



IAMG 2009

Computational Methods for the
Earth, Energy and Environmental Sciences

August 23-28, Stanford University, USA

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A word from the chairman



The theme of this year's meeting, "Computational Methods for Earth, Energy, and Environmental Sciences", was particularly pertinent. Computational aspects of geological modeling have always been at the heart of the IAMG and with the advent of cluster computing, it has become clear that modern mathematical and quantitative methods in Earth sciences will continue to require a strong computational component, whether this concerns the modeling of an aquifer, the process-simulation of a large sedimentary basin, or how human activities interact with Earth processes.

The rising complexity of tackling these kinds of computational challenges is bringing together the Earth and environmental science communities with computer scientists, in capacities of both hardware design and software coding. In addressing these kinds of new challenges, IAMG 09 contained papers that are both novel and forward looking, helping to drive development within both the Earth and computer sciences. Sessions on "Energy" addressed the critical problem in society on supply of sustainable energy.

I personally would like to thank the authors for their many excellent papers and contributions turning this meeting into a memorable one,

Jef Caers, Stanford University,



IAMG2009 Meeting
August 23–27, 2009
Frances C. Arrillaga Alumni Center
STANFORD UNIVERSITY

Monday, August 24, 2009

IAMG Distinguished Lecturer: Roussos Dimitrakopoulos (McGill University):

High-order Geostatistics: Simulating complex, non-Gaussian geological and environmental phenomena

Multiscale Modeling

Chairs: Sean McKenna (Sandia National Lab), **Qiuming Chen** (York University)

Multi-Scale Approach for Dynamic Data Integration Considering Geologically Consistent Flow Functions

Sanjay Srinivasan* (UT-Austin)

A Multiscale Method to Large-Scale Inverse Modeling

Jianlin Fu* and **Jef Caers** (Stanford University)

A Comparison Between Direct Sequential Approach and Error Simulation Approach in Downscaling Continuous Variables

Yongshe Liu* (Conocophillips)

Multifractal Dispersion Patterns of Elements in Soils with Different Petrological Backgrounds in Hainan Island, China

Shuyun Xie (China University of Geosciences), **Qiuming Cheng*** (York University), **Xitao Xing** (York University), **Zhengyu Bao** (China University of Geosciences)

Multiscale Behavior of Groundwater Flow and Transport in Binary Media

Sean McKenna* (Sandia National Lab)

Artificial Intelligence Applications

Chairs: Vasily Demyanov (Heriot-Watt University), **M. Kanevski** (University of Lausanne)

Permeability Prediction Using Electrofacies and Fuzzy Model in a Heterogeneous Reservoir (PDF)

Cheolkyun Jeong*, **Joomyung Kang** and **Changhyup Park** (Seoul National University)

A Hybrid Approach to Model Selection for Support Vector Classification for Facies Modeling (PDF)

Enrique Gallardo* and **Oy Leuangthong** (University of Alberta)

Support Vector Machines-Based Porosity Prediction Model in Heterogeneous Reservoir

Ammal Alanazi* (University of Calgary)

Uncertainty Quantification of a Semi-Supervised Support Vector Regression Reservoir Model (PDF)

V. Demyanov* (Heriot-Watt University), **A. Pozdnoukhov** (NCG, National University of Ireland), **M. Christie** (Heriot-Watt), **M. Kanevski** (University of Lausanne)

Using Bayesian Belief Networks to Evaluate Continuous Gas Resources (Shale Gas, Tight Gas, and Coal Bed Methane): Tools to Calibrate the Expert and Exploit Knowledge

Kurt Steffen* (ExxonMobil Exploration Company)

* *Presenting authors*



IAMG2009 Meeting
August 23–27, 2009
Frances C. Arrillaga Alumni Center
STANFORD UNIVERSITY

