Stanford

Jef Caers

Professor of Earth and Planetary Sciences and, by courtesy, of Geophysics

Earth & Planetary Sciences

Bio

BIO

Jef Caers received both an MSc (’93) in mining engineering / geophysics and a PhD (’97) in mining engineering from the Katholieke Universiteit Leuven, Belgium. Currently, he is Professor of Earth and Planetary at Stanford University, California, USA. Jef Caers’ research interests are decision making under uncertainty in developing the critical mineral supply as well as geothermal energy required to transition to 100% renewable energy. Jef Caers is founder of the mineral-X initiative, a community building effort to strengthen stewardship for a prosperous future for all, powered by Earth's minerals. Jef Caers has published in a diverse range of journals covering Mathematics, Statistics, Earth Sciences, Engineering and Computer Science. Jef Caers has received several best paper awards and authored or co-authored five books entitled "Petroleum Geostatistics” (SPE, 2005) “Modeling Uncertainty in the Earth Sciences” (Wiley-Blackwell, 2011), "Multiple-point Geostatistics: stochastic modeling with training images" (Wiley-Blackwell, 2015), “Quantifying Uncertainty in Subsurface Systems (Wiley-Blackwell, 2018), "Data Science for the Geosciences" (Cambridge UP, 2023). He was awarded the Krumbein Medal of the IAMG for his career achievement.

ACADEMIC APPOINTMENTS

- Professor, Earth & Planetary Sciences
- Professor (By courtesy), Geophysics
- Faculty Affiliate, Institute for Human-Centered Artificial Intelligence (HAI)

ADMINISTRATIVE APPOINTMENTS

- Post-doctoral researcher, Geological & Environmental Sciences, Stanford University, (1997-1999)
- Director of Earth Resources Forecasting, Stanford University, (2018- present)
- Post-doctoral researcher, Civil Engineering, University of Calgary, Canada, (1997-1997)
- Assistant Professor of Petroleum Engineering, Stanford University, (1999-2005)
- Director, Stanford Center for Reservoir Forecasting, Stanford University, (2000- present)
- Associate Professor of Energy Resources Engineering, Stanford University, (2006-2013)
- Professor of Energy Resources Engineering, Stanford University, (2014-2015)
- Professor of Geological Sciences, Stanford University, (2015- present)

HONORS AND AWARDS

- Research Fellow, National Science Foundation of Belgium (1994 – 1997)
- Post-doctoral Fellow, National Science Foundation of Belgium (1997 – 1999)
- Research Fellow, NATO (1997 – 1998)
- Fellow, B.A.E.F. (Belgian American Education Foundation) (1997)

- Vistelius Research Award, International Association for Mathematical Geology (2001)
- Frederick E. Terman Fellowship award, Stanford University (2003)
- Outstanding Technical Editor Award, SPE Journal (2005)
- Top 10 Oral presentations, AAPG Annual Convention, Long Beach, 2007 (2007)
- 1st prize software plugin, Schumberger Information Services Global Forum (2010)
- Krumbein Medal, International Association for Mathematical Geosciences (2014)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Editor-in-Chief, Computers & Geosciences (2011 - 2016)

PROFESSIONAL EDUCATION

- Ph.D., Katholieke Universiteit Leuven, Belgium , Mining Engineering (1997)
- M.S., Katholieke Universiteit Leuven, Belgium , Mining Engineering & Geophysics (1993)

LINKS

- Mineral-X Initiative: http://mineralX.stanford.edu

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Humanity is facing considerable challenges in the 21st century. Population is predicted to grow well into this century and saturate near 10 billion people. As the geological sciences have discovered, Earth and life are deeply and inextricably interwoven and human activity and the change it has wrought is perhaps just the most recent example. If we are to continue to live on this planet, our increasing population will require an increasing amount of resources, such as energy, mineral resources, food and water. In an ideal scenario, we would transform the current unsustainable use of carbon-emitting energy sources, polluting agricultural & mining practices and contaminating & over-exploiting drinking water resources, into a more sustainable and environmentally friendly practice.

My research focuses on assuring 100% renewable energy through development of geothermal energy and critical mineral supply, developing approaches from data acquisition to decision making under uncertainty and risk assessment.

Heat represents a remarkable source of energy that can be used to generate steam, drive turbines and produce power (high enthalpy heat systems). However, the exploitation of geothermal systems is costly and not always successful. Injecting water in kilometer deep wells may end up causing earthquakes. Reducing this subsurface risk is essential to a successful future for geothermal energy. On the other end of the heat spectrum, low enthalpy heat, the shallow subsurface can be used as a heat exchanger, for example through groundwater to heat buildings.

Minerals resources concentrated primarily through the flux of magmas and fluids in Earth are exploited from a large variety of reasons. An increase in its demand will require the development of mining practices that have minimal effect on the environment, such as properly dealing with waste, smart automation of mining operations based on data science and computer vision. This can only be achieved by a better understanding of the subsurface resources itself.

Teaching

COURSES

2022-23

- Data Science for Geoscience: EARTHSYS 100A (Win)

- Data Science for Geoscience: EARTHSYS 240, ENERGY 240, ESS 239, GEOLSCI 240 (Win)
- Data Science for Geoscience: GEOLSCI 6 (Win)

2021-22

- Data Science for Geoscience: GEOLSCI 6 (Win)
- Data science for geoscience: ENERGY 240, GEOLSCI 240 (Win)
- Quantifying Uncertainty in Subsurface Systems: GEOLSCI 260 (Spr)

2020-21

- Data Science for Geoscience: EARTHSYS 100A, GEOLSCI 6 (Win)
- Data science for geoscience: EARTHSYS 240, ENERGY 240, ESS 239, GEOLSCI 240 (Win)
- Quantifying Uncertainty in Subsurface Systems: GEOLSCI 260 (Spr)

2019-20

- Quantifying Uncertainty in Subsurface Systems: GEOLSCI 260 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Josue Fonseca, Alison Fritz, Halldora Gudmundsdottir

Postdoctoral Faculty Sponsor

Junling Fang, Xiaolong Wei

Doctoral Dissertation Advisor (AC)

Tyler Hall, yizheng wang

Master's Program Advisor

Aamnah Khalid

Doctoral (Program)

Tyler Hall, Timmy Lui, Sofia Mantilla Salas

Publications

PUBLICATIONS

- **The Intelligent Prospector v1.0: geoscientific model development and prediction by sequential data acquisition planning with application to mineral exploration** *GEOSCIENTIFIC MODEL DEVELOPMENT*
  Mern, J., Caers, J.
  2023; 16 (1): 289-313
- **Data-Driven Model Falsification and Uncertainty Quantification for Fractured Reservoirs** *ENGINEERING*
  Fang, J., Gong, B., Caers, J.
  2022; 18: 116-128
- **A sequential decision-making framework with uncertainty quantification for groundwater management** *ADVANCES IN WATER RESOURCES*
  Wang, Y., Zechner, M., Mern, J., Kochenderfer, M. J., Caers, J.
  2022; 166
- **Hierarchical Bayesian Inversion of Global Variables and Large-Scale Spatial Fields** *WATER RESOURCES RESEARCH*
  Wang, L., Kitanidis, P. K., Caers, J.
  2022; 58 (5)

- **Mapping high-resolution basal topography of West Antarctica from radar data using non-stationary multiple-point geostatistics (MPS-BedMappingV1)** *GEOSCIENTIFIC MODEL DEVELOPMENT*
  Yin, Z., Zuo, C., MacKie, E. J., Caers, J.
  2022; 15 (4): 1477-1497
- **Quantifying Uncertainty in Downscaling of Seismic Data to High-Resolution 3-D Lithological Models** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
  Yin, Z., Amaru, M., Wang, Y., Li, L., Caers, J.
  2022; 60
- **A geostatistical implicit modeling framework for uncertainty quantification of 3D geo-domain boundaries: Application to lithological domains from a porphyry copper deposit** *COMPUTERS & GEOSCIENCES*
  Fouedjio, F., Scheidt, C., Yang, L., Achtziger-Zupancic, P., Caers, J.
  2021; 157
- **Gravity inversion for geothermal exploration with uncertainty quantification** *GEOTHERMICS*
  Athens, N. D., Caers, J. K.
  2021; 97
- **Stochastic Inversion of Gravity Data Accounting for Structural Uncertainty** *MATHEMATICAL GEOSCIENCES*
  Athens, N., Caers, J.
  2021
- **3D Modeling of Large-Scale Geological Structures by Linear Combinations of Implicit Functions: Application to a Large Banded Iron Formation** *NATURAL RESOURCES RESEARCH*
  Yang, L., Achtziger-Zupancic, P., Caers, J.
  2021
- **I am (June, 10.1038/s43017-021-00189-1, 2021)** *NATURE REVIEWS EARTH & ENVIRONMENT*
  Caers, J.
  2021
- **"I am"** *NATURE REVIEWS EARTH & ENVIRONMENT*
  Caers, J.
  2021
- **Stochastic modeling of subglacial topography exposes uncertainty in water routing at Jakobshavn Glacier** *JOURNAL OF GLACIOLOGY*
  MacKie, E. J., Schroeder, D. M., Zuo, C., Yin, Z., Caers, J.
  2021; 67 (261): 75–83
- **Global Sensitivity Analysis of a Reactive Transport Model for Mineral Scale Formation During Hydraulic Fracturing** *Environmental Engineering Science*
  Li, Q., Wang, L., Perzan, Z., Caers, J., Brown Jr., G. E., Bargar, J. R., Maher, K.
  2021
- **Quantifying the Effect of Precipitation on Landslide Hazard in Urbanized and Non-Urbanized Areas** *Geophysical Research Letters*
  Johnston, E. C., Davenport, F. V., Wang, L., Caers, J. K., Muthukrishnan, S., Burke, M., Diffenbaugh, N. S.
  2021; 48 (16)
- **Conditional simulation of categorical spatial variables using Gibbs sampling of a truncated multivariate normal distribution subject to linear inequality constraints** *STOCHASTIC ENVIRONMENTAL RESEARCH AND RISK ASSESSMENT*
  Fouedjio, F., Scheidt, C., Yang, L., Wang, Y., Caers, J.
  2020
- **A Monte Carlo-based framework for risk-return analysis in mineral prospectivity mapping** *GEOSCIENCE FRONTIERS*
  Wang, Z., Yin, Z., Caers, J., Zuo, R.
  2020; 11 (6): 2297–2308
- **Direct forecasting of global and spatial model parameters from dynamic data** *COMPUTERS & GEOSCIENCES*
  Park, J., Caers, J.
  2020; 143

- **Automated Monte Carlo-based quantification and updating of geological uncertainty with borehole data (AutoBEL v1.0)** *GEOSCIENTIFIC MODEL DEVELOPMENT*
  Yin, Z., Strebelle, S., Caers, J.
  2020; 13 (2): 651–72
- **A Tree-Based Direct Sampling Method for Stochastic Surface and Subsurface Hydrological Modeling** *WATER RESOURCES RESEARCH*
  Zuo, C., Yin, Z., Pan, Z., MacKie, E. J., Caers, J.
  2020; 56 (2)
- **A Monte Carlo-based framework for assessing the value of information and development risk in geothermal exploration** *APPLIED ENERGY*
  Athens, N. D., Caers, J. K.
  2019; 256
- **Morphodynamic Analysis and Statistical Synthesis of Geomorphic Data: Application to a Flume Experiment** *JOURNAL OF GEOPHYSICAL RESEARCH-EARTH SURFACE*
  Hoffimann, J., Bufe, A., Caers, J.
  2019
- **Predicting drivers of groundwater Cr(VI) contamination in the Central Valley, CA: Integrated multivariate statistical & geospatial approach**
  Lopez, A., Caers, J., Fendorf, S.
  AMER CHEMICAL SOC.2019
- **Assessing and visualizing uncertainty of 3D geological surfaces using level sets with stochastic motion** *COMPUTERS & GEOSCIENCES*
  Yang, L., Hyde, D., Grujic, O., Scheidt, C., Caers, J.
  2019; 122: 54–67
- **Exploring viable geologic interpretations of gravity models using distance-based global sensitivity analysis and kernel methods** *GEOPHYSICS*
  Phelps, G., Scheidt, C., Caers, J.
  2018; 83 (5): G79–G92
- **Hydrostratigraphic modeling using multiple-point statistics and airborne transient electromagnetic methods** *HYDROLOGY AND EARTH SYSTEM SCIENCES*
  Barfod, A. S., Moller, I., Christiansen, A. V., Hoyer, A., Hoffimann, J., Straubhaar, J., Caers, J.
  2018; 22 (6): 3351–73
- **Quantifying Uncertainty in Subsurface systems**
  Scheidt, C., Li, L., Caers, J.
  American Geophysical Union - Wiley.2018
- **Quantifying Uncertainty in Subsurface Systems PREFACE** *QUANTIFYING UNCERTAINTY IN SUBSURFACE SYSTEMS*
  Scheidt, C., Li, L., Caers, J., Scheidt, C., Li, L., Caers, J.
  2018; 236: VII-IX
- **Bayesianism in the Geosciences** *HANDBOOK OF MATHEMATICAL GEOSCIENCES: FIFTY YEARS OF IAMG*
  Caers, J., Sagar, B. S., Cheng, Q., Agterberg, F.
  2018: 527–66
- **Uncertainty Quantification of Medium#Term Heat Storage From Short#Term Geophysical Experiments Using Bayesian Evidential Learning** *Water Resources Research*
  Hermans, T., Nguyen, F., Klepikova, M., Dassargues, A., Caers, J.
  2018
- **Reconstruction of Three-Dimensional Aquifer Heterogeneity from Two-Dimensional Geophysical Data** *Mathematical Geosciences*
  Gueting, N., Comunian, A., Caers , J.
  2018; 50 (1)
- **Direct forecasting of reservoir performance using production data without history matching** *COMPUTATIONAL GEOSCIENCES*
  Satija, A., Scheidt, C., Li, L., Caers, J.
  2017; 21 (2): 315-333

