



Andre Journel

The Donald and Donald M. Steel Professor of Earth Sciences, Emeritus
Energy Science & Engineering

Bio

ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Energy Science & Engineering

ADMINISTRATIVE APPOINTMENTS

- Mining Project Engineer, Centre de Morphologie Mathematique, (1969-1973)
- Maitre de Recherches, Centre de Geostatistique Paris School of Mines, (1973-1978)
- Visiting Associate Professor of Applied Earth Sciences, Stanford University, (1978-1979)
- Associate Professor of Applied Earth Sciences, Stanford University, (1979-1986)
- Chairman Applied Earth Sciences, Stanford University, (1986-1992)
- Professor of Applied Earth Sciences, Stanford University, (1987-1992)
- Professor of Geological & Environmental Sciences, Stanford University, (1992-2010)
- Professor of Petroleum Engineering, Stanford University, (1992-2010)

HONORS AND AWARDS

- Director, NATO Institute on Geostatistics (1983)
- Krumbein Medal, Mathematical Geology (1989)
- Opening Keynote Speaker, 23rd APCOM Congress (1992)
- Opening Keynote Speaker, Geostatistics for the Next Century Symposium (1993)
- Donald and Donald M. Steel Professor of Earth Sciences, Stanford University (1994)
- School of Earth Sciences Teaching Award, Stanford University (1995)
- Opening Keynote Speaker, 5th International Geostatistics Congress (1996)
- Elected Member, National Academy of Engineering (1998)
- Lucas Gold Medal, AIME/SPE (1998)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Scientific Committee, Geostatistics Congress (1980 - 2007)
- Admission Committee (G&ES), Stanford University (1982 - 1996)
- Week-long Geostatistics seminars, sponsored by academic institutions, attended by professionals from mining and petroleum industries, Stanford University (1983 - 2009)
- Chairman Applied Earth Sciences Dpt., Stanford University (1986 - 1992)

- Director, Stanford Center for Reservoir Forecasting, Stanford University (1986 - 2007)
- Associate Editor, Mathematical Geology (1989 - 2009)
- Admission Committee (PE), School Space Committee (1992 - 2000)
- Admission Committee (ERE), Stanford University (1997 - 2004)
- Editor, Applied Geostatistics Series, Oxford University Press (1997 - 2007)

PROFESSIONAL EDUCATION

- DSc, University of Nancy , Applied Math: Geostatistics (1977)
- DS2, University of Nancy , Ing. docteur (1974)
- B.S., Ecole Nat. Sup. Mines, Nancy, France , Mining Engineering (1967)

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Research

I am interested in the process of building numerical models of the space-time distributed phenomena that are found in Earth sciences. How can such models integrate data of different sources, different scales and reliability, both hard and soft, and at the end provide a basis for a numerical assessment of the phenomenon being studied including space extrapolation and time prediction? The mathematics and algorithmic parts of the building process are of greater interest to me than any particular application, although any model must be judged by its applicability to real data and ability to solve real questions. Recent applications are in modeling hydrocarbon reservoirs, air pollution spread, and urban growth. For the last few years at Stanford I have been editing a major book, SGEMS: User's Manual and Software, related to the new C++ freeware Stanford Geostatistical Earth Modeling Software. The book is authored by three of my students, Nicolas Remy, Alex Boucher, and Jianbing Wu, and was published by Cambridge U. Press (2008).

Teaching

As an emeritus each Spring quarter I teach an advanced PhD level seminar ERE240

Professional Activities

Election to the National Academy of Engineering (1998); director, Stanford Center for Reservoir Forecasting (1984-1997); editor-in-chief, Oxford Press Applied Geostatistics Series (until 2009); editorial board member, Mathematical Geology

Publications

PUBLICATIONS

- **A package for geostatistical integration of coarse and fine scale data** *COMPUTERS & GEOSCIENCES*
Liu, Y., Journel, A. G.
2009; 35 (3): 527-547
- **Fast FILTERSIM simulation with score-based distance** *MATHEMATICAL GEOSCIENCES*
Wu, J., Zhang, T., Journel, A.
2008; 40 (7): 773-788
- **The nu expression for probabilistic data integration** *MATHEMATICAL GEOLOGY*
Polyakova, E. I., Journel, A. G.
2007; 39 (8): 715-733
- **Geostatistical integration of linear coarse scale and fine scale data** *12th Conference of the International-Association-for-Mathematical-Geology*
Liu, Y., Journel, A. G.

STATE KEY LABORATORY GEOLOGICAL PROCESSES & MINERAL RESOURCES (GPMR).2007: 401–405

- **The necessity of a multiple-point prior model** *MATHEMATICAL GEOLOGY*
Journal, A., Zhang, T.
2006; 38 (5): 591-610
- **Establishing spatial pattern correlations between water saturation time-lapse and seismic amplitude time-lapse** *56th Annual Technical Meeting of the Canadian International Petroleum Conference*
Wu, J., Journal, A. G., Mukerji, T.
CANADIAN INST MINING METALLURGY PETROLEUM.2006: 15–20
- **Linear inverse Gaussian theory and geostatistics** *GEOPHYSICS*
Hansen, T. M., Journal, A. G., Tarantola, A., Mosegaard, K.
2006; 71 (6): R101-R111
- **A novel method for mapping land cover changes: Incorporating time and space with geostatistics** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Boucher, A., Seto, K. C., Journal, A. G.
2006; 44 (11): 3427-3435
- **Changing relationship between the North Atlantic Oscillation and key North Atlantic climate parameters** *GEOPHYSICAL RESEARCH LETTERS*
Polyakova, E. I., Journal, A. G., Polyakov, I. V., Bhatt, U. S.
2006; 33 (3)
- **Filter-based classification of training image patterns for spatial simulation** *MATHEMATICAL GEOLOGY*
Zhang, T., Switzer, P., Journal, A.
2006; 38 (1): 63-80
- **Prediction of spatial patterns of saturation time-lapse from time-lapse seismic** *7th International Geostatistics Congress*
Wu, J. B., Mukerji, T., Journal, A. G.
SPRINGER.2005: 671–680
- **Beyond covariance: The advent of multiple-point geostatistics** *7th International Geostatistics Congress*
Journal, A. G.
SPRINGER.2005: 225–233
- **Roadblocks to the evaluation of ore reserves - The simulation overpass and putting more geology into numerical models of deposits** *International Symposium on Orebody Modelling and Strategic Mine Planning*
Journal, A. G.
AUSTRALASIAN INST MINING & METALLURGY.2005: 17–20
- **Sequential conditional simulation using classification of local training patterns** *7th International Geostatistics Congress*
Zhang, T., Switzer, P., Journal, A.
SPRINGER.2005: 265–273
- **Merging prior structural interpretation and local data: The Bayes updating of multiple-point statistics** *Annual Conference of the International-Association-for-Mathematical-Geology*
Zhang, T., Switzer, P., Journal, A.
YORK UNIV.2005: 615–620
- **A workflow for multiple-point geostatistical simulation** *7th International Geostatistics Congress*
Liu, Y. H., Harding, A., Gilbert, R., Journal, A.
SPRINGER.2005: 245–254
- **Mapping land cover changes with landsat imagery and spatio-temporal geostatistics** *7th International Geostatistics Congress*
Boucher, A., Seto, K., Journal, A.
SPRINGER.2005: 809–818
- **Evaluating information redundancy through the tau model** *7th International Geostatistics Congress*
Krishnan, S., Boucher, A., Journal, A. C.

