

## CV - ARILD BULAND

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Norwegian | Born May 17, 1966.

### CURRENT POSITIONS

- Leader Department of Geophysical Methods and Analysis, Equinor (full time position).
- Adjunct Professor (20%), Department of Mathematics and Physics, University of Stavanger.

### EDUCATION:

- Ph.D., 2002: Statistics, Department of Mathematical Sciences, Norwegian University of Science and Technology (NTNU), Trondheim.
- M.Sc., 1990: Applied Mathematics, Department of Physics and Mathematics, Norwegian University of Science and Technology (previously Norwegian Institute of Technology).

### MAIN FIELDS OF COMPETENCE:

- Mathematical/applied statistics and Geophysics, (Ph.D./Professor)
- Technical and line leadership (>10 years' experience)

### JOB EXPERIENCE (FULL TIME POSITIONS):

- Equinor 1997-present
  - Various leadership roles in Equinor Exploration (2008-2021): Leading Advisor Special Geophysical Methods (2008-2010); Leader for Geophysical Analysis (GA) department, ca 15 persons (2010-2013); Exploration Manager responsible for around 20 North Sea Licenses, ca 15 persons, budget 1 billion NOK/year (2013-2015); Leader position as representative for Chief Geophysicist on R&D matters, Equinor Technology Strategy, steering documentation, and prioritized exploration projects (2015-2017); Leader for Seismic Interpretation and Analysis department/Seismic Analysis department, 12-24 persons (2017-2021), Leader Geophysical Methods and Analysis, ca 30 persons, 2022-now.
  - R&D (1997-2008): Various R&D projects mainly within application of statistical methods in geophysics. Ph.D. project (1998-2002). From 2003 project leader for development of Bayesian inversion methods for exploration and production. Promoted to Specialist in 2008.
- Sintef Petroleum Research 1992-1997
  - Research Geophysicist, Seismic Methods Department. Software development for seismic processing and inversion. Broad responsibility for generation of new projects, marketing, sales, customer relationships and project management and project execution.
- University of Trondheim 1991-1992
  - Sivil-ingeniør, Computer programming for ultrasound imaging.

#### ACADEMIC EXPERIENCE:

- 2022- Adjunct Professor (20%). Department of Mathematics and Physics, University of Stavanger.
- 2012-2021 Adjunct Professor (20%). Department of Energy Resources, University of Stavanger.
- 2008-2011 Adjunct Associate Professor (20%). University of Stavanger.

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#### LECTURING:

- STA600 Generalized Linear Models, UiS, 2022-. Credits (ECTS): 10.
- GEO670 Seismic analysis and inversion, UiS, 2018-2021. Credits (ECTS): 10.
- GEO610 Petrophysics and seismic analysis, UiS, 2012-2017. Credits (ECTS): 10 (50%).
- PET918 Advanced seismic amplitude analysis and inversion, UiS, 2013. PhD level.
- MPG250 Seismic amplitude analysis and inversion. UiS, 2011. Credits (ECTS): 5.
- MPG140 Seismic methods. UiS, 2008-2010. Credits (ECTS): 5.
- MOT320 Mathematical statistics for petroleum. UiS, 2006-2007.
- Seismic Data Processing. NTNU, 1996. (Lectured 25% of course).

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#### SUPERVISION:

Supervisor for 13 master students at UiS:

1. M. S. Teklehaimanot, 2012: Seismic reservoir characterization: Norwegian sea, Norway.
2. R. Noor Pertiwi, 2014: Probabilistic seismic inversion for fluid and lithology prediction.
3. T. Nguyen, 2016: Seismic Inversion for Fluid and Lithology Prediction of the Mikkel Field.
4. A. Bilalova, 2017: Rock physics models for Cenozoic siliclastic sediments in the North Sea.
5. A. Cruz, 2017: Using well log curves to study compaction trends of the Garn Formation and expected seismic response.
6. I. Castillo, 2017: Bayesian Lithology and Fluid Prediction on the Mikkel Field using a geologically constrained prior model
7. L. Y. Saadallah, 2019: Joint Bayesian AVO and RMO inversion.
8. S. Choudhury, 2019: Reservoir Characterization of the Snorre field: A pseudo wells based inversion approach.
9. K. Pratikna, 2020: A study of Machine Learning application on net-to-gross prediction using seismic horizons. Case Study: The Brent Group - Statfjord Field.
10. C. B. Nelson, 2021: Machine learning for prediction of reservoir parameters in the Brent Group on the Statfjord Field.
11. S. V. Mansoor, 2021: Multi-trace attributes Self-Organizing Map analysis.
12. J. P. Masapanta Pozo, 2021: Well Log Prediction by Using Machine Learning.
13. Henrik I. Jakobsen, 2024: Bayesian signal analysis (Work title - ongoing).

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#### OTHER:

- Associate Editor for Geophysics (SEG), Seismic Inversion, 2011-2013.
- Reviewer for various journals.

- Invited presentation at AAPG International Conference, 2011, as “Best of EAGE” from Barcelona 2010 [50].
- EAGE Distinguished Lecturer 2009 based on EAGE presentation in Rome, 2008 [46].
- Key-note presentation SPE/EAGE Workshop, Dubrovnik, Croatia, 2006 [42].
- Ph.D. evaluation committee for Helene H. Veire, NTNU, 2005.
- Member of
  - Norsk Statistisk Forening (Norwegian Statistical Association)
  - European Association of Geoscientists and Engineers (EAGE)

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JOURNAL PAPERS WITH INTERNATIONAL PEER REVIEW:

1. Mittet, R. and Buland, A., 1995: Numerical errors due to non-aligned interfaces in coarse grid modeling schemes. *Journal of Seismic Exploration*, **4**, 5-16.
2. Landrø, M., Buland, A. and D'Angelo, R., 1995: Target-oriented AVO inversion of data from Valhall and Hød fields. *The Leading Edge*, **14**, 855-861.
3. Buland, A., Landrø, M., Andersen, M. and Dahl, T., 1996: AVO inversion of Troll Field data. *Geophysics*, **61**, 1589-1602.
4. Buland, A. and Landrø, M., 2001: The impact of common-offset migration on porosity estimation by AVO inversion. *Geophysics*, **66**, 755-762.
5. Buland, A. and Omre, H., 2003: Bayesian linearized AVO inversion. *Geophysics*, **68**, 185-198.
6. Buland, A. and Omre, H., 2003: Bayesian wavelet estimation from seismic and well log data. *Geophysics*, **68**, 2000-2009.
7. Buland, A. and Omre, H., 2003: Joint AVO inversion, wavelet estimation and noise level estimation using a spatially coupled hierarchical Bayesian model. *Geophysical Prospecting*, **51**, 531-550.
8. Buland, A., Kolbjørnsen, O. and Omre, H., 2003: Rapid spatially coupled AVO inversion in the Fourier domain. *Geophysics*, **68**, 824-836.
9. Buland, A. and El Ouair, Y., 2006, Bayesian time-lapse inversion: *Geophysics*, **71**, R43-R48.
10. Larsen, A. L., Ulvmoen, M., Omre, H. and Buland, A., 2006, Bayesian lithology/fluid prediction and simulation based on a Markov-chain prior model: *Geophysics*, **71**, R69-R78.
11. Causse, E., Riede, M., Van Wijngaarden, A. J., Buland, A., Dutzer, J. F., and Fillon, R., 2007, Amplitude analysis with an optimal model-based linear AVO approximation: – Part I: Theory: *Geophysics*, **72**, C59-C69.
12. Causse, E., Riede, M., Van Wijngaarden, A. J., Buland, A., Dutzer, J. F., and Fillon, R., 2007, Amplitude analysis with an optimal model-based linear AVO approximation – Part II: Field data example: *Geophysics*, **72**, C71-C79.
13. Buland, A., Kolbjørnsen, O., Hauge, R., Skjæveland, Ø., and Duffaut, K., 2008, Bayesian lithology and fluid prediction from prestack seismic data: *Geophysics*, **73**, C13-C21.
14. Ulvmoen, M., Omre, H., and Buland, A., 2010, Improved resolution in Bayesian lithology/fluid inversion from prestack seismic data and well observations: Part 2 — Real case study: *Geophysics*, **75**, B73-B82.

