ICTP Lecture Notes

COLLEGE ON SOIL PHYSICS

3 – 21 March 2003

Editors

Donald M. Gabriels
University of Ghent, Ghent, Belgium

GianCarlo Ghirardi
University of Trieste, Trieste, Italy

Donald R. Nielsen
University of California, California, USA

Ildefonso Pla Sentis
University of Lleida, Lleida, Spain

Edward L. Skidmore
Kansas State University, Manhattan, Kansas, USA
Contents

S.K. Agodzo, P.Y. Okyere and K. Kusi-Appiah
The Use of Wenner Configuration to Monitor Soil Water Content 1

S.K. Agodzo and I. Adama
Bulk Density, Cone Index and Water Content Relations for Some Ghanian Soils 7

Zafer Aslan
Climatological Changing Effects on Wind, Precipitation and Erosion: Large, Meso and Small Scale Analysis 15

Zafer Aslan
Modelling of Environmental and Climatic Problems: Wind and Water Erosion 23

Gautam Barua
In-Situ Determination of Directional Conductivities of Soil 31

Gautam Barua
Optimal Estimations of Random Fields Using Kriging 41

R.M. Bhagat
Rice Lands of South and South East Asia, Some Soil Physics Aspects 47

R.M. Bhagat
Management of Soil Physical Properties of Lowland Puddled Rice Soil For Sustainable Food Production 63

Estela Bricchi
Hydrological Behaviour of Sealing Under Different Soil Management Conditions in the Center South Cordoba, Argentina 77

Estela Bricchi
Structure and Organic Matter Under Different Soil Management Conditions in the Center of Argentina 85

Fernando Delgado
Soil Physical Properties on Venezuelan Steeplands: Applications to Soil Conservation Planning 93

Moacir de Souza Dias Junior
A Soil Mechanics Approach to Study Soil Compaction and Traffic Effect On the Preconsolidation Pressure of Tropical Soils 111

Durval Dourado Neto, Klaus Reichardt and Gerd Sparovek
Soil Physics and Agriculture 139
Durval Dourado Neto, Gerd Sparovek, Klaus Reichardt, Luiz Carlos Timm and Donald R. Nielsen

*Agroclimatic Mapping of Maize Crop Based on Soil Physical Properties* 159

G. Erpul, D. