7th International Conference on
Sensitivity Analysis

of Model Output

July 1-4, 2013 — Nice, France
University of Nice, Valrose Campus

www.gdr-mascotnum.fr/mascot13.html

Conference Program

SAMO 2013 - July 1st - 4th 2013

University Nice Sophia Antipolis, Valrose Campus, Nice, France

7th International Conference on Sensitivity Analysis of Model Output

Scope of the conference

Modelling activities are steadily increasing in all scientific disciplines, ranging from financial to environmental assessments. Sensitivity Analysis is crucial both in the modelling phase and in the interpretation of model results. It contributes to model development, model calibration, model validation, reliability and robustness analysis, decision-making under uncertainty, quality-assurance, and model reduction.

SAMO conferences are devoted to advances in research on sensitivity analysis methods and their interdisciplinary applications, they are held every third year. The aim of the conference is to bring together researchers involved in the developments and improvements of methods and strategies and users of sensitivity analysis in all disciplines of science, including physics, operations research, chemistry, biology, nanotechnology, engineering, environmental science, nuclear and industrial safety, economics and finance, etc.

The first day (July 1) is organized jointly with the MASCOT-NUM network and is devoted to presentations by PhD students working on the topics covered by the SAMO conference and MASCOT-NUM (uncertainty in simulation, sensitivity analysis, design and modelling of computer experiments, model validation, optimization under uncertainty, applications, etc.). A submission call has been launched to PhD students. Eight PhD students have been selected for oral presentations, other student submissions being considered for poster communications. A prize of 1000€ will be conferred by the MASCOT-NUM's scientific committee to the best student communication (to be used by the student to attend a scientific conference or workshop).

Program Committee

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Organizing Committee

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MASCOT-SAMO 2013 – Ph.D. students day
University Nice Sophia Antipolis, Valrose Campus, Nice, France

Monday, July 1st 2013

8:30 – 9:15	Registration
9:15 – 9: 20	Welcome (B. Iooss & L. Pronzato)
9:20 – 9:30	Presentation of MASCOT-NUM and the Ph.D students day (C. Prieur)
9:30 – 10.30	Invited speaker: J. Blum (University of Nice, France): Back and forth nudging for data assimilation in geophysics Chair: D. Auroux & C. Prieur

10:30 – 11:00   Coffee break

First session - Chair: D. Ginsbourger

11:00 – 11:30	F. Bachoc (CEA/University Paris VII, France), Maximum likelihood and cross validation for kriging hyper-parameters estimation
11:30 – 12:00	M. Ivanov (University Dortmund, Germany), Parallel optimization based on FANOVA graph decomposition
12:00 – 12:30	L. Le Gratiet (CEA/University Paris VII, France), Asymptotic analysis of the learning curve for Gaussian process regression with noisy observations

12:30 – 14:00   Lunch break

14:00 – 15:00   Poster session

Second session - Chair: E. Vazquez

15:00 – 15:30	C. Chevalier (University Bern, Switzerland), Sequential and batch-sequential Bayesian sampling strategies for the identification of an excursion set
15:30 – 16:00	M. Jala (Telecom ParisTech, France), Sequential design of experiments for numerical dosimetry

16:00 – 16:30   Coffee break

Third session - Chair: T. Klein

16:30 – 17:00	G. Chastaing (University of Grenoble, France), Generalized Sobol sensitivity indices for dependent variables
17:00 – 17:30	P. Rai (Ecole Centrale Nantes, France), A regression based method using sparse low rank approximations for uncertainty propagation
17:30 – 18:00	J. Fruth (University Dortmund, Germany), Sensitivity analysis for functional inputs in a sheet metal forming process

Poster presentations

A. Birolleau (CEA, France), Bayesian inference accelerated by iterative polynomial chaos for compressible fluid dynamics

S. Bouquet (Ecole des Mines de Paris, France), Optimization of CO2 storage assessment using selection of stochastic realizations

G. Damblin (EDF, France), A Bayes decision approach to code validation in an industrial context

G. Deman (University of Neuchatel, Switzerland), Comparison of sensitivity analysis methods applied on a groundwater flow and mass transport model

J. Goffart (University of Savoie, France), Impact of weather data on the performance evaluation of a passive house: an application of sensitivity analysis

