SDAE (second edition) Statistical analysis of spatial data for the environment and the agro-ecosystem

Lake Como School of Advanced Studies, August 22-26, 2022

Home

The international summer school on "**S**tatistical analysis of spatial **D**ata in **A**gro-**E**nvironmental research" (**SDAE, 2nd edition**) will provide examples of the mostly used statistical analysis of agro-environmental data at various scales, from plot over catchment to regional scales.

Topics: Statistical analysis, advanced literature search and meta-analysis, data modelling (e.g., spatial mixed models, random forest, boosted regression trees), methods for covariate acquisition and selection, use of reference databases on land cover (CORINE land cover), soil (LUCAS and ESDAC-JRC products), as well as weather and climate data (MARS, WorldClim).

After the **SDAE** summer school, participants will be able to deal with spatial data (e.g., visualization, spatial references and projections, terrain analysis, modelling), and to use advanced literature analysis tools.
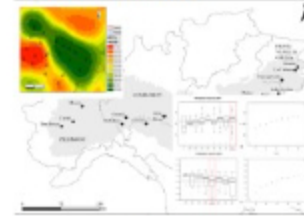
The school has received the support of the Italian Society of Agronomy (**SIA**) and the patronage of the Italian Association of Geomorphology and Physical Geography (AIGEO).

The school, it is organized into theoretical lessons in the morning and hands-on sessions in the afternoon with applications and case studies of agronomy, spatial data management, and terrain analysis. The course is dedicated to PhD students, young researchers, master students, professionals specialized in territorial analysis with numerical-statistical background

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Directors and Speakers

Directors:

Marco Acutis
Professor of Agronomy, University of Milan.

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

Speakers:

Aldo Lipani, Prof., UCL London, UK

Alessia Perego, Prof., Univ. Milan Italy

Sergio Saia, Prof., Univ. Pisa Italy

Calogero Schillaci, PhD JRC EC

Elena Valkama, PhD senior scientist., LUKE, FI

Marco Fiorentini, dr. UNIVPM

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Program

Monday 22 August 2022

Introduction to the Course and training objectives (school directors). Student self presentation.

Statistical models and sampling design. Prof. Acutis, Prof. Perego. **First class**: ANOVA (one way, factorial), regression (linear, non-linear and multiple). **Second class:** Sampling size, number of replications, and sampling design. **Practical**: Regression, general linear and mixed models. Sample size determination and power analysis.

Tuesday 23 August 2022

Conducting a meta-analysis in agro-environmental science". Dr. Valkama. **First class:** Literature search, data collection and database creation. **Second class:** Meta-analysis. **Practical:** Database creation and running a meta-analysis.

Wednesday 24 August 2022

Topography for agro-environmental modelling. Prof. Märker. **First class:** Fundamentals of Terrain analysis (TA). From soil catena to 3D landscape. **Second class:** Environmental process modelling with emphasis on soil erosion and storm flow. **Practical:** Examples and applications of TA. GIS-based assessment models for soil erosion.

Thursday 25 August 2022

Management and spatial assessment of the agro-environmental data. Dr. Schillaci, Prof. Saia. **First class**: Acquisition of reference databases, land cover, soil databases (e.g., LUCAS), weather and climate data), data processing and harmonization. **Second class:** Machine learning methods for soil and crop data modelling, (Boosted regression trees, Random Forest, ANN). **Practical:** Examples and applications of Soil Organic Carbon modelling using R and GIS.

Friday 26 August 2022

Machine learning and Geostatistics for environmental modelling. Dr. Veronesi, Prof. Lipani. **First class:** Geostatistics and Machine learning as a tool for agro-environmental modelling, land cover mapping, vegetation indices. **Second Class:** Deep learning classification of satellite images using convolutional neural networks, examples and applications using Pyton, R and GIS. **Practical:** Examples and applications of machine and deep learning.

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