15. Kjøsberg, H., Hauge, R., Kolbjørnsen, O., and Buland, A., 2010, Bayesian Monte Carlo method for seismic predrill prospect assessment: *Geophysics*, **75**, P09-P19.
16. Buland, A., Løseth, L. O., Becht, A., Roudot, M., and Røsten, T., 2011, The value of CSEM in exploration: *First Break*, **29**, 69-76.
17. Buland, A., Kolbjørnsen, O., and Carter, A. J., 2011, Bayesian Dix inversion: *Geophysics*, **76**, R15-R22.
18. Buland, A. and Kolbjørnsen, O., 2012, Bayesian inversion of CSEM and magnetotelluric data: *Geophysics*, **77**, No. 1, E33-E42.
19. Kolbjørnsen, O., Hauge R., Førland, M. D., and Buland, A., 2012: Model-based fluid factor for controlled source electromagnetic data: *Geophysics*, **77**, No. 1, E21-E31.
20. Hammer, H., Kolbjørnsen, O., Tjelmeland, H., and Buland, A., 2012, Lithology and Fluid Prediction from Prestack Seismic Data using a Bayesian model with Markov process prior: *Geophysical Prospecting*, **60**, 500-515.
21. Kolbjørnsen, O., Buland, A., Hauge, R., Røe, P., Jullum, M., Metcalfe, R. W., and Skjæveland, Ø., 2016, Bayesian AVO inversion to rock properties using a local neighborhood in a spatial prior model: *The Leading Edge*, **35**, 431-436.
22. Kolbjørnsen, O., Buland, A., Hauge, R., Røe, P., Ndingwan, A. O., and Aker, E., 2020, Bayesian seismic inversion for stratigraphic horizon, lithology, and fluid: *Geophysics*, **85**, No. 3, R207-R221.

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PROCEEDINGS/ABSTRACTS:

23. Buland, A., Sollie, R. and Amundsen, J., 1995: Parallelisation of a code for Seismic Depth Migration. Presented at the High-Performance Computing and Networking (HPCN) conference. *Lecture Notes in Computer Science*, **919**, 910-915, Springer Verlag.
24. Buland, A. and Landrø, M., 1995: AVO inversion, theory and applications. Presented at the 20th NOFTIG meeting. Abstract.
25. Buland, A., Landrø, M., Andersen, M. and Dahl, T., 1995: AVO inversion of Troll field data. Presented at the 57th EAEG Meeting. Extended Abstract.
26. Mittet, R. and Buland, A., 1995: Numerical errors due to non-aligned interfaces in coarse-grid modelling schemes. Presented at the 57th EAEG Meeting. Extended Abstract.
27. Buland, A., Sollie, R. and Amundsen, J., 1995: Portable parallel code for depth migration. Presented at the 57th EAEG Meeting. Extended abstract A022.
28. Buland, A., Landrø, M., Sollie, R., Andersen, M. and Dahl, T., 1995: Lithology identification by AVO inversion. Presented at the 65th SEG Annual Meeting. Expanded abstract, 1115-1118.
29. Amundsen, J., Buland, A., Sollie, R., 1995: Parallelisation of a code for seismic depth migration. Presented at the European Intel Supercomputer User's Group, Rennes, France. Abstract.
30. Dahl, T. and Buland, A., 1996: A Procedure for Lithology and Fluid Prediction from Seismic Data. Presented at the NPF Conference. Expanded Abstract.
31. Buland, A., Hansen, O., Abrahamsen, P., and Hektoen, A., 1996: Stochastic reservoir characterization using AVO inversion. Presented at the EAGE Winter Symposium, Venice. Extended abstract V011.