Monday, August 24, 2009

Mineral Resources: Regional Assessment Chairs: Donald Singer (USGS), Ryoichi Kouda (Geological Survey of Japan)
“5P” Areas: A New Approach of Target Delineation in Metallogenic/Mineral Deposit Prediction Zhao Pengda* (China University of Geology)
How Many Porphyry Copper Deposits Remain to be Found? Donald Singer* (USGS) and W. David Menzie (USGS)
Mineral Potential Mapping of Gold and Related Metals in Ancient Crust: Establishing a Metallogenic Fingerprint of the 3.0-3.5 Ga Barberton Greenstone Belt, South Africa Christien Thiar* and Maarten de Wit (University of Cape Town)
Spatial Equity Index for Equity Based Resource Allocation (PDF) Arif Wismadi* (International Institute for Geo-Information Science and Earth Observation, The Netherlands)
Assessment Methods of Subsurface Geology and Nickel-Copper Resources by Satellite Remote Sensing and GIS in Botswana and Madagascar Ryoichi Kouda* (Geological Survey of Japan)
Quantitative Assessments of Undiscovered Gold Resources in the Victorian Gold Province, Australia Vladimir Lisitsin* , Avi Olshina , David Moore , Clive William (GeoScience Victoria)
Multiple-Point Geostatistics Chairs: Sebastien Strebelle (Chevron), Julian Ortiz (University of Chile)
Multiple-Point Geostatistics: From Theory to Practice Sebastien Strebelle* (Chevron)
A Hierarchical, Extendable, Object-Based Training-Image Generation Methodology Aaditiya Satija* and Alexandre Boucher (Stanford University)
Improving Categorical Multipoint Statistics Algorithms Using a Compact Search Tree S.I. Pedersen (now with Shell Norway), T. Zhang* , C. Knudby , D. McCormick (Schlumberger-Doll Research)
Conditional Multiple-Point Simulation with a Texture Synthesis Algorithm (PDF) Julian Ortiz* and Alvara Para (University of Chile)
Combining 2D Geologic Maps and 1D Borehole Information to Simulate Non-Stationary 3D Sedimentary Basin Alexandre Boucher* (Stanford University) and Geoffrey Phelps (USGS)
An Efficient Approach to Generate Non-Stationary Multipoint Statistics Models by Local Grid Transformation Tuanfeng Zhang* , Stein Inge Pedersen , Christen Knudby , David McCormick (Schlumberger-Doll Research)

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IAMG2009 Meeting
August 23–27, 2009
Frances C. Arrillaga Alumni Center
STANFORD UNIVERSITY

Monday, August 24, 2009

Mineral Resources, Fractals and Weight of Evidence

Chairs: Frits Agterberg Graeme Bonham-Carter (Geological Survey of Canada)

Weighted Weights of Evidence Model for Mineral Potential Mapping
Shengyuan Zhang (Shijiazhuang University of Economics) and Qiuming Cheng* (China University of Geosciences)

Fractal-Multifractal Modeling for Predicting Undiscovered Mineral Deposits
Qiuming Cheng* (China University of Geosciences and York University)

A Modified Weights-of-Evidence Method for Regional Mineral Resource Estimation (PDF)
Frits Agterberg* (Geological Survey of Canada)

Correction for Bias in Weights-of-Evidence Applications to Assessing Mineral Prospectivity
Graeme Bonham-Carter* (Geological Survey of Canada), Frits Agterberg (Geological Survey of Canada), Qiuming Cheng (York University), Pouran Behnia (Geological Survey of Iran), Gary Raines, John Kerswill (Geological Survey of Canada)

Multifractal Simulation for Evaluating Regional Mineral Potential Based on Information-Integration Model
Lingqing Yao* (China University of Geosciences)

Schlumberger Student Paper Contest

Chair: Sanjay Srinivasan (University of Texas at Austin)

Jury Members: Ricardo Olea (USGS), Vera Pawlowsky-Glahn (President IAMG), and Sean McKenna (Sandia National Lab)

Prediction the Equivalent Fracture Network Permeability Using Multivariable Regression Analysis and Artificial Neural Networks
Alireza Jafari* (University of Alberta)

Multi-Point Modeling of Shale Lenses and Its Impact on Groundwater Flow in Buried Valley Deposits in Denmark
Whitney Trainor* (Stanford University)

Finite Element Modeling of Bubble Growth in Soft Fine Grained Sediments
Christopher Algar* (Dalhousie University)

Accounting for Decompaction During 3D Restoration Using Explicit and Implicit Approaches (PDF)
Florian Basier* (Nancy School of Geology)