M. Grandjacques (University of Grenoble, France), Stochastic modelling of inputs

M. Hainy (University of Linz, Austria), Likelihood-free simulation-based optimal design

S. Hamza (University of Mulhouse, France), Sensitivity analysis for the study of a tire model with correlated parameters and an arbitrary distribution

B. Jan (SUPELEC, France), Fully Bayesian approach for the calculation of Sobol indices

B. Lamoureux (Arts & Metiers ParisTech, France), Kriging-based surrogate modeling of health indicators for the monitoring of a turbofan fuel system

P. Lemaître (EDF/University of Bordeaux, France), A new sensitivity analysis method for failure probability

V. Moutoussamy (EDF/University of Toulouse, France), Comparing conservative estimations of failure probabilities using sequential designs of experiments in monotone frameworks

S. Nanty (CEA, France), Uncertainty quantification and visualization for functional data

I. Niang (University of Lyon, France), Sensitivity analysis of long-term yield curves

G. Pirot (University of Neuchatel, Switzerland), Sensitivity analysis of DeeSse, a recent multiple-point statistic algorithm

F. Zertuche (University of Grenoble, France), Learning with Gaussian processes with high and low accuracy observations

J. Zhao (University of Munich, Germany), Sensitivity analysis with application to multi-sensor positioning

P. Ziegler (University of Nuremberg, Germany), A quality measure for comparing different feature deviations to perform sensitivity analysis in tolerancing

SAMO 2013 - July 2nd-4th 2013
University Nice Sophia Antipolis, Valrose Campus, Nice, France

	Tuesday, July 2nd, 2013

8:30 – 9:30	Registration
9:30 – 9:40	Welcome (B. Iooss)
9:40 – 9:45	Opening ceremony (F. Vidal, president University Nice Sophia Antipolis)
9:45 – 10:05	From sensitivity analysis to Latinorum: twenty years of SAMO conferences (A. Saltelli) Chair: B. Iooss
10:05 – 10:55	<u>Invited speaker</u>: D. Den Hertog (Tilburg University, Netherlands) - Robust optimization using computer experiments Chair: B. Iooss

> 10:55 – 11:20   Coffee break

Session 1 – New methods for calculating Sobol indices
Chair: W. Becker

11:20 – 11:40	<u>M. Lamboni</u> (JRC, Italy), New way of estimating total sensitivity indices
11:40 – 12:00	<u>S. Kucherenko</u> (Imperial College London, UK), B. Iooss (EDF, France) & S. Tarantola (JRC, Italy), Application of the control variate technique to the estimation of the total sensitivity indices
12:00 – 12:20	<u>M. Munoz-Zuniga</u> (IRSN, France) & S. Kucherenko (Imperial College London, UK), Low cost bounds and estimates of total sensitivity indices based on metamodels
11:20 – 12:40	<u>O. Roustant</u> (Ecole des Mines de Saint Etienne, France), B. Iooss (EDF, France), J. Fruth & S. Kuhnt (TU Dortmund, Germany), Derivative-based global sensitivity measures for interactions

> 12:40 – 14:15   Lunch break

> 14:15 – 15:15   Poster session I

Session 2 - New sensitivity measures
Chair: T. Mara

15:15 – 15:35	E. Borgonovo (Milano University, Italy), S. Tarantola (JRC, Italy), <u>E. Plischke</u> (Clausthal University) & M. D. Morris (Iowa State Univ., USA), Transformations and invariance in global sensitivity analysis
15:35 – 15:55	<u>N. Rachdi</u> (EADS, France), J-C. Fort (Paris Descartes Univ., France), T. Klein (IMT, France) & F. Mangeant (EADS, France), New sensitivity indices subordinated to a contrast
15:55 – 16:15	<u>N. Saint Geours</u> (Irstea, France), S. Tarantola, V. Kopustinkas (JRC Ispra, Italy) & R. Bolado-Lavin (JRC Petten, The Netherlands), Estimating sensitivity indices using contribution to the sample mean

Session 3 – Socio-economic applications
Chair: S. Tarantola

16:40 – 17:00	P. Paruolo (Univ. of Insubria, Italy), M. Saisana & <u>A. Saltelli</u> (JRC Ispra, Italy), Fallacies of rankings and ratings
17:00 – 17:20	<u>A. Weber</u>, A. Saltelli & W. Becker (JRC Ispra, Italy), A sensitivity analysis of the birth cohort model for tertiary education attainment 2011-2020
17:20 – 17:40	<u>W.E. Becker</u>, A. Saltelli (JRC Ispra, Italy) & P. Paruolo (Univ. of Insubria, Italy), Econometric model selection using sensitivity analysis
17:40 – 18:00	Mascot-Num Ph. D. award ceremony

Wednesday, July 3rd, 2013

9:00 – 9:50   <u>Invited speaker</u>: H. Dette (Bochum University, Germany) - Design for linear models with correlated observations
Chair: L. Pronzato

Session 4 – Design and sensitivity analysis I
Chair: L. Pronzato

9:50 – 10:10   <u>S.M. Spiessl</u> & D.A. Becker (GRS, Germany), Sensitivity analysis of final repository models using quasi-random sampling and a metamodel approach

10:10 – 10:30   <u>R. Faivre</u>, V. Picheny & H. Monod (INRA, France), Simple and efficient tools to explore complex models in agroecology with an eye on interactions

10:30 – 10:50   <u>S. Lefebvre</u> (ONERA, France) & J-P. Gauchi (INRA, France), Multidimensional global sensitivity analysis for aircraft infrared signature models with dependent inputs

10:50 – 11:15   Coffee break

Session 5 – Polynomial Chaos
Chair: S. Kucherenko

11:15 – 11:35   <u>Y. Caniou</u> (Phimeca, France) & B. Sudret (ETH Zurich, Switzerland), Covariance-based sensitivity indices based on polynomial chaos functional decomposition

11:35 – 11:55   <u>B. Sudret</u> & C.V. Mai (ETH Zurich, Switzerland), Derivative-based sensitivity indices based on polynomial chaos expansions

11:55 – 12:15   <u>R. Zivanovic</u> (Univ. Adelaide, Australia), Global sensitivity analysis for interpretation of black box functions

12:15 – 12:35   <u>A. Janon</u> (Univ. Lyon 1, France), M. Nodet & C. Prieur (Grenoble Univ./INRIA, France), Goal-oriented error estimation for reduced basis method. Application to certified sensitivity analysis

12:35 – 14:00   Lunch break

14:00 – 15:00   Poster session II

15:00 – 15:50   <u>Invited speaker</u>: S. Funtowicz (Bergen University, Norway) - Models of science and policy
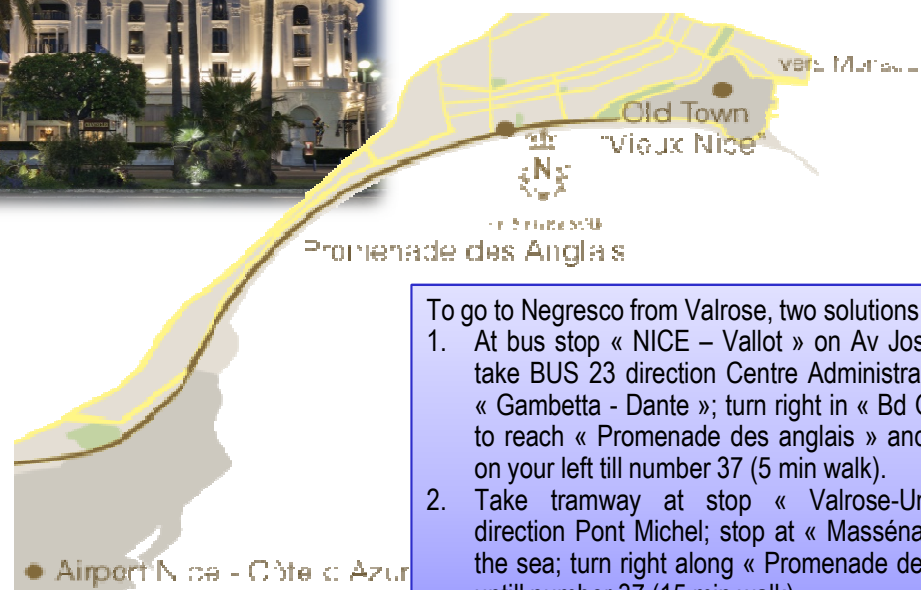Chair: A. Saltelli

