., Bona, A., Dautriat, J., Esteban, L., Hauser, J., Hoskin, T., Issa, N., Kamei, R., Langhi, L., Miyoshi, T., Mueller, T., Potter, T., Sarout, J., Siggins, T., Shragge, J., Tertyshnikov,

- K., Urosevic, M., 2016, *Feasibility and Design for Passive Seismic Monitoring at the SW Hub CO2 Geosequestration Site*: Australian National Low Emissions Council (ANLEC) R&D Project Number 7-0212-0203. http://anlecrd.com.au/reports_storage/.
10. Emami Niri, M., and **D.E. Lumley**, 2016, Estimation of subsurface geomodels by multi-objective stochastic optimization: *J. App. Geophys.*, 129, 187-199.
 11. Emami Niri, M., and **D.E. Lumley**, 2016, Probabilistic Reservoir Property Modelling Jointly Constrained by 3D Seismic Data and Hydraulic Unit Analysis: *SPE Reservoir Evaluation and Engineering*, SPE #171444, <http://dx.doi.org/10.2118/171444-PA>.
 12. Gavin, L., and **D. Lumley**, 2015, Stress-induced seismic azimuthal anisotropy in the upper crust across the North West Shelf, Australia: *J. Geophys. Res. Solid Earth*, 121, 1023-1039, doi: 10.1002/2015JB012568.
 13. Kamei, R., N. Nakata, and **D. Lumley**, 2015, Introduction to microseismic source mechanisms: *The Leading Edge*, 34 (8), 876-880. doi: 10.1190/tle34080876.1
 14. Emami Niri, M., and **D. Lumley**, 2015, Initialising reservoir models for history matching using pre-production 3D seismic data: constraining methods and uncertainties: *Exploration Geophysics*, <http://dx.doi.org/10.1071/EG15013>.
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