An Improved Multiple Point Geostatistical Algorithm by Generating New Training Image Patterns in Kernel Space (PDF)
Mehrdad Honarkhah* (Stanford University)

Method to Improve Offshore Wind Energy Resource Assessments Using Cokriging
Michael Dvorak* (Stanford University)

1st Prize Winner is Mehrdad Honarkhah of Stanford University

**Presenting authors*



IAMG2009 Meeting
August 23–27, 2009
Frances C. Arrillaga Alumni Center
STANFORD UNIVERSITY

Tuesday, August 25, 2009

Towards 5D Geological Modeling Ceremony: Vistelius Award 2009 - Guillaume Caumon (Nancy School of Geology)
Poster Presentations
Modeling Geological Processes Chair: Quiming Chen (China University of Geosciences & York University)
An Advanced Simulation Model of Carbonate Production Using SIMAFADIM Roger Clavera-Gispert* (Universität Bayreuth), Ana Carmona (Universitat de Barcelona) , Raimon Tolosana-Delgado (Universitat Politècnica de Catalunya) , Telm Bover-Arnal (Universität Bayreuth) , Oscar Gratacós (Universitat de Barcelona) , Klaus Bitzer (Universität Bayreuth)
Nonlinear Phenomena in the Forming of Sphalerite Dynamic System Deyi Xu* (China University of Geosciences), Qiuming Cheng (China University of Geosciences) , Zhijing Wang (York University) , Wenlei Wang (York University)
Discrete Simulation of Biogeochemical Exchanges in a Microbial Mat Damien Chappatte* and Eric P. Verrecchia (University of Lausanne)
Predicting Decay Dynamics of Rock Materials Using Geostatistics (PDF) Jennifer McKinley* (QUB), Stephen McCabe (QUB) , and Joanne Curran (Consarc Conservation)
Mechanical-Mathematical Modeling for Sedimentary Movement and Landslide Processes (PDF) Valentina Svalova* (Russian Academy of Sciences)
Frontiers in Geostatistics Chairs: Jef Caers, Celine Scheidt (Stanford University)
ODSIM: Conditional Simulation of Complex Geological Structures Using Stochastic Perturbation of Object Distance Functions Henrion Vincent* , Guillaume Caumon , Nicolas Cherpeau (Nancy School of Geology)
Modeling Uncertainty in Metric Space (PDF) Jef Caers* (Stanford University)
Conditioning Multiple Realizations to Nonlinear Time-Series Data by Solving a Post-Imaging Problem in Metric Space Kwangwon Park* and Jef Caers (Stanford University)
Higher Order Non-Parametric Conditional Probability Theory for Multiple Point Successions of Rock Categories Jose-Antonio Varga-Guzman*
Programming Designs for the Advancement of Geostatistical Modeling Alexandre Boucher* (Stanford University) and Guillaume Caumon (Nancy School of Geology)

**Presenting authors*



IAMG2009 Meeting
August 23–27, 2009
Frances C. Arrillaga Alumni Center
STANFORD UNIVERSITY