15:50 – 16:15   Coffee break

Session 6 – Environmental, energy and transport applications
Chair: A. Pasanisi

16:15 – 16:35   I. Arevalo Martin, R. Bolado-Lavin (JRC Petten, The Netherlands) & V. Kopustinskas (JRC Ispra, Italy), Identification of bottlenecks in the EU gas transmission network via Sensitivity analysis

16:35 – 16:55   B. Ciuffo, V. Punzo, S. Tarantola (JRC Ispra, Italy) & M. Montanino (Univ. Napoli, Italy), Assessing the robustness of sensitivity analysis results. Application to traffic simulation models

16:55 – 17:15   J. Nossent, O.T. Leta & W. Bauwens (Univ. Brussels, Belgium), Assessing the convergence of a Morris-like screening method for a complex environmental model

17:15 – 17:35   A. Guaus (INRA, France), A. Bsaibes, T. Cartailler (ITK, France), C. Prieur (Joseph Fourier Univ., France), E. Lebon & F. Gérard (INRA, France), Time-dependent sensitivity and uncertainty analyses of an agroclimatic model for the water status management of vineyard

20:00   Conference Dinner
Négresco, 37 Promenade des Anglais, Nice

To go to Negresco from Valrose, two solutions:
1. At bus stop « NICE – Vallot » on Av Joseph Vallot, take BUS 23 direction Centre Administratif; stop at « Gambetta - Dante »; turn right in « Bd Gambetta » to reach « Promenade des anglais » and then walk on your left till number 37 (5 min walk).
2. Take tramway at stop « Valrose-Université » direction Pont Michel; stop at « Masséna »; walk to the sea; turn right along « Promenade des anglais » untill number 37 (15 min walk).

Thursday, July 4th, 2013

9:15 – 10:05   <u>Invited speaker</u>: F. Gamboa (Institut de Mathématiques de Toulouse, France) - Fast and Sobol pick freeze methods in the Costa Brava sauce
Chair: B. Sudret

Session 7 – Functional inputs
Chair: B. Sudret

10:05 – 10:25   <u>F. Anstett-Collin</u> (Univ. Lorraine, France), T. Mara (Univ. La Réunion, France), L. Denis-Vidal (UTC, France) & J. Goffart (Univ. of Savoy, France), UASA of complex models: coping with dynamic and static inputs

10:25 – 10:45   J-C. Fort (Univ. Paris Descartes, France), T. Klein, <u>A. Lagnoux</u> & B. Laurent (Institur de Mathématiques de Toulouse, France), Estimation of the Sobol indices in a linear functional multidimensional model

10:45 – 11:10   Coffee break

Session 8 – Gaussian processes
Chair: C. Prieur

11:10 – 11:30   <u>N. Durrande</u> (Univ. Sheffield, UK), D. Ginsbourger (Bern Univ., Switzerland) & O. Roustant (Ecole des Mines de St-Etienne, France), A class of ANOVA kernels dedicated to sensitivity analysis

11:30 – 11:50   L. Le Gratiet, <u>C. Cannamela</u> (CEA, France) & B. Iooss (EDF, France), Multi-fidelity sensitivity analysis

11:50 – 12:10   <u>N. Lenz</u> (Univ. Bern, Switzerland), A new class of covariance kernels accounting for non-additivity in high-dimensional kriging

12:10 – 12:30   <u>W. G. Müller</u>, H. Waldl (Univ. Linz, Austria), L. Pronzato & J. Rendas (Univ. Nice, France), Efficient prediction designs for random fields

12:30 – 13:45   Lunch break

Session 9 – Design and sensitivity analysis II
Chair: H. Monod

13:45 – 14:05   E. Plischke (Clausthal Univ., Germany), <u>S. Tarantola</u> (JRC Ispra, Italy) & T. Mara (Univ. La Réunion, France), Hiking to mount Toblerone: advanced methods for random balance design

14:05 – 14:25   <u>J-M. Fédou</u>, G. Menez, L. Pronzato & M-J. Rendas (Univ. Nice, France), Revisiting Morris method: A polynomial algebra for design definition with increased efficiency and observability

14:25 – 14:45   <u>C. Prieur</u> & J-Y. Tissot (Univ. Grenoble, France), Estimating Sobol indices combining Monte Carlo estimators and Latin Hypercube Sampling