SPRINGER.2005: 1037–1046

- **Early uncertainty assessment: Application to a hydrocarbon reservoir appraisal** *7th International Geostatistics Congress*
Caumon, G., Journel, A. G.
SPRINGER.2005: 551–557
- **From maximum entropy to pattern reconstruction: the advent of multiple-point simulation** *Annual Conference of the International-Association-for-Mathematical-Geology*
Journel, A. G., Zhang, T.
YORK UNIV.2005: 726–731
- **Improving sequential simulation with a structured path guided by information content** *MATHEMATICAL GEOLOGY*
Liu, Y. H., Journel, A.
2004; 36 (8): 945-964
- **Uncertainty in N/G ratio in early reservoir development** *JOURNAL OF PETROLEUM SCIENCE AND ENGINEERING*
Journel, A. G., Bitanov, A.
2004; 44 (1-2): 115-130
- **Spatial connectivity: From variograms to multiple-point measures** *MATHEMATICAL GEOLOGY*
Krishnan, S., Journel, A. G.
2003; 35 (8): 915-925
- **Combining knowledge from diverse sources: An alternative to traditional data independence hypotheses** *MATHEMATICAL GEOLOGY*
Journel, A. G.
2002; 34 (5): 573-596
- **The theoretical links between sequential Gaussian simulation, Gaussian truncated simulation, and probability field simulation** *MATHEMATICAL GEOLOGY*
Journel, A. G., Ying, Z. J.
2001; 33 (1): 31-40
- **Stochastic modeling of atmospheric pollution: a spatial time-series framework. Part II: application to monitoring monthly sulfate deposition over Europe** *ATMOSPHERIC ENVIRONMENT*
Kyriakidis, P. C., Journel, A. G.
2001; 35 (13): 2339-2348
- **Stochastic modeling of atmospheric pollution: a spatial time-series framework. Part I: methodology** *ATMOSPHERIC ENVIRONMENT*
Kyriakidis, P. C., Journel, A. G.
2001; 35 (13): 2331-2337
- **Geostatistical quantification of geological information for a fluvial-type North Sea reservoir** *1999 SPE Annual Technical Conference and Exhibition*
Caers, J. K., Srinivasan, S., Journel, A. G.
SOC PETROLEUM ENG.2000: 457–67
- **Correcting the smoothing effect of estimators: A spectral postprocessor** *MATHEMATICAL GEOLOGY*
Journel, A. G., Kyriakidis, P. C., Mao, S.
2000; 32 (7): 787-813
- **Integrating seismic attribute maps and well logs for porosity modeling in a west Texas carbonate reservoir: addressing the scale and precision problem** *JOURNAL OF PETROLEUM SCIENCE AND ENGINEERING*
Yao, T. T., Journel, A. G.
2000; 28 (1-2): 65-79
- **Markov models for cross-covariances** *11th Annual Meeting of the Stanford-Center-for-Reservoir-Forecasting*
Journel, A. G.
SPRINGER/PLENUM PUBLISHERS.1999: 955–64
- **Conditioning geostatistical operations to nonlinear volume averages** *11th Annual Meeting of the Stanford-Center-for-Reservoir-Forecasting*
Journel, A. G.

SPRINGER/PLENUM PUBLISHERS.1999: 931–53

- **Conditional 3D simulation of lithofacies with 2D seismic data** *COMPUTERS & GEOSCIENCES*
Mao, S. G., Journel, A. G.
1999; 25 (7): 845-862
- **Geostatistical space-time models: A review** *MATHEMATICAL GEOLOGY*
Kyriakidis, P. C., Journel, A. G.
1999; 31 (6): 651-684
- **An expanded GSLIB cokriging program allowing for two Markov models** *COMPUTERS & GEOSCIENCES*
Ma, X. L., Journel, A. G.
1999; 25 (6): 627-639
- **Scale matching with factorial kriging for improved porosity estimation from seismic data** *MATHEMATICAL GEOLOGY*
Yao, T. T., Mukerji, T., Journel, A., Mavko, G.
1999; 31 (1): 23-46
- **Deriving constraints on small-scale variograms due to variograms of large-scale data** *MATHEMATICAL GEOLOGY*
Kupfersberger, H., Deutsch, C. V., Journel, A. G.
1998; 30 (7): 837-852
- **Stochastic modelling of a fluvial reservoir: a comparative review of algorithms** *JOURNAL OF PETROLEUM SCIENCE AND ENGINEERING*
Journel, A. G., Gunderso, R., Gringarten, E., Yao, T.
1998; 21 (1-2): 95-121
- **Automatic modeling of (cross) covariance tables using fast Fourier transform** *MATHEMATICAL GEOLOGY*
Yao, T. T., Journel, A. G.
1998; 30 (6): 589-615
- **Deterministic geostatistics: A new visit** *Wollongong 96 International Geostatistical Congress*
Journel, A. G.
SPRINGER.1997: 292–301
- **Geostatistical analysis of a soil salinity data set** *ADVANCES IN AGRONOMY, VOL 58*
Bourgault, G., Journel, A. G., Rhoades, J. D., Corwin, D. L., Lesch, S. M.
1997; 58: 241-292
- **Deriving conditional distributions from ordinary kriging** *Wollongong 96 International Geostatistical Congress*
Rao, S. E., Journel, A. G.
SPRINGER.1997: 92–102
- **The abuse of principles in model building and the quest for objectivity** *Wollongong 96 International Geostatistical Congress*
Journel, A. G.
SPRINGER.1997: 3–14
- **Rank order geostatistics: A proposal for a unique coding and common processing of diverse data** *Wollongong 96 International Geostatistical Congress*
Journel, A. G., Deutsch, C. V.
SPRINGER.1997: 174–87
- **Conditional simulation of geologically averaged block permeabilities** *JOURNAL OF HYDROLOGY*
Journel, A. G.
1996; 183 (1-2): 23-35
- **INTEGRATING SOIL MAP INFORMATION IN MODELING THE SPATIAL VARIATION OF CONTINUOUS SOIL PROPERTIES** *EUROPEAN JOURNAL OF SOIL SCIENCE*
Goovaerts, P., Journel, A. G.
1995; 46 (3): 397-414
- **HISTOGRAM AND SCATTERGRAM SMOOTHING USING CONVEX QUADRATIC-PROGRAMMING** *MATHEMATICAL GEOLOGY*