Tuesday, August 25, 2009

Mineral Resources, Reserves Estimation Chair: Roussos Dimitrakopoulos (McGill University)
Modeling of Mineral Deposits Using Geostatistics and Experimental Design (PDF) Luis P.V. Braga* (UFRJ), Cassio F. Almeida (IBGE), Claudio Porto (UFRJ), Francisco Silva (UFRJ)
Research on Mineral Reserve Calculation Method: Genetic Kriging Zhanglin Li (China University of Geosciences), Xialin Zhang* (China University of Geosciences) Chonglong Wu (China University of Geosciences), and Guang Liu (China University of Geosciences)
3D Integrated Geological Modeling in Tongshan Copper Deposit, Heilongjiang Province, China (PDF) Gongwen Wang* (China University of Geosciences), Limei Wang (China University of Geosciences), Gen Cui (Heilongjiang Heilong Mining), Chengyin Tan (China University of Geosciences), and Shanyan Jin (Heilongjiang Heilong Mining)
Statistical Inference on the Ore-Forming Stage of the Huaaobaote Pb-Zn-Ag Deposit and Establishment of Its Evaluation Criterion for Ore Potential in Depth Yongqing Chen* (China University of Geosciences)
Optimizing the Model of Lateritic Nickel Deposit by Using Multivariate Geostatistics and Land Cover Analysis (PDF) Mohamad Nur Heriawan* (Institute Teknologi Bandung, Indonesia)
Innovative Methods for Quantifying Hydrologic Systems Chairs: Geoffrey Phelps (USGS), Keith J. Halford (USGS)
Using Calibrated Models to Guide Collection of Field Data for Improved Predictions Claire R. Tiedeman* (USGS), Matthew J. Tonkin (S.S. Papadopulos & Associates), Mary C. Hill (USGS)
Causal Factors of Non-Fickian Dispersion Explored Through Measures of Aquifer Connectivity (PDF) Katherine A. Klise (Sandia National Laboratories), Sean A. McKenna* (Sandia National Laboratories), Vincent C. Tidwell (Sandia National Laboratories), Jonathan W. Lane (Rice University), Gary S. Weissmann (University of New Mexico), Tim F. Wawrzyniec (University of New Mexico), Elizabeth M. Nichols (University of New Mexico)
Using Nearest Neighbor, Sequential Indicator Simulation, and Single Normal Equation Simulation Interpolators to Calculate Bulk Hydraulic Conductivity Within an Alluvial Fan Geoffrey Phelps* (USGS)
The Wavelet Approach to Analysis of Urbanized Groundwater Regime (PDF) Gleb Batrak* (Russian Academy of Science)
Probabilistic Approach to Forecast of the Risk Caused by Groundwater Contamination at Urbanized Territory (PDF) Irina Galitskaya* , Irina A. Pozdnyakova , Leonid S. Toms (Russian Academy of Science)
Coupled THMC Processes in Geological Media Using Stochastic Discrete Fractured Network. Application to HDR Geothermal Reservoirs Souheil Ezzedine (Lawrence Livermore National Lab)

*Presenting authors



IAMG2009 Meeting
August 23–27, 2009
Frances C. Arrillaga Alumni Center
STANFORD UNIVERSITY

Tuesday, August 25, 2009

Geomathematics and Energy Resources

Chair: Ricardo Olea (USGS)

Developing a Large Scale Model for the Estimation of Gas Hydrates

John M. Schuenemeyer* (Southwest Statistical Consulting), **John Grace** (Earth Science Associates), **Ray Faith** (MIT), **Matt Frye** (U.S. Mineral Management Service), and **Gordon Kaufman** (MIT)

Issues of Correlation and Aggregation in the Circum-Arctic Assessment

Donald Gautier* (USGS)

Orthogonality of Risk Components in Assessment of Hydrocarbon Plays

John Grace* (Earth Science Associates)

Experimental Geostatistical Model of a Continuous Gas Accultation, Rocky Mountain, Utah

Ricardo Olea*, **Troy A. Cook**, **James L. Coleman** (USGS)

Modelling and Predictions in the Ketzin CO₂ Storage Experimental Site

Peter Frykman*, **Carsten M. Nielsen** (GEUS), **Ben Norden**, **Andrea Förster** (Helmholtz-Centre Potsdam-GFZ)

Integrated Risk Evaluation in Value Creation Chain of Optimal Electric Energy Production from Lignite with the Use of Conditional Simulation of a Lignite Deposit Quality Parameters

Leszek Jurdziak and **Witold Kawalec*** (Institute of Mining Engineering at Wroclaw University of Technology, Poland)

The Application of SedSeis in Monitoring of Steam Injection in SAGD Projects, **Xingquan Zhang*** (Roxar Canada)

Using Computer-Generated Maps as Aids for Estimation of Input Distributions for Hydrocarbon Volume Assessment

Steven Salzman and **John Schuette*** (ExxonMobil Exploration Company)

Modeling of Sedimentary Transport, SEDSIM and Beyond

Chairs: Jan Harff (Szczecin University, Poland), **Dan Tetzlaff** (Schlumberger), **John Harbaugh** (Stanford University), **Cedric Griffiths** (CSIRO Predictive Geoscience Group)

The CSDMS Project and Submission Standards for Model Source Code

S.D. Peckham, **E. Hutton**, and **J.P.M. Syvitsk*** (University of Colorado at Boulder)

