

## PLENARY SESSIONS

### J. Stuart Hunter Lecture

**Chair:** Don Stevens

Douglas W. Nychka, Director of the Institute for Mathematics Applied to Geosciences National, Center for Atmospheric Research “Spatial statistics, computer models and regional climate change”.

### President's Invited Lecture

**Chair:** Daniela Cocchi

Walter Radermacher, Chief Statistician of the European Union and Director-General of Eurostat: “Sustainable Economics: the contribution of official statistics”.

**Invited Lecture GRASPA.** Project “Statistical analysis and modelling of impact and risk for environmental phenomena in space and time”

**Chair:** Gianfranco Lovison

Giovanna Jona Lasinio, University of Roma "La Sapienza" , “Spatio temporal data modeling in environmental sciences a review.”

**Invited Lecture GRASPA.** Project “Methods for collecting and analyzing environmental data”

**Chair:** Alessandro Fassò

Lorenzo Fattorini, University of Siena, “Sampling strategies for the assessment of ecological diversity”

INVITED SESSIONS *Affiliation refers to the first author when authors are more than one*

## TIES SESSIONS

### T1: Statistical issues in assessing forest sustainability (TIES/ISARA)

**Organizer:** Ronald Mc Roberts **Chair:** Andrew Finley

- Steen Magnussen, Ronald Mc Roberts, Canadian Forest Service, British Columbia, Canada: “A bootstrap variance estimator for the observed species richness in quadrat sampling from finite populations”
- Erkki Tomppo, Mari Myllymäki, Antti Penttinen, Finnish Forest Research Institute (Metla), Finland: “Predicting tree level variables using airborne LiDAR data and field observations”
- Ronald Mc Roberts, U.S. Forest Service, Minnesota USA: “Satellite Image-based Maps: Scientific Inference or Just Pretty Pictures?”

### T2: Change-Point Methods for Environmental Data Analysis

**Organizer:** Venkata K. Jandhyala **Chair:** Bronwyn Harch

- Ian B. MacNeill, Venkata K. Jandhyala, Elena Naumova, University of Western Ontario, Canada: “Monitoring using Changepoints”
- Anders Grimvall, Sackmone Sirisack, Linköping Universitet, Sweden: “Integrating smoothing and regression trees for change-point detection in environmental data”
- Venkata K. Jandhyala, Stergios Fotopoulos, Elena Khapalova, Washington State University, USA: “Earthquakes from the Indonesian region: an application of exact computable expressions for the asymptotic distribution of change-point mle in the exponential case”
- Hyune-Ju Kim, Jun Luo, Michael Barrett, Eric Feuer, Syracuse University, USA: “Comparing piecewise linear trends”

### **T3: Palaeoclimate reconstruction: statistical challenges**

**Organizer:** John Haslett **Chair:** Don Stevens

- John Haslett, Trinity College Dublin, Ireland: "Statistical Methods in the Reconstruction of Paleoclimate"
- Andrew Parnell, John Haslett, Michael Salter-Townshend, University College Dublin, Ireland: "Bayesian methods for reconstructing past climate histories"
- Vincent Garreta, Joël Guiot, CEREGE in Aix-en-Provence, France, "Climate reconstructed from pollen data using a dynamic vegetation model"
- Michael Crucifix, Rouger Jonathn, Université catholique de Louvain, Belgie: "Long-range climate reconstructions with dynamical systems"

### **T4: Uncertainty in Hydrological forecasting**

**Organizer:** Daniela Cocchi-Ezio Todini **Chair:** Lelys Guenni

- Ezio Todini, University of Bologna, Italy: "Predictive Uncertainty in Hydrological Forecasting"
- Alexandra Schmidt, Romy Ravines, Helio Migon, Federal University of Rio de Janeiro, Brazil: "Modelling multiple series of runoff: the case of Rio Grande Basin"
- Pierre Aillot, Craig Thompson, Peter Thomson, University of Brest, France: "Space time modeling of precipitation using hidden Markov models"

### **T5: Ocean Climatologies**

**Organizer:** Alexandra Schmidt **Chair:** Alexandra Schmidt

- Bruno Sanso, Ricardo Lemos, University of California, USA: "Spatio-temporal models for oceanic variables"
- Lelys Guenni, Gabriel Huerta, Bruno Sansò, Universidad Simón Bolívar, Venezuela: "Detection of oceanic influence on the precipitation of the central Venezuelan coast using time-varying models"
- Nadia Pinardi, Srdjan Dobiricic, Ralph Milliff, University of Bologna, Italy: "Operational Oceanography: the science based approach to marine management problems"

### **T6: Fast computation for spatial data**

**Organizer:** Ulla Holst **Chair:** Ulla Holst

- Nicolas Verzelen, LM-Orsay, INRIA Saclay-Ile de France: "Data-driven neighborhood selection of a Gaussian field"
- Finn Lindgren, Håvard Rue, Johan Lindström, David Bolin, Lund University, Sweden: "Eliminating the practical boundary between Markov and other Gaussian random fields"
- Johan Lindström, Finn Lindgren, Peter Jonsson, David Bolin, Håvard Rue, Lund University, Sweden: "Fast estimation of non-stationary Gaussian Markov Random Fields"
- David Bolin, Finn Lindgren, Lund University, Sweden: "Non-stationary spatial ARMA models applied to global ozone data"

### **T7: Risk and extremes in climate research**

**Organizer:** Peter Guttorp **Chair:** Rick Schoenberg

- Ola Haug, Norwegian Computing Center, Norway: "Projections of future insurance losses from climate model data"
- George Lindgren, Lund University, Sweden: "Possible climate change effects on marine safety"
- Peter Guttorp, University of Washington, USA: "Looking for climate change signals in extreme temperatures"

### **T8: Random effects modeling of environmental data**

**Organizer:** Renjun Ma **Chair:** Renjun Ma

- Francesca Dominici, Roger Peng, Michelle Bell, Johns Hopkins Bloomberg School of Public Health, USA: "A Bayesian hierarchical model for estimating health effects of chemical constituents of particulate matter"
- Ronghui Xu, Michael Donohue, Florin Vaida, Rosanna Haut, University of California, USA: "Mixed-effects model selection"
- Guohua Yan, Renjun Ma, University of New Brunswick, Canada: "Analysis of clustered environmental multinomial data with random cluster sizes"

### **T9: Computational Methods for Large Spatial Data**

**Organizer:** Hao Zhang **Chair:** Jorge Mateu

- Abdel El-Shaarawi, National Water Research Institute and McMaster University, Canada: "Matrix inversion and statistical data analysis"
- Pascal Monestiez, David Nerini, INRA, France: "Functional kriging of ocean profile data"
- Hao Zhang, Purdue University, USA: "Dealing with large covariance matrices for spatial data"

### **T10: Forest Fire and Weather**

**Organizer:** W. John Braun **Chair:** Victoria Wan

- Valentin Rousson, Juhyun Park, Theo Gasser, University of Lausanne - Switzerland, "On the concept of structural components with an application to weather functional data"
- Alisha Albert-Green, W. John Braun, David L. Martell, Douglas G. Woolford, University of Western Ontario, Canada: "Modelling the Ontario Fire Weather Index"
- Sylvia Esterby, Zuzana Hrdlickova, Steve Taylor, University of British Columbia-Okanagan, Canada, "Characterizing spatial patterns of fire weather using historical data"
- Jonathan Lee, W. John Braun, Bruce Jones, Doug Woolford, Mike Wotton, University of Western Ontario, Canada: "Fire risk assessment in Muskoka, Ontario"

### **T11: Modeling count environmental data**

**Organizer:** Abdel El-Shaarawi **Chair:** Armand Maul

- Renjun Ma, University of New Brunswick Fredericton, Canada: "Poisson nonlinear mixed models for environmental data"
- Rhong Zhu, Abdel El-Shaarawi, Harry Joe, McMaster University, Canada: "Modelling bacterial density count data with various overdispersion and tail heaviness"
- Dianliang Deng, University of Regina, Canada: "The testing of Zero-inflation and overdispersion for the environmental count data"

### **T12: Chemometrics**

**Organizer:** Abdel El-Shaarawi **Chair:** Abdel El-Shaarawi

- Clifford Spiegelman, Abdel El-Shaarawi, Texas A&M University Center for Statistical Bioinformatics, USA: "Chemometrics and Environmetrics: Tall Shoulders, Accomplishments, and Future Directions".
- Maria Chiara Pietrogrande, Mattia Mercuriali, Nicola Marchetti, Luisa Pasti, Dimitri Bacco, Gaetano Zanghirati, Francesco Dondi, University of Ferrara, Italy: "A chemometric approach based on the autocovariance function for handling complex signals from environmental monitoring".
- Ester Papa, Paola Gramatica, University of Insubria, Italy: "QSAR modelling and multivariate analysis of the environmental behaviour of organic pollutants"

### **T13: Estimating personal exposures to air pollution**

**Organizer:** Gavin Shaddik **Chair:** Gavin Shaddik

- Marta Blangiardo, Sylvia Richardson, Imperial College, UK: “A Bayesian model of time activity data for ecological studies with implications to the bias of disease risks”
- Duncan Lee, Gavin Shaddik, Ruth Salway, Jim Zidek, University of Glasgow, UK: “Using estimated personal exposures in studies of the effects of air pollution on health”
- Gulliver John, Blangiardo Marta, Briggs David, Hansell Anna, University of the West of Scotland, UK: “Simultaneous modelling of spatial and temporal variations in air pollution exposures for health risk assessment and epidemiological analysis”

