Bibliography

Abdollahzadeh, A., Reynolds, A., Christie, M., Corne, D., Williams, G., and Davies, B. (2011). Estimation of distribution algorithm applied to history matching. *SPE Reservoir Simulation Symposium.* The Woodlands, TX: Society of Petroleum Engineers.

Abdollahzadeh, A., Reynolds, A., Christie, M., Corne, D. W., Davies, B. J., and Williams, G. J. (2012). Bayesian optimisation algorithm applied to uncertainty quantification. *SPE Journal* **17**(3), 865–873.

Armstrong, M. (1984). Problems with universal kriging. *Mathematical Geology* **16**, 101–108.

Armstrong, M., Galli, A., Le Loc'h, G., Geffroy, F., and Eschard, R. (2003). *Plurigaussian simulations in geosciences* (Berlin ed.). Springer-Verlag.

Arnold, D. (2008). *Geological parameterisation of petroleum reservoir models for improved uncertainty quantification.* PhD thesis, Institute of Petroleum Engineering, Heriot-Watt University, Edinburgh, UK.

Arnold, D., Demyanov, V., Christie, M., Bakay, A., and Gopa, K. (2016). Optimisation of decision making under uncertainty throughout field lifetime: A fractured reservoir example. *Computers & Geosciences* **95**, 123–139.

Arnold, D. P., Demyanov, V., Tatum, D., Christie, M., Rojas, T., Geiger, S., *et al.* (2012). Hierarchical benchmark case study for history matching, uncertainty quantification and reservoir characterisation. *Computers & Geosciences* **50**, 4–15.

Arpat, G. B. and Caers, J. (2004). A multiple-scale, pattern-based approach to sequential simulation. In A. L. Deutsch (Ed.), *Geostatistics Banff 2004* (pp. 225–264). Kluwer Academic Publishers.

Barnes, R. (1991). The variogram sill and the sample variance. *Mathematical Geology* **23**(4), 673–678.

Batty, M. (1974). Spatial entropy. *Geographical Analysis* **6**(1), 1–31.

Bennett, K. and Demiriz, A. (1999). Semi-supervised support vector machines. *Advances in Neural Information Processing Systems*, 368–374.

Bishop, C. M. (1995). *Neural networks for pattern recognition.* Oxford University Press.

Bond, C. E., Gibbs, A. D., Shipton, Z. K., and Jones, S. (2007). What do you think this is? "Conceptual uncertainty" in geoscience interpretation. *GSA Today* **17**(11), 4–10.

Box, G. E. P. and Draper, N. R. (1987). *Empirical model-building and response surfaces.* New York, NY: John Wiley & Sons.

Bridge, J. (2003). Rivers and floodplains: Forms, processes, and sedimentary record. Blackwell Publishing.

Caers, J. (2005). *Petroleum geostatistics.* Society of Petroleum Engineers.

Caers, J. (2011). Modeling uncertainty in the Earth sciences. John Wiley & Sons.

Caers, J. and Tuanfeng, Z. (2004). Multiple-point geostatistics: A quantitative vehicle for integrating geologic analogs into multiple reservoir models. In G. Grammer, P. Harris, & G. Eberli (Eds.), *Integration of outcrop and modern analogs in reservoir modeling: AAPG Memoir* **80** (pp. 383–394).

Caers, J. and Hoffman, T. (2006). The probability perturbation method: A new look at Bayesian inverse modeling. *Mathematical Geology* **38**(1), 81–100.

Carle, S. (1996). A transition probability-based approach to geostatistical characterization of hydrostratigraphic architecture. PhD thesis, University of California, Davis.

Carrasco, P., Ibarra, F., Le Loc'h, G., Rojas, R., and Seguret, S. (2005). Application of the Truncated Gaussian Simulation Method to the MM deposit at Codelco Norte, Chile. *67th EAGE Conference and Exhibition - Workshops.*

Carter, J., Ballester, P., Tavassoli, Z., and King, P. (2004). Our calibrated model has no predictive value: An example from the petroleum industry. *Fourth International Conference on Sensitivity Analysis.*

Castro, S. A., Caers, J., and Mukerji, T. (2005). *The Stanford VI reservoir. 18th Annual Report*, Stanford Center for Reservoir Forecasting, Stanford University.

Chapelle, O., Schölkopf, B., and Zien, A.(2006). *Semi-supervised learning.* MIT Press.

Chen, C., Wang, Y., Li, G., and Reynolds, A. (2010). Closed-loop reservoir management on the Brugge test case. *Computational Geosciences* **14**, 691–703.

Chiles, J.-P. and Delfiner, P. (1999). *Geostatistics: Modeling spatial uncertainty.* John Wiley & Sons.

Christie, M., Demyanov, V., and Erbas, D. (2006). Uncertainty quantification for porous media flows. *Journal of Computational Physics* **217**, 143–158.

Christie, M., Cliffe, A., Dawid, P., and Senn, S. (2011). *Simplicity, complexity and modelling.* John Wiley & Sons.

Christie, M., Eydinov, D., Demyanov, V., Talbot, J., Arnold, D., and Shelkov, V. (2013). Use of multi-objective algorithms in history matching of a real field. *SPE Reservoir Simulation Symposium.* Houston, TX: Society of Petroleum Engineers.

Christie, M. A. (2001). Tenth SPE comparative solution project: A comparison of upscaling techniques. *SPE Reservoir Engineering and Evaluation* **4**, 308–317.

Christie, M. A., Glimm, J., Grove, J. W., Higdon, D. M., Sharp, D. H., and Wood-Schultz, M. M. (2005). Error analysis and simulations of complex phenomena. *Los Alamos Science* **29**(6), 6–25.

Chugunova, T. and Hu, L. (2008). Multiple-point statistical simulations constrained by continuous auxiliary data. *Mathematical Geosciences* **40**(2), 133–146.

Corbett, P. (2009). *Petroleum geoengineering: Integration of static and dynamic models.* SEG/EAGE Distinguished Instructor Short Course.

Cressie, N. (1993). *Statistics for spatial data.* John Wiley & Sons.

Demyanov, V., Subbey, S., and Christie, M. (2004). Neighbourhood algorithm with geostatistical simulations for uncertainty quantification reservoir modelling: PUNQ-S3 case study. *Proceedings of the 9th European Conference on the Mathematics in Oil Recovery* (ECMOR IX). Cannes, France: European Association of Geoscientists and Engineers.

Demyanov, V., Backhouse, L., and Christie, M. (2015). Geological feature selection in reservoir modelling and history matching with Multiple Kernel Learning. *Computers & Geosciences* **85**, 16–25.

Demyanov, V., Pozdnoukhov, A., Kanevski, M., and Christie, M. (2008). Geomodelling of a fluvial system with semi-supervised support vector regression. In X. E. J. Oriz (Ed.), *Proceedings of the VII International Geostatistics Congress* (pp. 627–636). Gecamin.

Demyanov, V., Foresti, L., Kanevski, M., and Christie, M. (2010). Multiple kernel learning approach for reservoir modelling. *12th European Conference on the Mathematics of Oil Recovery* (ECMOR XII), Oxford, UK: European Association of Geoscientists and Engineers.

Demyanov, V., Rojas, T., Arnold, D., and Christie, M. (2013). Uncertainty quantification in history matching of fluvial reservoirs with connectivity analysis and realistic geology. *75th EAGE Conference & Exhibition incorporating SPE EUROPEC 2013.* European Association of Geoscientists and Engineers.

Deutsch, C. J. and Journel, A. G. (1998). *GSLIB: Geostatistical software library and user's guide.* New York, NY: Oxford University Press.

Dhillon, I., Guan, Y. and Kulis, B. (2005). *A unified view of kernels k-means, spectral clustering and graph cuts.* University of Texas at Austin.

Doyen, P. (2007). *Seismic reservoir characterization: An earth modelling perspective.* European Association of Geoscientists and Engineers.

Dromgoole, P. and Speers, R. (1992). Managing uncertainty in oilfield reserves. *Schlumberger Middle East Well Evaluation Review* **12**, 30–41.

Dubrule, O. (1998). *Geostatistics in petroleum geology.* American Association of Petroleum Geologists.

Dubrule, O. and Sung, P. (2015). Indicator variogram models - Do we have much choice? *EAGE Petroleum Geostatistics.*

Elsheikh, A. H., Wheeler, M. F., and Hoteit, I. (2013). Nested sampling algorithm for subsurface flow model selection, uncertainty quantification and nonlinear calibration. *Water Resources Research* **49**(12), 8383–8399.

Emery, X. (2010). On the existence of mosaic and indicator random fields with spherical, circular and triangular variograms. *Mathematical Geosciences* **42**, 969–984.

Erbas, D. and Christie, M. (2007). Effect of sampling strategies on prediction uncertainty estimation. *SPE Reservoir Simulation Symposium.* Houston, TX: Society of Petroleum Engineers.

Evensen, G. (2003). The ensemble Kalman filter: Theoretical formulation and practical implementation. *Ocean Dynamics* **53**(4), 343–367.

Evensen, G., Dee, D., and Schröter, J. (1998). Parameter estimation in dynamical models. In *Ocean modelling and parameterisation* (pp. 373–398). Kluwer Academic Publishers.

Evensen, G., Hove, J., Meisingset, H., Reiso, E., Seim, K., and Espelid, Ø. (2007). Using the EnKF for assisted history matching of a North Sea reservoir model. *SPE Reservoir Simulation Symposium.* Houston, TX: Society of Petroleum Engineers.

Flamm, C., Kanevsky, M., and Savelieva, E. (1994). Non-regular variography and multi-method mapping to determination of origin of heavy metals. *International Association for Mathematical Geology Annual Conference.*

Floris, F., Bush, M., Cuypers, M., Roggero, F., and Syversveen A. (2001). Methods for quantifying the uncertainty of production forecasts: a comparative study. *Petroleum Geoscience* **7**, 87–96.

Foresti, L. (2011). Kernel-based mapping of meteorological fields in complex orography. PhD thesis, University of Lausanne.

Gawith, D. E. and Gutteridge, P. A. (1999). Decision-driven reservoir modelling: The next big thing. *SPE Symposium on Reservoir Simulation* (pp. 131–134).

Gilks, W. R., Richardson, S. and Spiegelhalter, D. (Eds.). (1996). *Markov chain Monte Carlo in practice.* Chapman & Hall/CRC.

Goovaerts, P. (1997). *Geostatistics for natural resources evaluation.* Oxford University Press.

Guardiano, F. B. and Srivastava, R. M. (1993). Multivariate geostatistics: Beyond bivariate moments. In A. Soares (Ed.), *Geostatistics-Troia* (v. 1, pp. 133–144). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Haas, T. (2013). Introduction to probability and statistics for ecosystem managers: Simulation and resampling. John Wiley & Sons.

Hajizadeh, Y., Christie, M. A., and Demyanov, V. (2010). History Matching with differential evolution approach; a look at new search strategies. *SPE EUROPEC/EAGE Annual Conference and Exhibition.* Barcelona, Spain: Society of Petroleum Engineers.

Hajizadeh, Y., Christie, M. A., and Demyanov, V. (2011). Towards multiobjective history matching: Faster convergence and uncertainty quantification. *SPE Reservoir Simulation Symposium.* The Woodlands, TX: Society of Petroleum Engineers.

Hargreaves, J. C. and Annan, J. D. (2006). Using multiple observationally-based constraints to estimate climate sensitivity. *Geophysical Research Letters* **33**(6).

Haykin, S. (1999). *Neural network: A comprehensive foundation* (2nd ed.). Prentice Hall.

Hofmann, T., Schölkopf, B., and Smola, A. J. (2008). Kernel methods in machine learning. *The Annals of Statistics*, 1171–1220.

Honarkhah, M. and Caers, J. (2012). Direct pattern-based simulation of non-stationary geostatistical models. *Mathematical Geosciences* **44**, 651–672.

Horta, A., Caeiro, M. H., Nunes, R. and Soares, A. (2008). Simulation of continuous variables at meander structures: Application to contaminated sediments of a lagoon. *geoENV VII–Geostatistics for Environmental Applications*, Quantitative Geology. Springer.

Hu, L. Y. (2000). Gradual deformation and iterative calibration of Gaussian-related stochastic models. *Mathematical Geology* **32**(1), 87–108.

Hu, L. Y. and Chugunova, T. (2008). Multiple-point geostatistics for modeling subsurface heterogeneity: A comprehensive review. *Water Resources Research* **44**(11).

Jaynes, E. (2003). *Probability theory: The logic of science.* Cambridge, UK: Cambridge University Press.

Joachims, T. (1999). Transductive inference for text classification using support vector machines. *ICML* **99**.

Josset, L. and Lunati, I. (2013). Local and global error models to improve uncertainty quantification. *Mathematical Geosciences* **45**, 601–620.

Journel, A. (1983). Nonparametric estimation of spatial distributions. *Mathematical Geology* **15**, 445–468.

Journel, A. and Huijbregts, C. (1978). *Mining geostatistics.* London, UK: Academic Press.

Jung, A., Fenwick, D. H., and Caers, J. (2013). Training image-based scenario modeling of fractured reservoirs for flow uncertainty quantification. *Computational Geosciences* **17**(6), 1015–1031.

Kanevski, M. (Ed.) (2008). Advanced mapping of environmental data: Geostatistics, machine learning and Bayesian maximum entropy. Wiley-ISTE.

Kanevski, M. and Maignan, M. (2004). *Analysis and modelling of spatial environmental data.* Lausanne, Switzerland: EPFL Press.

Kanevski, M., Pozdnoukhov, A., and Timonin, V. (2009). *Machine learning algorithms for GeoSpatial data.* EPFL Press-Wiley.

Kanevski, M., Pozdnoukhov, A., and Timonin, V. (2010). *Machine learning algorithms for GeoSpatial data.* EPFL Press.

Kennedy, J. and Eberhart, R. (1995). Particle swarm optimisation. *Proceedings of the IEEE International Conference on Neural Networks* (pp. 1942–1948). Piscataway, NJ: IEEE.

Kohonen, T. (2001). *Self-organizing maps.* Springer.

Kovalevskiy, E. (2011). *Geological modelling on the base of geostatistics.* European Association of Geoscientists and Engineers.

Kuznetsova, A. (2016). Hierarchical geological realism for reliable reservoir predictions. SPE-184495-STU.

Lewis, J. O. and Beal, C. (1918). Some new methods for estimating the future production of oil wells. *Transactions of the American Institute of Mining Engineers* **59**(1).

Liu, Y. (2004). An information content measure using multipoint geostatistics. In O. Leuangthong and C. V. Deutsch (Eds.), *Geostatistics Banff 2004* (pp. 1047–1056). Springer.

MacKay David, J. (2003). Information theory, inference, and learning algorithms. Cambridge University Press.

Mahmud, K., Mariethoz, G., Caers, J., Tahmasebi, P., and Baker, A. (2014). Simulation of Earth textures by conditional image quilting. *Water Resources Research* **50**(4), 3088–3107.

Mariethoz, G., Renard, P., Cornaton, F., and Jaquet, O. (2009). Truncated plurigaussian simulations to characterize aquifer heterogeneity. *Ground Water* **47**(1), 12–24.

Mariethoz, G., Renard, P., and Straubhaar, J. (2010). The Direct Sampling method to perform multiple-point geostatistical simulations. *Water Resources Research* **46**.