Modelling Syntectonic Sedimentation: Combining Mechanic and Sedimentary Process-Based Models in 3D

Ana Carmona* (Universitat de Barcelona), **Roger Clavera-Gispert** (Universität Bayreuth, Germany), **Óscar Gratacós** (Universitat de Barcelona), and **Stuart Hardy** (Universtat de Barcelona)

A Combined Geostatistics and Process-Based Methodology for Conditional Simulation of Geologic Heterogeneity

Holly Michael* and **Jef Caers** (Stanford University)

Construction of Hybrid Geostatistical Models Combining Surface Based Methods with Multiple-Point Geostatistics

Alejandro Leiva* and **Tapan Mukerji** (Stanford University)

Towards Conditioning of Process-Based Geologic Models

Kaveh Ghayour*, **Tao Sun**, and **James K. Miller** (ExxonMobil Upstream Research Company)

Modeling of Sandy Spit of the Baltic Sea Coast Using SEDSIM and PRD-LTMM

Jan Harff* (Szczecin University, Poland), **Michael Meyer** (Leibniz-Institute for Baltic Sea Research, Germany), **Wenyan Zhang** (Zhongshan University)

The 2009 Status of Sedsim Modelling and Future Plans

Cedric Griffiths*, **Chris Dyt**, and **Tristan Salles** (CSIRO Predictive Geoscience Group)

**Presenting authors*



IAMG2009 Meeting
August 23–27, 2009
Frances C. Arrillaga Alumni Center
STANFORD UNIVERSITY

Wednesday, August 26, 2009

Combining Areal and Point Data in Geostatistical Interpolation: Applications to Soil Science and Medical Geography” Keynote Speaker: Pierre Goovaerts (Biomedware Inc.)
Geostatistics Chair: Alexandre Boucher (Stanford University)
Noise Reduction by M-Factorial Kriging (PDF) Cédric Magneron (Estimages), Jacques Deraismes* (Geovariances), Nicolas Jeanne (Geovariances)
Data Transforms and Unbiased Back Transforms in Geostatistics (PDF) Jorge Kazuo Yamamoto* (University of Sao Paulo, Brazil) and Rafael Furuie (Petrobras)
Histogram Modelling and Simulations in the Case of Skewed Distributions with a 0-Effect: Issues and New Developments Jacques Deraisme* (Geovariances)
Crossvalidation of Cumulative Probabilities for Parameter Selection in Geostatistical Estimation and Simulation Ricardo Olea* (USGS)
Reservoir Characterization Chair: Jerry Jensen (University of Calgary)
Electrofacies Characterization of a Giant North African Petroleum Reservoir John Davis* and Stefan Egger (Heinemann Oil)
Applying Lacunarity Analysis to Complimentary Experimental Stratigraphy Datasets Marc L. Buursink*, Martin Perlmutter, and Thomas P. Gerber (Chevron)
Statistical Analysis of Cyclicity Within Point Bar Deposits, McMurray Formation Jerry Jensen* (University of Calgary)
Geostatistical Analysis of Reservoir Architecture and Pore Volume for Sequestration Target Layers in the Appalachian Basin Erik Venteris* (Ohio Department of Natural Resources) and Kristin Carter (Pennsylvania Geological Survey)
Reconstruction Sedimentary Architectures of Analogues for Reservoir Models E. June Hill* and Cedric M. Griffiths (CSIRO)

**Presenting authors*



IAMG2009 Meeting
August 23–27, 2009
Frances C. Arrillaga Alumni Center
STANFORD UNIVERSITY

Wednesday, August 26, 2009

Computational Methods in the Geosciences by Example

Chairs: Yuguang Chen (Chevron), Dongxiao Zhang (University of Southern California)

Scale-up of Recovery Processes in Heterogeneous Reservoirs (PDF)

Juliana Leung* and Sanjay Srinivasan (University of Texas, Austin)

Efficient Incorporation of Time-Dependent Global Effects in Two-Phase Upscaling of Flow and Transport in Heterogeneous Formations

(PDF)

Yuguang Chen* (Chevron), Yan Li and Yalchin Efendiev (Texas A&M University)

Flow and Radionuclide Transport Calculations for Highly Heterogeneous Radioactive Waste Disposal in Clay