- **High resolution aquifer characterization using crosshole GPR full-waveform tomography: Comparison with direct-push and tracer test data** *WATER RESOURCES RESEARCH*
  Gueting, N., Vienken, T., Klotzsche, A., van der Kruk, J., Vanderborght, J., Caers, J., Vereecken, H., Englert, A.
  2017; 53 (1): 49-72

- **Integrating Non-Colocated Well and Geophysical Data to Capture Subsurface Heterogeneity at an Aquifer Recharge and Recovery Site** *Journal of Hydrology*
  Gottschalk, I. P., Hermans, T., Knight, R., Caers, J., Cameron, D. A., Regnery, J., McCray, J. E.
  2017; 555: 407-419

- **Discovering geochemical patterns by factor-based cluster analysis** *Journal of Geochemical Exploration*
  Wang, J., Zuo, R., Caers , J.
  2017; 181: 106-115

- **Quantifying structural uncertainty on fault networks using a marked point process within a Bayesian framework** *Tectonophysics*
  Aydin, O., Caers , J.
  2017; 712-713: 101-124

- **Stochastic Simulation by Image Quilting of Process-based Geological Models** *Computers & Geosciences*
  Hoffimann, J., Scheidt, C., Barfod, A., Caers, J.
  2017; 106: 18-32

- **Cokriging for multivariate Hilbert space valued random fields: application to multi-fidelity computer code emulation** *Stoch Environ Res Risk Assess*
  Grujoc, O., Menafoglio, A., Caers , J.
  2017: 1-17

- **Hydrostratigraphic modelling using multiple-point statistics and airborne transient electromagnetic methods** *Hydrology and Earth System Sciences Discussions*
  Barfod, A., Straubhaar, J., Høyer, A., Hoffimann, J., Christiansen, A., Møller, I., Caers, J.
  2017

- **DGSA: A Matlab toolbox for distance-based generalized sensitivity analysis of geoscientific computer experiments** *COMPUTERS & GEOSCIENCES*
  Park, J., Yang, G., Satija, A., Scheidt, C., Caers, J.
  2016; 97: 15-29

- **Quantifying natural delta variability using a multiple-point geostatistics prior uncertainty model** *JOURNAL OF GEOPHYSICAL RESEARCH-EARTH SURFACE*
  Scheidt, C., Fernandes, A. M., Paola, C., Caers, J.
  2016; 121 (10)

- **Direct prediction of spatially and temporally varying physical properties from time-lapse electrical resistance data** *WATER RESOURCES RESEARCH*
  Hermans, T., Oware, E., Caers, J.
  2016; 52 (9): 7262-7283