Mariethoz, G. and Caers, J. (2014). Multiple-point geostatistics: Stochastic modeling with training images. John Wiley & Sons.

Matheron, G. (1989). The internal consistency of models in geostatistics. In M. Armstrong (Ed.), *Geostatistics* (pp. 21–38). Kluwer Academic Publishers.

Mohamed, L., Christie, M., and Demyanov, V. (2010). Comparison of stochastic sampling algorithms for uncertainty quantification. *SPE Journal* **15**(1), 31–38.

Mohamed, L., Christie, M., Demyanov, V., Robert, E., and Kachuma, D. (2010). Application of particle swarms for history matching in the brugge reservoir. *SPE Annual Technical Conference and Exhibition*. Florence, Italy: Society of Petroleum Engineers.

Mustapha, H. and Dimitrakopoulos, R. (2010). A new approach for geological pattern recognition using high-order spatial cumulants. *Computers & Geosciences* **36**, 313–334.

O'Sullivan, A. and Christie, M. (2005). Error models for reducing history match bias. *Computational Geosciences* **9**, 125–153.

Oliver, D. S., Reynolds, A. C., and Liu, N. (2008). *Inverse theory for petroleum reservoir characterization and history matching*. Cambridge University Press.

Oliver, D. S. and Chen, Y. (2011). Recent progress on reservoir history matching: A review. *Computational Geosciences* **15**, 185–221.

Park, H., Scheidt, C., Fenwick, D., Boucher, A., and Caers, J. (2013). History matching and uncertainty quantification of facies models with multiple geological interpretations. *Computational Geosciences* **17**(4), 609–621.

Peters, E., Leeuwenburgh, O., and Hanea, R. (2008). Influences of the ensemble geostatistics on production history matching and prediction at new wells. *VIII International Geostatistics Conference*. Santiago, Chile.

Peters, L., Arts, R., Brouwer, G., Geel, C., Cullick, S., Lorentzen, R. J. *et al.* (2010). Results of the Brugge benchmark study for flooding optimisation and history matching. *SPE Reservoir Evaluation & Engineering* **13**(3), 391–400.

Polson, D. and Curtis, A. (2010). Dynamics of uncertainty in geological interpretation. *Journal of the Geological Society* **167**, 5–10.

Pozdnoukhov, A. (2006). *Prior knowledge in kernel methods*. PhD thesis, École Polytechnique Fédérale de Lausanne, Switzerland.

Pyrcz, M. J. and Deutsch, C. V. (2014). *Geostatistical reservoir modeling* (2nd ed.). Oxford University Press.

Rankey, E. C. and Mitchell, J. C. (2003). Interpreter's corner. That's why it's called interpretation: Impact of horizon uncertainty on seismic attribute analysis. *The Leading Edge* **9**, 820–828.

Remy, N., Boucher, A., and Wu, J. (2009). *Applied geostatistics with SGeMS: A user's guide*. Cambridge University Press.

Ringrose, P. and Bentley, M. (2014). *Reservoir model design: A practitioner's guide*. Springer.

Rissanen, J. (2007). Information and complexity in statistical modeling. Springer.

Rojas, S., Demyanov, V., Christie, M., and Arnold, D. (2014a). Controlling the sedimentological realism of deltaic reservoir models by the use of intelligent sedimentological prior information. *First Break* **32**(10), 69–72.

Rojas, T., Demyanov, V., Christie, M., and Arnold, D. (2011). Use of geological prior information in reservoir facies modelling. *Proceedings of the International Association for Mathematical Geosciences*. Salzburg, Austria.

Rojas, T., Demyanov, V., Christie, M., and Arnold, D. (2012). Reducing uncertainty in modelling fluvial reservoirs by using intelligent geological priors. *9th International Geostatistics Congress*. Oslo, Norway.

Rojas, T., Demyanov, V., Christie, M., and Arnold, D. (2014b). Learning uncertainty from training images for reservoir predictions. *Mathematics of Planet Earth*. Heidelberg, Germany: Springer.