Alain Genty*, Christophe Le Potier, Stéphane Gounand (Commissariat à l'Énergie Atomique, France)

Large-Scale Modeling of 3D Fracture Distributions for Hydrogeological Characterization (PDF)

Katsuaki Koike* (Kumamoto University), Chunxue Liu (Yunnan University of Finance and Economics), Alaa Masoud (Tanta University), Kenji Amano and Arata Kurihara (Japan Atomic Energy Agency)

Combining Process Models with Geostatistics for Simulating Stratigraphic Surfaces

Antoine Bertonecello* and Jef Caers (Stanford University)

Full-Scale Stochastic Modeling

Artur Mukharlyamov, Andrey Bezrukov*, and Vladimir Savichev (Rosneft)

Application of Statistics in Geosciences (McCaw Hall)

Chairs: Helmut Schaeben (Freiberg University), John Schuenemeyer (Southwest Statistical Consulting)

Using DEM Resampling to Study the Spatial Characteristics of DEM Error

Steve Wise* (Sheffield University)

Statistical Analysis of EBSD Data From Single Crystalline Grains

Helmut Schaeben* (Freiberg University)

Impact of Decadal and Century-Scale Oscillations on Hydroclimate Trend Analyses

Zhuoheng Chen* and Steve Grasby (Geological Survey of Canada)

Non-Parametric Kernel Density Estimation for SO(3)

Ralf Hielscher (Freiberg University)

**Presenting authors*



IAMG2009 Meeting
August 23–27, 2009
Frances C. Arrillaga Alumni Center
STANFORD UNIVERSITY

Wednesday, August 26, 2009

3D Modeling Chair: Guillaume Caumon (Nancy School of Geology)
Geostatistics Estimation of Contaminated Sediment Volume: Review of Common Challenges and Solutions Pierre Goovaerts* (BioMedware)
Combining Class Transition Probabilities in the Prediction and Simulation of Categorical Fields Guofeng Cao* (UC Santa Barbara)
Why Doesn't Your Model Pass Information to Mine? Jeremy Giles* (British Geological Survey)
Bootstrap Confidence Intervals for Reservoir Model Selection Techniques Celine Scheidt* and Jef Caers (Stanford University)
3D Geological Model Building from Remote Sensing Data: Implicit Approach Julien Clément, Davis Riffault, Christophe Antoine, and Guillaume Caumon* (CRPG-Gocad, Nancy)
Stochastic Simulations and Perturbations of Structural Models Including Topological Changes Nicolas Cherpeau* and Guillaume Caumon (CRPG-Gocad, Nancy)
Stochastic Modeling of Subsurface Heterogeneities in Goettingen Area (Lower Saxony, Germany) Using Markov Chains Enayatollah Khojasteh (Georg-August University)
Geophysical Inversion Chairs: Tapan Mukerji, Mohammad Maysami (Stanford University)
Seismic Velocity Tomography with a Co-Located Soft Data Mohammad Maysami* and Bob Clapp (Stanford University)
Application of Particle Swarm Optimization to Reservoir Modeling and Inversion Juan Luis Fernández Martínez* (University of Oviedo), David Echeverría Ciaurri (Stanford University), Tapan Mukerji (Stanford University), and Esperanz García Gonzalo
Wavelet Transforms and Reduced Complexity Model Parameterizations for Inversion Zulima Fernández Muñoz, C. Omar Menéndez Pérez, David Echevarría (Stanford University), Tapan Mukerji (Stanford University), Juan Luis Fernández Martínez (University of Oviedo)
Reducing Complexity of Inverse Problems Using Approximations and Geostatistical Priors (PDF) Thomas Mejer Hansen*, Klaus Mosegaard, Knud S. Cordua (University of Copenhagen)
Physics-Based Earthquake Source Characterization and Modeling for Strong Ground Motion Prediction with Geostatistics Seok Goo Song (URS Corporation)

**Presenting authors*



IAMG2009 Meeting
August 23–27, 2009
Frances C. Arrillaga Alumni Center
STANFORD UNIVERSITY