- Xu, W. L., Journel, A. G.
1995; 27 (1): 83-103
- **Unsmoothed estimation with dense secondary information using probability field technique** *3rd Canadian Conference on Computer Applications in the Mineral Industry (CAMI 95)*
Bourgault, G., Journel, A. G.
MCGILL UNIV.1995: 95-102
 - **JOINT SIMULATION OF MULTIPLE-VARIABLES WITH A MARKOV-TYPE COREGIONALIZATION MODEL** *MATHEMATICAL GEOLOGY*
Almeida, A. S., Journel, A. G.
1994; 26 (5): 565-588
 - **THE USE OF CONDITIONAL SIMULATION IN NUCLEAR-WASTE-SITE PERFORMANCE ASSESSMENT - DISCUSSION** *TECHNOMETRICS*
Journel, A. G.
1994; 36 (2): 149-150
 - **POSTERIOR IDENTIFICATION OF HISTOGRAMS CONDITIONAL TO LOCAL DATA** *MATHEMATICAL GEOLOGY*
Journel, A. G., Xu, W. L.
1994; 26 (3): 323-359
 - **CONDITIONAL FBM SIMULATION WITH DUAL KRIGING** *International Forum in Honour of Michel Davids Contribution to Geostatistics: Geostatistics for the Next Century*
Chu, J. C., Journel, A. G.
KLUWER ACADEMIC PUBL.1994: 407-421
 - **MODELING UNCERTAINTY - SOME CONCEPTUAL THOUGHTS** *International Forum in Honour of Michel Davids Contribution to Geostatistics: Geostatistics for the Next Century*
Journel, A. G.
KLUWER ACADEMIC PUBL.1994: 30-43
 - **ENTROPY AND SPATIAL DISORDER** *MATHEMATICAL GEOLOGY*
Journel, A. G., Deutsch, C. V.
1993; 25 (3): 329-355
 - **STOCHASTIC IMAGING OF THE WILMINGTON CLASTIC SEQUENCE** *SPE FORMATION EVALUATION*
Journel, A. G., GOMEZHERNANDEZ, J. J.
1993; 8 (1): 33-40
 - **GEOSTATISTICAL TOOLS FOR MODELING AND INTERPRETING ECOLOGICAL SPATIAL DEPENDENCE** *ECOLOGICAL MONOGRAPHS*
Rossi, R. E., Mulla, D. J., Journel, A. G., Franz, E. H.
1992; 62 (2): 277-314
 - **PREDICTION OF UNCERTAINTY IN RESERVOIR PERFORMANCE FORECAST** *JOURNAL OF CANADIAN PETROLEUM TECHNOLOGY*
Ballin, P. R., Journel, A. G., AZIZ, K.
1992; 31 (4): 52-62
 - **INDICATOR PRINCIPAL COMPONENT KRIGING** *MATHEMATICAL GEOLOGY*
SUROPEREZ, V., Journel, A. G.
1991; 23 (5): 759-788
 - **SIMULATION OF NON-GAUSSIAN SPACE RANDOM FUNCTIONS FOR MODELING TRANSPORT IN GROUNDWATER** *WATER RESOURCES RESEARCH*
Rubin, Y., Journel, A. G.
1991; 27 (7): 1711-1721
 - **MIXTURE OF POPULATIONS** *MATHEMATICAL GEOLOGY*
Zhu, H., Journel, A. G.
1991; 23 (4): 647-671
 - **CHARACTERISTIC BEHAVIOR AND ORDER RELATIONS FOR INDICATOR VARIOGRAMS** *MATHEMATICAL GEOLOGY*
Journel, A. G., Posa, D.

