1st International Statistical analysis of spatial Data in Agro-Environmental research Summer School

COMO ITALY
VILLA DEL GRUMELLO
August, 26-30 2019

SCHOOL DIRECTORS

Marco Acutis
Professor of Agronomy University of Milan.

Michael Märker
Professor of Phisical Geography and Geomorphology, University of Pavia.

SPEAKERS

Aldo Lipani, PhD, UCL London, UK

Alessia Perego, PhD, Univ. Milan Italy

Dario Sacco, Professor, University of Turin

Sergio Saia, PhD CREA, Italy

Calogero Schillaci, PhD, Univ. Milan, Italy

Elena Valkama, PhD, Luke Institute, Finland

Fabio Veronesi, PhD, WRc plc Consulting, UK

Dear participants, we are glad to share with you the program of the school. The registration is now closed and we are looking forward to seeing you in Como on next 26th August. The programme of the SDAE summer school integrates many disciplines. We will present a case study, which will be studied under different aspects during lectures and with practical computer exercises. A guideline on software download and installation will be sent soon.

Monday 26-08-2019

Statistical inference and introduction to the terrain analysis

8:30-9:30 Registration and open coffee
9:30-11 Prof. Acutis: Introduction on general linear models,
11-11:30 Coffee break
11:30-13 Prof. Acutis: Regression and analysis of variance ANOVA, ANCOVA, Regression analysis
13-14 Lunch (catering offered by the school)
14-15.30 Prof. Marker: Terrain analysis: soil landscape relations & process dynamics, (intro in SAGA)
15:30-15:45 Coffee break
15:45-17 Prof. Acutis: Case study, A model for the prediction of a soil variable: example of development of a pedotransfer function, use of regional soil data, Worldclim, terrain properties, CORINE, LUCAS data.
Sample size determination: normal data and general case; the Sissi software
17-18 Dr. Perego, introduction to Mixed models

Tuesday 27-08-19

Meta-analysis, advanced literature search, effect sizes

9-9:30 Dr. Schillaci and Dr. Saia, Introduction of advanced literature search in Agriculture, Environmental and Earth Sciences
9:30-11 Dr. Valkama: Meta-analysis: History of meta-analysis and its applications in agriculture and environmental sciences. Types of data and their conversion to effect sizes. Question formulation, data search and collection, data extraction, database creation and dealing with missing data.
11-11:30 Coffee break
11:30-13 Dr. Valkama: Meta-analysis : Dealing with non-independence of observations (long-term experiments, multi-treatments experiments, multi-species/varieties). Dealing with different controls and experimental designs. Combining effect sizes across studies. Testing for moderators: a meta-regression and subgroup analysis.
13-14 Lunch (catering offered by the school)
14-15:30 Dr. Valkama, Conducting meta-analysis with OpenMee. Format of meta-analysis report.
15:30-15:45 Coffee break
15:45-17 Dr. Valkama, Conducting meta-analysis with OpenMee. Format of meta-analysis report.

19-22 Social Dinner (offered from the SDAE school)

Wednesday 28-08-19
Spatial mixed models
Terrain analysis and Erosion modelling

9-11 Prof. Sacco: Introducing spatial components in mixed models. A case study on carbon stocking in rice.
11-11:30 Coffee break
11:30-13 Prof. Marker: Terrain analysis for Digital soil mapping DSM and agro-environmetal modelling. Introduction to SAGA GIS, Digital elevation models (formats and quality), DEM pre -processing.
Introduction to Terrain analysis, primary and secondary topographic indices
13-14 Lunch (catering offered by the school)
14-17 Prof. Marker Dr. Veronesi and Dr. Schillaci: Terrain analysis K factor determination, C factor determination from CORINE. Methods for K factor determination a) Maxent, b) Geographic Weighted Regression GWR. Application of soil erosion models using Universal soil loss equation USLE, or Unit stream power erosion deposition model USPED.

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Thursday 29-08-2019
Data Science from academia to the Industry

9-10 Dr. Veronesi: Data manipulation, Spread sheet, Spatial data, Temporal data
10-11 Dr. Veronesi: Data visualisation, Static plots with ggplot2, Interactive plots with html widgets
11-11:30 Coffee break
11:30-13 Dr. Veronesi: Reporting, R markdown, Introduction to Shiny
13-14 Lunch (catering offered by the school)
14-15:30 Dr. Veronesi, Dr. Schillaci, Dr. Saia, Dr. Lipani: Case study 1- Case study for geostatitic, R and GIS, model builder in GIS.
15:30-15:45 Coffee break
15:45-17 Dr. Veronesi, Dr. Schillaci, Dr. Saia, Dr. Lipani: Case study 2- Use R in production through ArcGIS, using arcbridge, a step forward to the model builder.

Thursday 17-18 Certificate ceremony prof. Marco Acutis & prof. Michael Marker
with aperitivo organized by the SDAE School team

Friday 30-08-2019
Digital soil mapping, from regression trees and random forest. Deep learning

9-9:30 Dr. Lipani: An introduction to Machine Learning
9:30-11 Dr. Schillaci, Dr. Saia: Tree based classification and regression models, Boosted regression trees and Random Forest
11-11:30 Coffee break
11:30-13 Dr. Lipani: Deep learning algorithms for environmental sciences
13-14 Lunch (catering offered by the school)
14-15:30 Dr. Lipani: Deep Learning case study
15:30-15:45 Coffee break

15:45-17 Dr. Schillaci, Dr. Saia, Dr. Lipani, Dr. Veronesi: Predictive mapping examples and applications,
- Spatial uncertainty modelling with R.
-Case study on Digital soil mapping, Covariate selection (LASSO etc,) multiple linear regression, neural networks, the caret package (R),
-Spatio-temporal DSM of soil organic carbon a case study using machine learning, environmental covariates and remote sensing.
-Digital soil mapping- geostatistic and local uncertainty for spatial assessment of agro-environmental data.

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