Thursday, August 27, 2009

Environmental Risk Chair: Alexandre Boucher (Stanford University)
Assessing Vulnerability of Aquifers in Buried Valley Deposits: A Case Study from Denmark Whitney Trainor* and Jef Caers (Stanford University)
Regional and National Scale Modeling of Natural Geohazards and Climate Change Matt Harrison* (British Geological Survey)
Using Positive and Negative Evidences of Contamination to Evaluate Groundwater Vulnerability (PDF) Marco Masetti and Alessandro Sorichetta* (Universta Degli Studi de Milano)
Compositional Data Analysis Chairs: John Doveton (Kansas Geological Survey), John Davis (Heinemann Oil)
CoDaPack 3D. New Features of Compositional Data Package Santiago Thió-Henestrosa (Universitat de Girona) presented by Juan José Egozcue* (Universitat Politècnica de Catalunya)
Compositional Data Analysis of the Mineralogy and Geochemistry of Soil and Stream Sediment Samples Along an East-West Continental-Scale Transect in the United States Lawrence J. Drew* (USGS), Eric C. Grunsky (Geological Survey Canada), David M. Sutphin (USGS), and Laurel G. Woodruff (USGS)
Redundancy and the Tau-Method from a Compositional Point of View (PDF) Juan José Egozcue* (Universitat Politècnica de Catalunya) and Vera Pawlowsky-Glahn (Universitat de Girona)
Compositional Data Analysis of Shaly Sandstones from Petrophysical Logs in Oil and Gas Reservoirs (PDF) John Doveton* (Kansas Geological Survey)
Multivariate Geostatistics Chairs: Pierre Goovaerts (Biomedware)
On the Selection of Secondary Variables for Co-Simulation Miguel Cuba* (University of Alberta), Olena Babak (Total E&P Canada Ltd.), Oy Leuangthong (University of Alberta)
Using Direct Sequential Co-Simulation for Soil Characterization Ana Horta* and Amilcar Soares (Instituto Superior Técnico, Portugal)
Spatio-Temporal Stochastic Modelling of Alluvium Soils Contaminated by Heavy Metals Maria T.D. Albuquerque*, (Escola Superior de Tecnologia do Instituto Politécnico de Castelo Branco, Portugal), M.C.R. Silva (Universidade de Lisboa, Portugal)
Improved soil organic carbon estimation at the regional scale using Area to Point kriged soil polygon data, altitude and radiometric survey data Ruth Kerry* (Brigham Young University), Pierre Goovaerts* (Biomedware Inc.), Barry Rawlins (British Geological Survey), and Ben Marchant (Biomathematics and Bioinformatics, Rothamsted Research, UK)
A Stochastic Simulation Algorithm for Image Data Fusion Maria Pereira* (Instituto Superior Técnico, Portugal)

*Presenting authors



IAMG2009 Meeting
August 23–27, 2009
Frances C. Arrillaga Alumni Center
STANFORD UNIVERSITY

Thursday, August 27, 2009

Inverse Modeling of Flow in Porous Media Chairs: Lin-Ying Hu (Conocophillips), Jaime Gomez-Hernandez (Universidad Politécnic de Valencia, Spain)
A Stochastic Collocation Based Kalman Filter for Data Assimilation Dongxiao Zhang* and Lingzao Zeng (USC)
Geologically-Consistent History Matching of Fine-Grid, Naturally Fractured Reservoirs Darryl Fenwick*, Marco Thiele (Streamsim Technologies), and Jef Caers (Stanford University)
Adaptive Local Parameterization of Facies Proportions for the History Matching of Production and Time Lapse Saturation Data (PDF) Veronique Gervais* (IFP)
History Matching with the Wrong A Priori Model Jaime Gomez-Hernandez*, H. Zhou (Universidad Politécnic de Valencia, Spain), and Jianlin Fu (Stanford University)
Geographical Information System Chair: Walter Stromquist (Swarthmore College)
The Real Meaning of Geoscience Data and Process Integration (PDF) Khalid Amin Khan* (K-tron Research, Pakistan), Gulraiz Akhter and Zulfiqar Ahmad (Quaid-i-Azam University, Pakistan)
N-Dimensional GIS John D. Grace (Earth Sciences Associates) and Walter Stromquist* (Swarthmore College)

**Presenting authors*

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