- **Universal Kriging of functional data: Trace-variography vs cross-variography? Application to gas forecasting in unconventional shales** *SPATIAL STATISTICS*
  Menafoglio, A., Grujic, O., Caers, J.
  2016; 15: 39-55

- **Geological realism in hydrogeological and geophysical inverse modeling: A review** *ADVANCES IN WATER RESOURCES*
  Linde, N., Renard, P., Mukerji, T., Caers, J.
  2015; 86: 86-101

- **Universal kriging with training images** *SPATIAL STATISTICS*
  Li, L., Romary, T., Caers, J.
  2015; 14: 240-268

- **Probabilistic falsification of prior geologic uncertainty with seismic amplitude data: Application to a turbidite reservoir case** *GEOPHYSICS*
  Scheidt, C., Jeong, C., Mukerji, T., Caers, J.
  2015; 80 (5): M89-M100

- **Updating joint uncertainty in trend and depositional scenario for reservoir exploration and early appraisal** *COMPUTATIONAL GEOSCIENCES*
  Scheidt, C., Tahmasebi, P., Pontiggia, M., Da Pra, A., Caers, J.
  2015; 19 (4): 805-820
- **Uncertainty in training image-based inversion of hydraulic head data constrained to ERT data: Workflow and case study** *WATER RESOURCES RESEARCH*
  Hermans, T., Nguyen, F., Caers, J.
  2015; 51 (7): 5332-5352
- **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*
  Satija, A., Caers, J.
  2015; 77: 69-81
- **Prediction-Focused Subsurface Modeling: Investigating the Need for Accuracy in Flow-Based Inverse Modeling** *MATHEMATICAL GEOSCIENCES*
  Scheidt, C., Renard, P., Caers, J.
  2015; 47 (2): 173-191
- **Assessing seismic uncertainty via geostatistical velocity-model perturbation and image registration: An application to subsalt imaging** *The Leading Edge*
  Li, L., Caers, J., Sava, P.
  2015; 34 (9): 1064-1070
- **MS-CCSIM: Accelerating pattern-based geostatistical simulation of categorical variables using a multi-scale search in Fourier space** *COMPUTERS & GEOSCIENCES*
  Tahmasebi, P., Sahimi, M., Caers, J.
  2014; 67: 75-88
- **Quantifying Asymmetric Parameter Interactions in Sensitivity Analysis: Application to Reservoir Modeling** *MATHEMATICAL GEOSCIENCES*
  Fenwick, D., Scheidt, C., Caers, J.
  2014; 46 (4): 493-511
- **Simulation of Earth textures by conditional image quilting** *WATER RESOURCES RESEARCH*
  Mahmud, K., Mariethoz, G., Caers, J., Tahmasebi, P., Baker, A.
  2014; 50 (4): 3088-3107
- **Comparing Training-Image Based Algorithms Using an Analysis of Distance** *MATHEMATICAL GEOSCIENCES*
  Tan, X., Tahmasebi, P., Caers, J.
  2014; 46 (2): 149-169
- **Multiple-point geostatistics: stochastic modeling with training images**
  Mariethoz, G., Caers, J.
  Wiley-Blackwell.2014
- **Assessing the Probability of Training Image-Based Geological Scenarios Using Geophysical Data** *15th Annual Conference of the International-Association-for-Mathematical-Geosciences (IAMG)*
  Hermans, T., Caers, J., Frederic Nguyen, F.
  SPRINGER-VERLAG BERLIN.2014: 679–682
- **SGEMS-UQ: An uncertainty quantification toolkit for SGEMS** *COMPUTERS & GEOSCIENCES*
  Li, L., Boucher, A., Caers, J.
  2014; 62: 12-24
- **(submitted) Uncertainty Quantification in Inverse Problems: Model-Based versus Prediction-Focused Inversion** *Mathematical Geosciences*
  Scheidt, C., Renard, P., Caers, J.
  2014
- **Training image-based scenario modeling of fractured reservoirs for flow uncertainty quantification** *COMPUTATIONAL GEOSCIENCES*
  Jung, A., Fenwick, D. H., Caers, J.
  2013; 17 (6): 1015-1031