### **T14: Assessment of ecosystem status**

**Organizer:** Ron Smith **Chair:** Marian Scott

- Anne E Magurran, Stephen R Baillie, Steve T Buckland, Jan McP Dick, David A Elston, E Marian Scott, Ron Smith, Paul J. Somerfield, Allan Watt, University of St Andrews, :” Measuring Biodiversity in the context of Ecosystem Services”;
- Paul Warren, University of Albury-Wodonga, Australia: “A Causal Modelling Approach to Spatial and Temporal Confounding in Environmental Impact Studies”
- Ron Smith, Jan Dick, Centre for Ecology and Hydrology, Bush Estate: “Linking Statistics to Ecosystem Services Frameworks”

## **GRASPA/TIES SESSIONS**

### **GT1: Bayesian multivariate spatial models**

**Organizer:** Francesca Bruno **Chair:** Peter Guttorp

- Fedele Greco, Carlo Trivisano, Daniela Cocchi, University of Bologna, Italy: “A multivariate CAR model and its applications”
- Sudipto Banerjee, Yufen Zhang, James Hodges, University of Minnesota, USA: ” Smoothed ANOVA with spatial effects as a competitor to MCAR in multivariate spatial smoothing”
- Steve Sain, Geophysical Statistics Project–NCAR: ”Spatial Analysis of Regional Climate Model Ensembles”

### **GT2: Environmental Sampling Applications**

**Organizer:** Lucio Barabesi, Don Stevens **Chair:** Lucio Barabesi

- Dick Brus, Jaap de Gruijter, Wageningen University and Research Centre, The Netherlands: “A mixed, design-based model-based sampling approach for estimating global quantities in space-time”
- Don Stevens, Oregon State University, USA, “Using imputation to estimate trend and abundance in Coho Salmon numbers using a multi-period rotating panel sampling design”
- Hailemariam Temesgen, Vicente Monleon, Aaron Weiskittel, Duncan Wilson, Oregon State University, USA, “A tail of two phases: design and estimation of three foliage biomass”
- Sara Franceschi, University of Siena, Italy: “Sampling properties of spatial total estimators under tessellation stratified designs”

### **GT3: Statistical Modeling for Water Resources**

**Organizer:** Sylvia Esterby **Chair:** Sylvia Esterby

- Vito Muggeo, Gianfranco Lovison, University of Palermo, Italy: “Score and quasi-score inference for change-points, with applications in marine ecology and groundwater monitoring”
- Gonçalves A. Manuela, Marco Costa, Universidade do Minho, Portugal: "Prediction of Water Quality Variables using State-Space and Linear Models for River Network Data "
- Guillaume Evin, Anne-Catherine Favre, University of Québec, Canada: “A non-stationary Neyman-Scott model for rainfall”

## GRASPA SESSIONS

### G1: Spatiotemporal models

**Organizer:** Rosaria Ignaccolo **Chair:** Francesca Bruno

- Yongku Kim, Institute for Mathematics Applied to Geosciences, NCAR, USA: "Change of Spatiotemporal Scale in Dynamic Models"
- Veronica Berrocal, Alan Gelfand, Duke University, USA: "A multivariate spatio-temporal downscaler for output from numerical models"
- Michela Cameletti, Rosaria Ignaccolo, Stefano Bande, University of Bergamo, Italy: "Comparing air quality statistical models"
- Pancrazio Bertaccini, Vanja Dukic, Rosaria Ignaccolo, University of Turin, Italy: "Air pollution: meteorology or traffic, what does really matter?"

### G2: Environmental indices

**Organizer:** Alessandro Fassò **Chair:** Gianfranco Lovison

- Antonello Maruotti, Francesco Lagona, University of Rome, Italy: "A Hurdle Markov model for pollutants concentrations"
- Antonella Plaia, Mariantonietta Ruggieri, Anna Lisa Bondì, University of Palermo, Italy: "An aggregate air quality index considering interactions among pollutants"
- Marian Scott, Duncan Lee, Claire Ferguson, Ron Smith, University of Glasgow, UK: "Simple metrics, complex environmental systems"

### G3: Air quality modeling

**Organizer:** Alessandro Fassò **Chair:** Alessandro Fassò

- Paul D.Sampson, Adam Szpiro, Lianne Sheppard, Johan Lindstrom, University of Washington, USA: "Spatial regression modeling with nonstationary spatial covariance structure for air quality exposure from complex spatio-temporal monitoring and GIS-based covariates"
- Francesco Finazzi, Cinzia D'Ariano, Alessandro Fassò, Gianandrea Mannarini, Orietta Nicolis, University of Bergamo, Italy: "Integrating satellite and ground level data for air quality monitoring and dynamical mapping"
- Wolfgang Schmid, Olha Bodnar, Universität Viadrina Frankfurt an der Oder, Germany: "Local Approaches for interpolating Air Pollution Processes"