32. Amundsen, J., Arntsen, B., Sollid, A., Buland, A., and Sollie, R., 1996: Parallelisation of 2-D and 3-D depth migration. Presented at the 66th SEG Annual Meeting. Expanded abstract, 1001-1004.
33. Buland, A., 1998: Relative amplitude processing -A contractor evaluation. Presented at the 60th EAEG Conference and Technical Exhibition. Extended Abstract.
34. Østmo, S., Tjøland, E., Buland, A., and Sollie, R., 1998: 3D target-oriented AVO inversion of data from the Statfjord Field. Presented at the 60th EAEG Conference and Technical Exhibition. Extended Abstract.
35. Buland, A. and Omre, H., 2000: Bayesian AVO inversion. Presented at the 62nd EAGE Conference and Technical Exhibition. Extended Abstract.
36. Buland, A. and Omre, H., 2001: Bayesian wavelet estimation from seismic and well log data. Presented at the 63rd EAGE Conference and Technical Exhibition. Extended Abstract.
37. Omre, H. and Buland, A., 2003: Bayesian seismic inversion and estimation in a spatial setting. Presented at the 65th EAGE Conference and Technical Exhibition. Extended Abstract.
38. Buland, A., Kolbjørnsen, O. and Omre, H., 2003: Rapid spatially coupled AVO inversion in the Fourier domain. Presented at the 73rd SEG Annual Meeting, Expanded abstract, 196-199.
39. Causse, E., Riede, M., Van Wijngaarden, A. J., Buland, A., Dutzer, J. F., and Fillon, R., 2005: AVO analysis with an optimal linear AVO approximation: Presented at the 65th EAGE Conference and Technical Exhibition. Extended Abstract.
40. Riede, M., Causse, E., Van Wijngaarden, A. J., Buland, A., Dutzer, J. F., and Fillon, R., 2005: Optimized AVO analysis by using an optimal linear approximation: Presented at the 75th SEG Annual Meeting, Expanded abstract, 222-226.
41. El Ouair, Y., Buland, A., Osdal, B., and Furre, A.-K., 2005: Improving drainage interpretation using a new Bayesian time-lapse inversion. Presented at the 67th EAGE Conference and Technical Exhibition. Extended Abstract.
42. Buland, A., 2006, Seismic information contents, scale and uncertainty: Key-note presentation SPE/EAGE Workshop, Dubrovnik, Croatia. Abstract.
43. Buland, A., Kolbjørnsen, O., and Hauge, R., 2007, Fast Bayesian prediction of lithology and fluid classes and rock properties from seismic data. Challenges in seismic rock physics, Beijing. Extended abstract.
44. Kolbjørnsen, O., Hauge, R., and Buland, A., 2007, Depth-to-time conversion errors in Bayesian seismic wavelet estimation. Petroleum Geostatistics, Caiscais. Extended abstract.
45. Hauge, R., Kolbjørnsen, O., and Buland, A., 2007, Feasibility of lithology and fluid prediction from seismic data. 77th SEG Annual Meeting, Expanded abstract.
46. Buland, A., Kolbjørnsen, O. and Hauge, R., 2008: Fast Bayesian Seismic Prestack Inversion with Consistent Coupling to Rock Physics. Presented at the 70th EAGE Conference and Technical Exhibition. Extended Abstract I016.
47. Ulvmoen, M., Omre, H., and Buland, A., 2009: spatially coupled lithology/fluid inversions from real seismic data and well observations. 71st EAGE Conference & Exhibition in Amsterdam. Extended abstract S031.

48. Kjøsberg, H., Hauge, R., Kolbjørnsen, O., and Buland, A., 2009: Integrating stochastic rock properties in seismic pre-drill prospect risk and reservoir quality assessment. SEG Annual Meeting. Expanded abstract RC 3.2.
49. Buland, A., Løseth, L. O., and Røsten, T., 2010, The value of CSEM data in exploration: 72nd EAGE Conference & Exhibition in Barcelona. Extended abstract C006.
50. Buland, A, Løseth, L. O., Becht, A., Roudot, M. and Røsten, T., 2011, The value of CSEM data in exploration “Best of EAGE”. Extended abstract 1072006. AAPG International Conference in Milan October 2011. Invited as “Best of EAGE” from Barcelona 2010 [27].
51. Riise, O., Elgenes, J., Frey-Martinez, J.M., Kjøsnes, Ø., and Buland, A., 2012, Detailed Lithology and Fluid Mapping of the Asterix Gas Discovery Using Bayesian Inversion Methodology: 74th EAGE Conference & Exhibition in Copenhagen, Denmark. Extended abstract C004.
52. Dischler, E., Hokstad, K. and Buland, A., 2013, Bayesian anisotropic Dix inversion, SEG, Expanded Abstract, 4853-4857.

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PATENTS:

53. Buland, A., El Ouair, Y., and Eiken, O., 2004: Processing seismic data representing a physical system (constrained inversion of 4D seismic). Patent Number: GB2409900.
54. Kolbjørnsen, O., Hauge, R., and Buland, A., 2008: Method of modelling a subterranean region of the earth. Patent Number: GB2463242.
55. Buland, A., 2010: Estimating interval velocities. Patent Number: US 9,223,043 (Filed: 31.03.2010; Date of Patent 29.12.2015).