1990; 22 (8): 1011-1025

- **VARIOGRAMS WITH ZONAL ANISOTROPIES AND NONINVERTIBLE KRIGING SYSTEMS** *MATHEMATICAL GEOLOGY*
Myers, D. E., Journel, A.
1990; 22 (7): 779-785
- **NEW METHOD FOR RESERVOIR MAPPING** *JOURNAL OF PETROLEUM TECHNOLOGY*
Journel, A. G., Alabert, F. G.
1990; 42 (2): 212-218
- **WHEN DO WE NEED A TREND MODEL IN KRIGING** *MATHEMATICAL GEOLOGY*
Journel, A. G., Rossi, M. E.
1989; 21 (7): 715-739
- **Non-Gaussian data expansion in the Earth Sciences** *TERRA NOVA*
Journel, A. G., ALABERT, F.
1989; 1 (2): 123-134
- **NEW DISTANCE MEASURES - THE ROUTE TOWARD TRULY NON-GAUSSIAN GEOSTATISTICS** *MATHEMATICAL GEOLOGY*
Journel, A. G.
1988; 20 (4): 459-475
- **CONSTRAINED INTERPOLATION AND QUALITATIVE INFORMATION - THE SOFT KRIGING APPROACH** *MATHEMATICAL GEOLOGY*
Journel, A. G.
1986; 18 (3): 269-305
- **GEOSTATISTICS - MODELS AND TOOLS FOR THE EARTH-SCIENCES** *MATHEMATICAL GEOLOGY*
Journel, A. G.
1986; 18 (1): 119-140
- **THE DETERMINISTIC SIDE OF GEOSTATISTICS** *JOURNAL OF THE INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOLOGY*
Journel, A. G.
1985; 17 (1): 1-15
- **RECOVERABLE RESERVES ESTIMATION - THE GEOSTATISTICAL APPROACH** *MINING ENGINEERING*
Journel, A. G.
1985; 37 (6): 563-568
- **NEW WAYS OF ASSESSING SPATIAL DISTRIBUTIONS OF POLLUTANTS** *ACS SYMPOSIUM SERIES*
Journel, A. G.
1984; 267: 109-118
- **NATO INSTITUTE MEETS ON GEOSTATISTICS** *GEOTIMES*
Journel, A. G., Jones, T. A.
1984; 29 (3): 11-12
- **CONDITIONAL INDICATOR SIMULATION - APPLICATION TO A SASKATCHEWAN URANIUM DEPOSIT** *JOURNAL OF THE INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOLOGY*
Journel, A. G., ISAAKS, E. H.
1984; 16 (7): 685-718
- **NONPARAMETRIC-ESTIMATION OF SPATIAL DISTRIBUTIONS** *JOURNAL OF THE INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOLOGY*
Journel, A. G.
1983; 15 (3): 445-468
- **ANISOTROPIC HOLE-EFFECT MODELING** *JOURNAL OF THE INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOLOGY*
Journel, A. G., Froidevaux, R.
1982; 14 (3): 217-239

- **PREDICTION OF LOCAL ORE RECOVERIES AND ORE-WASTE RATIOS AT THE SILVER BELL URANIUM-MINE** *JOURNAL OF THE INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOLOGY*
Froidevaux, R., Journel, A. G.
1982; 14 (6): 645-660
- **THE LOGNORMAL APPROACH TO PREDICTING LOCAL DISTRIBUTIONS OF SELECTIVE MINING UNIT GRADES** *JOURNAL OF THE INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOLOGY*
Journel, A. G.
1980; 12 (4): 285-303
- **GEOSTATISTICAL SIMULATION .6. METHODS FOR EXPLORATION AND MINE PLANNING** *E&MJ-ENGINEERING AND MINING JOURNAL*
Journel, A. G.
1979; 180 (12): 86-91