

O57-3

[C1.2-2] Soil Data, Spatial information Systems and Interpretation Procedures

Comparing Different Approaches - Data Mining, Geostatistic, and Deterministic Pedology - to Assess the Frequency of WRB Reference Soil Groups in the Italian Soil Regions

Romina Lorenzetti^{*}, Roberto Barbetti, Maria Fantappie', Giovanni L'abate and Edoardo A.c. Costantini

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The assessment of class frequency in soil map legends is affected by uncertainty, especially at small scales, where generalization is larger. The aim of this study was to test the hypothesis that data mining or geostatistic techniques provide better estimation of class frequency than traditional deterministic pedology in a national soil map.

In the map of Italian soil regions compiled at 1:5,000,000 reference scale, soil classes were the WRB Reference Soil Groups (RSGs). Different data mining techniques, namely neural networks, random forests, boosted tree, classification and regression tree, supported vector machine (SVM), were tested and the last one gave the best RSGs predictions, using selected auxiliary variables and 22,015 classified soil profiles. Given the categorical target variable, the multi-collocated indicator cokriging was the algorithm chosen for the geostatistic approach. The first five more frequent RSGs resulting from the three methods were compared. The outcomes were validated with a Bayesian approach on a subset of 10% of geographically representative profiles, kept out before the elaborations.

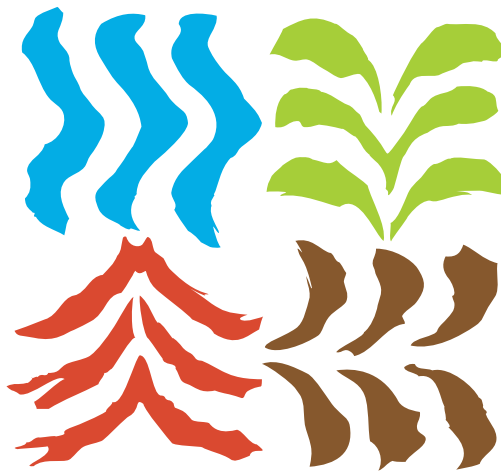
The most frequent classes were uniformly predicted by the three methods, which instead differentiated notably for the classes with a lower occurrence. The Bayesian validation indicated that the SVM method was as reliable as the multi-collocated indicator cokriging, and both more than the deterministic pedological approach. An advantage of the SVM was the possibility to use numeric and categorical variable in the same elaboration, without any previous transformation, which notably reduced the processing time.

Keywords : learning machine, non-linear kriging, soil type classification, Italy



20th WORLD CONGRESS OF SOIL SCIENCE

In Commemoration of the
90th Anniversary of the IUSS



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O R A L S E S S I O N

- Congress Symposium
 - June 9 (Mon)
 - June 10 (Tue)
 - June 12 (Thu)
 - June 13 (Fri)

- For your reference, abstracts of oral sessions are shown as group per symposium, but those of poster presentations are listed individually.

- Those who wish to cite abstracts in the proceedings of 20WCSS may refer as below since the abstract online access system does not specify the page.

* Author's Name. 2014. Title of Abstract. Symposium Name. Proceedings of the 20th WCSS (www.20wcscs.org), Abstract Online Access System, June 8 to 13, Jeju, Korea.
(Example) Kim, S.Y. and V.K. Choi. 2014. Soil security and awareness. Congress Symposium 1: Soils for Peace. Proceedings of the 20th WCSS (www.20wcscs.org), Abstract Online Access System, June 8 to 13, Jeju, Korea.

O57-3
14:30 **Comparing Different Approaches - Data Mining, Geostatistic, and Deterministic Pedology - to Assess the Frequency of WRB Reference Soil Groups in the Italian Soil Regions**

Romina Lorenzetti^{*}, Roberto Barbetti, Maria Fantappie', Giovanni L'abate and Edoardo A.c. Costantini
Consiglio per la ricerca e la sperimentazione in agricoltura, Italy

O57-4
14:50 **Towards a New International Typological Data Base - Data Integration and Validation**

Rainer Baritz¹, Josef Kozak², Michael Bock³, Ulrich Schuler⁴ and Enrico Pickert⁵

¹Federal Institute for Geosciences and Natural Resources (BGR), Germany; ²Czech University of Life Sciences Prague, Czech Republic ³Scilandis GmbH, Germany; ⁴Ifu Institute for Environmental Observation, Germany; ⁵Saxonian Agency for Environment, Agriculture and Geology (LfULG), Germany

O57-5
15:10 **Spatial Variability of Electrical Conductivity of Salt-Affected Soils in Northeast Thailand**

Pornthip Phontusang¹, Roengsak Katawatin^{2*}, Krikk Pannangpetch¹, Sununtha Kingpaiboon¹ and Rattana Lersduwansri¹

¹Khon Kaen University, Thailand; ²Groundwater Research Center, Khon Kaen University, Thailand; ³Thammasat University, Thailand

O57-6 (Not Presented) **Hydrophysical Database for Brazilian Soils: Challenges and Perspectives**