- **Conditioning Surface-Based Geological Models to Well and Thickness Data** *MATHEMATICAL GEOSCIENCES*
  Bertoncello, A., Sun, T., Li, H., Mariethoz, G., Caers, J.
  2013; 45 (7): 873-893
- **History matching and uncertainty quantification of facies models with multiple geological interpretations** *COMPUTATIONAL GEOSCIENCES*
  Park, H., Scheidt, C., Fenwick, D., Boucher, A., Caers, J.
  2013; 17 (4): 609-621
- **Image transforms for determining fit-for-purpose complexity of geostatistical models in flow modeling** *COMPUTATIONAL GEOSCIENCES*
  Aydin, O., Caers, J.
  2013; 17 (2): 417-429
- **A special issue on benchmark problems, datasets and methodologies for the computational geosciences** *COMPUTERS & GEOSCIENCES*
  Caers, J.
  2013; 50: 1-3
- **Fast multiple point geostatistical simulation using a multi-scale approach** *IAMG 2013, Madrid, Sept 2-6, 2013*
  Pejman, T., Caers, J.
  2013
- **Modeling Spatial and Structural Uncertainty in the Subsurface Computational Challenges in the Geosciences** *Institute for Mathematics and its Applications, The IMA Volumes in Mathematics and its Applications*
  Gerritsen, M., Caers, J.
  2013; 156: 143-167
- **Simulation of Earth textures by Conditional Image Quilting** *Water Resources Research*
  Mahmud , K., Tahmasebi, P., Mariethoz, G., Caers, J., Baker, A.
  2013
- **Comparing training-image based algorithms using an analysis of distance** *Mathematical Geosciences*
  Tan, X., Tahmasebi, P., Caers, J.
  2013
- **Assessing the probability of training image-based geological scenarios using geophysical data** *IAMG 2013*
  Hermans, T., Caers, J., Nguyen, F.
  2013
- **Possibility as a complement to probability in quantifying geological scenario uncertainty: a deep-water reservoir case study** *IAMG 2013*
  Li, L., Caers, J.
  2013
- **Updating of uncertainty in fractured reservoirs driven by geological scenarios** *IAMG 2013*
  Jung, A., Fenwick, D., Caers, J.
  2013
- **Learning Needed Complexity in Structural Modeling Using Procrustes Analysis** *IAMG 2013*
  Aydin, O., Caers, J.
  2013
- **A distance-based generalized sensitivity analysis for energy resources modeling** *IAMG 2013*
  Scheidt, C., Fenwick, D., Caers, J.
  2013
- **SGEMS-UQ: An Uncertainty Quantification Toolkit for SGEMS** *Computers & Geosciences*
  Li, L., Boucher, A., Caers, J.
  2013
- **A quantitative comparison of multiple-point algorithms using an analysis of distance method** *IAMG 2013*
  Tan, X., Tahmasebi, P., Caers, J.
  2013

- **Modeling Geological Scenario Uncertainty from Seismic Data using Pattern Similarity** *IAMG 2013*
  Jeong, C., Scheidt, C., Caers, J., Mukerji, T.
  2013
- **Use of Tank Experiment Data In Surface-based Modeling** *IAMG 2013*
  Xu, S., Jung, A., Mukerji, T., Caers, J.
  2013
- **Updating uncertainty in the conceptual geological representation of fractured reservoirs using production data** *75th EAGE Conference & Exhibition*
  Jung, A., Fenwick, D., Caers, J.
  2013
- **Training-image based scenario modeling of fractured reservoir for flow uncertainty quantification** *Computational Geosciences*
  Jung, A., Fenwick, D., Caers, J.
  2013
- **Probability perturbation applied to the use of groundwater flow models in HydroGeoSphere** *3rd International HydroGeoSphere User Conference*
  Hermans, T., Scheidt, C., Caers, J., Nguyen, F.
  2013
- **Direct Pattern-Based Simulation of Non-stationary Geostatistical Models** *MATHEMATICAL GEOSCIENCES*
  Honarkhah, M., Caers, J.
  2012; 44 (6): 651-672
- **Method for Stochastic Inverse Modeling of Fault Geometry and Connectivity Using Flow Data** *MATHEMATICAL GEOSCIENCES*
  Cherpeau, N., Caumon, G., Caers, J., Levy, B.
  2012; 44 (2): 147-168
- **Direct non-stationary multiple-point modeling by distance-based pattern simulation** *9th International Geostatistics Congress*
  Honarkhah, M., Caers, J.
  2012
- **History matching under uncertain geological scenario** *9th International Geostatistics Congress*
  Park, H., Caers, J.
  2012
- **Transformation spaces for determining spatial model complexity** *9th International Geostatistics Congres*
  Aydin, O., Caers, J.
  2012
- **Data inversion under geological scenario uncertainty** *SEG Technical Program*
  Caers, J.
  2012: 1–2
- **On internal consistency, conditioning and models of uncertainty** *9th International Geostatistics Congress*
  Caers, J.
  2012
- **Conditioning Facies Simulations with Connectivity Data** *MATHEMATICAL GEOSCIENCES*
  Renard, P., Straubhaar, J., Caers, J., Mariethoz, G.
  2011; 43 (8): 879-903
- **A Methodology for Establishing a Data Reliability Measure for Value of Spatial Information Problems** *MATHEMATICAL GEOSCIENCES*
  Trainor-Guitton, W. J., Caers, J. K., Mukerji, T.
  2011; 43 (8): 929-949
- **A multiscale method for subsurface inverse modeling: Single-phase transient flow** *ADVANCES IN WATER RESOURCES*
  Fu, J., Caers, J., Tchelepi, H. A.
  2011; 34 (8): 967-979