14:45 – 15:05   Coffee break

Session 10 – Calibration and Bayesian approaches
Chair: F. Gamboa

15:05 – 15:25   <u>O. Martin</u>, C. Bruchou & L. Pages (INRA, France), Usefullness of sensitivity analysis for Approximate Bayesian Computation

15:25 – 15:45   <u>W.N. Edeling</u>, P. Cinolla (ENSAM ParisTech/TU Delft), R. P. Dwight & H. Bijl (TU Delft, The Netherlands), Bayesian estimates of the parameter variability in turbulence models for the RANS equations

15:45 – 16:05   <u>X. Merle</u> & P. Cinella (Arts et Métiers ParisTech, France), Bayesian quantification of thermodynamic uncertainties in dense gas flows

16:05 – 16:15   Closing ceremony (S. Tarantola, B. Iooss, L. Pronzato)

Poster session I

C.L. Azevedo (LNEC Lisbon) & **B. Ciuffo** (JRC Ispra), Global sensitivity analysis of high dimensional traffic micro-simulation models: a multistep approach

B. Bieda (Univ. Krakow), Stochastic approach for life of the Municipal Solid Waste (MSW) landfill using Monte Carlo simulation

B. Ciuffo & S. Sala (JRC Ispra), Global sensitivity analysis to identify archetypes for the impact assessment of chemicals

B. Delinchant (Univ. Grenoble), Reliable based design optimization using k-sigma method and local sensitivity

I.T. Dimov & R. Georgieva (Academy Sciences Sofia), Global sensitivity study of compact models in nanodevices with correlated inputs

F. Douard & **B. Iooss** (EDF), Dealing with uncertainty in technical & economic studies of investment strategy optimization

T. Figueiro, **J-H. Tortai, N. Jedidi** (Univ. Grenoble), **M. Saib** & **P. Shiavone** (Aselta Nanographics), Selection of test patterns for model calibration based on sensitivity analysis

M. Flechsig, T. Nocke & C. Rachimow (Posdam Institute for Climate Impact Research), Multi-run simulation environments – requirements, development and application

A. Hedin (Swedish Nuclear Fuel and Waste Management Co.), Sensitivity analyses of a fast analytical radionuclide transport model

M. Lamboni, R. Koeble & **A. Leip** (JRC Ispra), Uncertainty and sensitivity analysis of land shares model over EU 27

Poster session II

E. Castano (Universidad Autónoma de Querétaro), **V.M. Aguirre** (Instituto Tecnológico Autónomo de México), **A. Villeda** (Universidad Autónoma de Querétaro), A response surface approach for sensitivity analysis in differential equations

B. Ciuffo (JRC Ispra), **Q. Ge** & **M. Menendez** (ETH Zurich), Quasi-OTEE versus kriging-based approaches for the sensitivity analysis of computationally expensive traffic simulation models: an exploratory study

S.H. Hoang & **R. Baraille** (Shom Toulouse), Schur vectors for estimating parameters in filtering algorithm for data assimilation

K. Kandananond (Rajabhat Univ.), Robust assessment of different machine learning methods for time series forecasting using a factorial design of experiment

N. Marie (Univ. Paris 10), Rough paths theory applied to computation of sensitivities

G.P. Petropoulos, H. Griffiths (Univ. of Aberystwyth) & **S. Tarantola** (JRC Ispra), Towards operational products development from earth observation: exploration of SimSphere land surface process model sensitivity using a GSA approach

C.M. Rocco (Univ. Central Venezuela) & **E. Hernandez** (Univ. Catlolica Portuguesa), Uncertainty and sensitivity analysis in multiple criteria decision problems using rule learner techniques

N. Saint Geours (Irstea), **S . Tarantola** (JRC Ispra) & **L. Lilburne** (Landcare Research), Computing variance-based sensitivity indices for spatial inputs with "map labelling": study of sampling size bias

H. Sulieman (American University of Sharjah), Profile-based sensitivity in D-optimal designs for precise parameter estimation

Q-L. Wu, B. Bayol, F. Kang (Ecole Centrale de Paris), **J. Lecoeur** (3Syngenta Seeds,) & **P-H. Cournede** (Ecole Centrale de Paris), Sensitivity analysis for plant models with correlated parameters : application to the characterization of sun over genotypes

M. Zambrano-Bigliarini, A. Zajace & **S. Tarantola** (JRC Ispra), Global sensitivity analysis for the calibration of a fully-distributed hydrological model