Sambridge, M. (1999). Geophysical inversion with a neighbourhood algorithm—II. Appraising the ensemble. *Geophysical Journal International* **138**(3), 727–746.

Satija, A. and Caers, J. (2015). Direct forecasting of subsurface flow response from non-linear dynamic data by linear least-squares in canonical functional principal component space. *Advances in Water Resources* **77**, 69–81.

Savelieva, E. (2005). Using Ordinary Kriging to Model Radioactive Contamination Data. *Applied GIS* **1**(2), 10.1–10.10.

Scheidt, C. and Caers, J. (2008). A new method for uncertainty quantification using distances and kernel methods: Application to a deepwater turbidite reservoir. *SPE Journal* **14**(4), 680–692.

Sindhwani, V., Belkin, M., and Niyogi, P. (2006). The geometric basis of semi-supervised learning. In O. B. Chapelle (Ed.), *Semi-supervised learning*. MIT Press.

Smola, A. and Schölkopf, B. (1998). A tutorial on support vector regression. NeuroCOLT Technical Report, TR-98-030.

Soares, A. (2001). Direct sequential simulation and co-simulation. *Mathematical Geology* **33**(8), 911–926.

Soares, A.O. and Azevedo, L. (2017). *Geostatistical Methods for Reservoir Geophysics*. Springer.

Solomonoff, R. (1964). A formal theory of inductive inference, Part 1 and Part 2. *Information and Control,* **7**(1–22), 224–254.

Sperrevik, S., Gillespie, P., Fisher, Q., Halvorsen, T., and Knipe., R. (2002). Empirical estimation of fault rock properties. *Norwegian Petroleum Society Special Publications* **11**, 109–125.

Srivastava, R. M. and Leuangthong O. (2012). On maximizing spatial entropy. *9th International Geostatistics Congress.* Oslo, Norway.

Straubhaar, J., Renard P., Mariethoz G., Froidevaux R., and Besson O. (2011). *An improved parallel multiple-point algorithm using a list approach.* Mathematical Geosciences **43**(3), 305-328.

Strebelle, S. (2000). *Sequential simulation drawing structures from training images.* Unpublished doctoral dissertation, Stanford University, USA.

Strebelle, S. (2002). Conditional simulation of complex geological structure using multiple-point statistics. *Mathematical Geology* **34**, 1–22.

Strebelle, S. and Zhang, T. (2005). Non-stationary multiple-point geostatistical models. In O. Leuangthong and C. V. Deutsch (Eds.), *Geostatistics Banff 2004* (pp. 235–244). Dordrecht, The Netherlands: Springer.

Suzuki, S., Caumon, G., and Caers, J. (2008). Dynamic data integration for structural modeling: model screening approach using a distance-based model parameterization. *Computational Geosciences* **12**(1), 105–119.

Tarantola, A. (2005). *Inverse problem theory and model parameter estimation.* Society for Industrial and Applied Mathematics.

Tidwell, V. C. and Wilson, J. L. (2000). Heterogeneity, permeability patterns, and permeability upscaling: Physical characterization of a block of massillon sandstone exhibiting nested scales of heterogeneity. *SPE Reservoir Evaluation & Engineering* **3**(4).

Vapnik, V. (1995). *The nature of statistical learning theory.* New York, NY: Springer.

Vargas-Guzman, J.A. (2014). Unified principles for nonlinear nonstationary random fields in stochastic geosciences. *Mathematics of Planet Earth*, 857-861.

Walsh, M. (1994). New, improved equation solves for volatile oil and condensate reserves. *Oil and Gas Journal* **72**.

Wickelmaier, F. (2003). *An introduction to MDS.* Sound Quality Research Unit, Aalborg University, Denmark.

Zhang, T., Switzer, P., and Journel, A. (2006). Filter-based classification of training image patterns for spatial simulation. *Mathematical Geology* **38**(1).