### G4: Source apportionment with multivariate receptor models

**Organizer:** Alessio Pollice **Chair:** Giovanna Jona Lasinio

- Alessio Pollice, University of Bari, Italy: "A critical review of some statistical issues implied by the use of multivariate receptor models"
- Eleonora Andriani, Maurizio Caselli, Gianluigi De Gennaro, University of Bari, Italy: "Synergistic use of several receptor models (CMB, APCS and PMF) to interpret air quality data"
- Bo Larsen, IES, EU Joint Research Center, Ispra: "A critical look at the fulfillment of basic assumptions for the application of the two common receptor models CMB and PMF for source apportionment of PM10"
- William F. Christensen, Basil Williams, Shane Reese, Brigham Young University, USA: "Identifying pollution source directions for pollution source apportionment"

### **G5: Environmental point process**

**Organizer:** Marcello Chiodi **Chair:** Marcello Chiodi

- Rick Schoenberg, University of California, USA: "Separable conditional intensity estimates for space-time point processes with application to Los Angeles County wildfires"
- Crescenza Calculli, Alessio Pollice, University of Bari, Italy: "Joint incidence of various diseases in the presence of risk source"
- Renata Rotondi, Elisa Varini, CNR-IMATI, Italy: "Bayesian estimation of the conditional intensity function in self-correcting point processes applied to the seismic activity of Italian tectonic regions"
- Giada Adelfio, Marcello Chiodi, University of Palermo, Italy: "Semi-parametric estimation of the intensity function in space-time point processes"

### **G6: Extreme values for spatio-temporal data**

**Organizer:** Jean-Noel Bacro, Liliane Bel **Chair:** Liliane Bel

- Simone Padoan, Anthony Davison, Mathieu Ribatet, Ecole Polytechnique Federale de Lausanne, Switzerland: "Modelling of spatial extremes: a review"
- Gwladys Toulemonde, Armelle Guillou, Philippe Naveau, Mathieu Vrac, Frédéric Chevallier, Université Montpellier II, France: "State-space models in extreme value theory"
- Mathieu Ribatet, Simone A. Padoan, Scott A. Sisson, EPFL, Lausanne, Switzerland: "Likelihood-based inference for max-stable processes"
- Pierre Ribereau, Armelle Guillou, Philippe Naveau, Université de Montpellier 2, France: "Generalized Probability Weighted Moments Methods in Extreme Value Theory"

### **G7: Nonparametric statistics and functional analysis in environmental problems**

**Organizer:** Carlo Gaetan **Chair:** Carlo Gaetan

- Stefano Tonellato, Stefano Ciavatta, Andrea Pastore, Roberto Pastres, University of Venice, Italy: "Clustering of monitoring stations in Venice Lagoon"
- Sonia Petrone, Michele Guindani, Alan Gelfand, Bocconi University, Italy: "Bayesian nonparametric mixtures for local clustering of functional data"
- Jan-Michel Poggi, Francois-Xavier Jollois, Bruno Portier, Université Paris-Sud, France: "Three non-linear statistical methods to analyze PM10 pollution in Rouen area"
- David Dunson, Duke University, USA: "Bayesian density regression and mixtures with environmental applications"

### **G8: Wavelet-based analysis of environmental data**

**Organizer:** Orietta Nicolis **Chair:** George Christakos

- Jorge Mateu, Orietta Nicolis, Universitat Jaume I, Spain: "Wavelet-based analysis of the spatial structure of point patterns"
- José Miguel Angulo, Ana E. Madrid, Universidad de Granada Facultad de Ciencias, Spain: "Wavelet-based multiscale intermittency analysis in environmental applications"
- Orietta Nicolis, George Christakos, University of Bergamo, Italy: "A unified framework of fractal and wavelet random fields"
- Emilio Porcu, Maria Dolores Ruiz Medina, Rosaura Fernandez Pascual, Universitat Göttingen, Germany: "Functional estimation of Gaussian Dagum random fields and related models"

### **G9: Epidemiology**

**Organizer:** Emanuela Dreassi **Chair:** Emanuela Dreassi

- Leonhard Held, Birgit Schrödle, University of Zurich, Switzerland: "Spatio-temporal disease mapping using INLA"
- Rossella Miglio, Francesca Bruno, University of Bologna, Italy, "Flexible statistical models in the study of vulnerability to environmental exposure"
- Dolores Catelan, Annibale Biggeri, Corrado Lagazio, University of Florence, Italy: "Epidemiologic surveillance and impact evaluation: the false discovery rate"
- Adam A. Szpiro, Lianne Sheppard, Thomas Lumley, University of Washington, USA: "Accounting for Exposure Measurement Error in Environmental Epidemiology"