Marta Ottoni^{1*}, Maria Leonor Lopes Assad² and Otto Correa Rotunno Filho³

¹Department of Hydrology, Geological Survey of Brazil, Brazil; ²Federal University of Sao Carlos, Brazil; ³Federal University of Rio de Janeiro, Alberto Luiz Coimbra Institute, Brazil

15:30-16:20 **Coffee Break & Poster Session 3 (3F, 5F Lobby)**

Oral Session No. 58

Baekrok A (1F)

[WG2] WRB - Lessons Learned from the Development of the Third Edition 2014

June 12 (Thu), 16:20 - 18:10

Convenor: *Cornie van Huyssteen* (University of the Free State, South Africa)/ *Peter Schad* (Technische Universität München, Germany)

O58-1 **Presenting the 3rd Edition of WRB**

16:20 Peter Schad¹, Cornie Van Huyssteen² and Erika Micheli³
¹Universitaet Muenchen, Germany; ²University of the Free State, South Africa; ³Szent Istvan University, Hungary

O58-2 **The Application of Wrb by the European Commission: Experiences and Future Perspectives**

16:40 Luca Montanarella^{*} and Arwyn Jones
European Commission, Italy

O58-3 **WRB and the Australian Soils Experience**

16:55 Ben Harms¹, David Rees² and David Morand²
¹DSITIA, Australia; ²Agriculture Group, Australia; ³Office of Environment and Heritage, Australia

O58-4 **A New Diagnostic Horizon in WRB for Anthropic Topsoils in Amazonian Dark Earths (South America)**

Lucia Helena Anjos^{1*}, W.g. Teixeira², P. Schad³ and A. Fontana²

¹UFRRJ, Brazil; ²Embrapa soils, Brazil; ³Technische Universitaet Muenchen, Brazil

O58-5
17:25 **Classification of Technogenic Soils in WRB in the Light of Polish Experiences**

Przemyslaw Charzynski^{1*}, Renata Bednarek¹, Andrzej Greinert², Piotr Hulisz² and Lukasz Uzarowicz³

¹Nicolaus Copernicus University, Poland; ²University of Zielona Gora, Poland; ³Warsaw University of Life Sciences - SGGW, Poland

O58-6
17:40 **Conceptual Development of WRB 2014 and Its Impact on the Third Soils Cartography Series in Mexico**

Carlos Omar Cruz Gaistardo^{*}
Instituto Nacional de Estadística y Geografía, Mexico

O58-7
17:55 **Software Tool for Deriving WRB Soil Names from National Soil Data - Potential for Further Development of WRB**

Einar Eberhardt¹ and Peter Schad²

¹Federal Institute for Geosciences and Natural Resources (BGR), Germany; ²Technische Universität München, Germany

Oral Session No. 59

Baekrok B (1F)

[C2.3-2] B: Life in Soils - Distribution and Function of Soil Microorganisms in a Changing Environment

June 12 (Thu), 16:20 - 18:10

Convenor: *Ellen Kandeler* (University of Hohenheim, Germany)

O59-1 **The Survival Strategy of the Soil Microbial Biomass**

16:20 Philip Brookes^{1*}, Sarah Kemmitt² and Jianming Xu¹
¹Zhejiang University, China; ²Rothamsted Research, United Kingdom

O59-2 **Niche Specialisation and Differentiation of Archaeal and Bacterial Ammonia-oxidisers across Agricultural Soils in Southern Hemisphere**

Sasha Jenkins, Daniel Murphy, Ian Waite and Anthony O'donnell
The University of Western Australia, Australia

O59-3 **Exoenzyme Activities across the Soil Micro-landscape: Spatial Distribution, Stoichiometry and Ecosystem Function**

Haryun Kim¹, Naoise Nunan^{2*}, Dechesne Arnaud³ and Genevieve Grundmann⁴

¹Pohang University of Science and Technology, Korea; ²CNRS, France; ³Technical University of Denmark, Denmark; ⁴Universite Claude Bernard Lyon 1, France

O59-4 **Water Flow Drives Small Scale Biogeography of Substrates and Soil Microorganisms-a Microcosm Study using 2,4-D as a Model Compound**

Marc Pinheiro¹, Franzisca Ditterich², Holger Pagel², Christian Poll², Patricia Garnier¹, Thilo Streck², Ellen Kandeler² and Laure Vieuble Gonod^{1*}

¹INRA-AgroParisTech, France; ²University of Hohenheim, Germany

O59-5
17:50 **Are Microbial Habitat Conditions or Microbial Communities the Main Drivers of Soil Organic Matter Decomposition ?**

082-9
17:50 **Spatial Distribution of Soil Organic Carbon in Southern Greenland Assessed following the Global-soilmap.net Specifications**

Søren Munch Kristiansen^{1*}, Kabindra Adhikari², Lis Wollesen De Jonge¹ and Mogens Humlekrog Greve¹
¹Aarhus University, Denmark; ²University of Wisconsin-Madison, USA

082-10
18:00 **Application of Spatial Simulated Annealing Method on a Soil Sampling Scheme in the Road Surrounding Region**
Wei Huangwei* and Zongwei Han
College of Resources & Environment, Huazhong Agricultural University, China