- **A multi-resolution workflow to generate high-resolution models constrained to dynamic data** *COMPUTATIONAL GEOSCIENCES*
  Scheidt, C., Caers, J., Chen, Y., Durlofsky, L. J.
  2011; 15 (3): 545-563
- **Geological modelling and history matching of multi-scale flow barriers in channelized reservoirs: methodology and application** *PETROLEUM GEOSCIENCE*
  Li, H., Caers, J.
  2011; 17 (1): 17-34
- **Modeling Uncertainty in the Earth Sciences**
  Caers, J.
  Wiley-Blackwell.2011
- **Topological uncertainties in structural geology and assimilation of dynamic data: parametrization and sampling** *Water Resources Research*
  Cherpeau, N., Caumon, G., Caers, J., Levy, B.
  2011
- **Distance-based sampling of posterior distributions in spatial inverse problems** *IAMG 2011*
  Caers, J., Park, K., Scheidt, C.
  2011
- **Integration of engineering and geological uncertainty for reservoir performance prediction using a distance-based approach** *AAPG Memoir on Modeling Geological Uncertainty*
  Caers, J., Scheidt, C.
  2011: 191–202.
- **Assessing the impact of fault connectivity uncertainty in reservoir studies using explicit discretization** *SPE Reservoir Characterisation and Simulation Conference and Exhibition*
  Cherpeau, N., Caumon, G., Caers, J., Lévy, B.
  2011
- **Bayesian inverse problem and optimization with iterative spatial resampling** *WATER RESOURCES RESEARCH*
  Mariethoz, G., Renard, P., Caers, J.
  2010; 46
- **A flow-based pattern recognition algorithm for rapid quantification of geologic uncertainty** *COMPUTATIONAL GEOSCIENCES*
  Alpak, F. O., Barton, M. D., Caers, J.
  2010; 14 (4): 603-621
- **Special Issue on Computational Methods for the Earth, Energy and Environment-IAMG 2009** *MATHEMATICAL GEOSCIENCES*
  Caers, J.
  2010; 42 (5): 453-455
- **Laudatio Guillaume Caumon, Vistelius Award 2009** *MATHEMATICAL GEOSCIENCES*
  Caers, J.
  2010; 42 (5): 595-596
- **Stochastic Simulation of Patterns Using Distance-Based Pattern Modeling** *Annual Meeting on Computational for the Earth Energy and Environment (IAMG 2009)*
  Honarkhah, M., Caers, J.
  SPRINGER HEIDELBERG.2010: 487–517
- **A multiscale adjoint method to compute sensitivity coefficients for flow in heterogeneous porous media** *ADVANCES IN WATER RESOURCES*
  Fu, J., Tchelepi, H. A., Caers, J.
  2010; 33 (6): 698-709
- **Combining geologic-process models and geostatistics for conditional simulation of 3-D subsurface heterogeneity** *WATER RESOURCES RESEARCH*
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