Oral Session No. 83

Baekrok B (1F)

[WG11] Soil Information Exchange Standards and Systems

June 13 (Fri), 16:20 - 18:10

Convenor: Peter Wilson (CSIRO, Australia)/ Rainer Baritz (Federal Institute for Geosciences and Natural Resources (BGR), Germany)

083-1
16:20 **Developing International Soil Information Exchange Standards**

Peter Wilson^{1*} and Rainer Baritz²
¹CSIRO, Australia; ²Federal Institute for Geosciences and Natural Resources, BGR, Germany

083-2
16:50 **ISO and Inspire for Digital Soil Data Exchange? Extensions, Improvements and Potential Feedbacks between Similar Standards**

Einar Eberhardt^{1*}, Simon Templar² and Tomas Reznik³
¹Federal Institute for Geosciences and Natural Resources (BGR), Germany; ²Fraunhofer Institute for Computer Graphics Research IGD, Germany; ³Masaryk University, Czech Republic

083-3
17:10 **European Soil Data Centre: a Spatial Data Infrastructure for Research and Policy Making in Europe**

Panos Panagos*, Marc Van Liedekerke, Arwyn Jones and Luca Montanarella
European Commission, Joint Research Centre, Italy

083-4
17:30 **Best Practice Guidelines for Soil Data Harmonization**

Rainer Baritz¹, Gordon Hudson² and Borut Vrscaj³
¹Federal Institute for Geosciences and Natural Resources (BGR), Germany; ²The James Hutton Institute, United Kingdom; ³Agricultural Institute of Slovenia, Slovenia

083-5
17:50 **Towards an Ontology-based Soil Information System**
Yanfeng Shu*, Ahsan Morshed and Ritaban Dutta
CSIRO, Australia

Oral Session No. 84

Yeongju A (1F)

[C3.2-1] B: Soil Erosion and Degradation on Agriculture Land

June 13 (Fri), 16:20 - 18:10

Convenor: Erik Cammeraat (University of Amsterdam, Netherlands)

084-1
16:20 **Soil Erosion at European Level: a Step Forward data Harmonization and Collection with the Contribution of a European Network**

Panos Panagos^{1*}, Katrin Meusburger², Luca Montanarella¹ and Marc Van Liedekerke¹
¹Joint Research Centre, European Commission, Italy; ²University of Basel, Switzerland

084-2
16:40 **Natural Regeneration of Soil Physical Conditions following the Establishment of Permanent Pasture on a Structurally Degraded Soil**

Roger Mdenaghen, Brendon Malcolm, Keith Cameron and Hong Di Lincoln University, New Zealand

084-3
17:55 **Impact of Enrichment Planting Activity on Soil Physico-chemical Properties of Degraded Forestland**

Daljit Singh Karam Singh*, Arifin Abdu, Radziah Othman, Shamshuddin Jusop, Nik Muhamad Majid and Hazandy Abdul Hamid, Universiti Putra Malaysia, Malaysia

084-4
17:10 **Application of Soil Survey to Assess Non-point Source of Elements Contamination to Surface Water in Agriculture Watersheds**

Moustafa Elrashidi
United States Department of Agriculture (USDA), USA

084-5
17:25 **The Soil Erosion Risk Map of the Sicilian Region (1:250,000 Scale)**

Maria Fantappie, Simone Priori and Edoardo Costantini*
Consiglio per la Ricerca e la sperimentazione in Agricoltura, Italy

084-6
17:40 **A Sound Measurement of Splash Detachment Rates for Erosion and Eluviation Modelling**

Sophie Leguedois^{1*}, Frederic Darboux¹, Cedric Legout², Carine Lucas³, Eric Michel¹, Olivier Planchon¹ and Yves Le Bissonnais¹
¹INRA, France; ²UJF-Grenoble, France; ³University Orleans, France

Oral Session No. 85

Yeongju B (1F)

[C3.3-4] B: Soil Management Strategy for Enhancing Crop Yields

June 13 (Fri), 16:20 - 18:10

Convenor: Wolfgang Burghardt (University Duisburg-Essen, Germany)/ Chunsheng Hu (Chinese Academy of Sciences, China)

085-1
16:20 **Industrialization Progress and Application of Slow & Controlled Release Fertilizers in China**

Min Zhang^{1*}, Yuechao Yang¹, Lianbu Wan², Chengliang Li¹, Hongkun Chen² and Li Ma¹
¹Shandong Agricultural University, China; ²Shandong Kingenta Ecological Engineering Co, Ltd, China

085-2
16:50 **Utility of Soil Analysis Database of Routine Laboratory to Monitor and Describe the Evolution of the Fertility of Costa Rican Soils**

Floria Bertsch* and Juan Carlos Mendez
University of Costa Rica, Costa Rica

085-3
17:10 **Changes in Soil Fertility under Slash and Burn Systems with Different Land Use Systems in the Peruvian Amazon**

Julio Alegre^{1*}, Ruby Vega¹, Eddie Schrevens² and Felipe De Mendiburu¹
¹Universidad Nacional Agraria La Molina, Peru; ²University of Leuven, Belgium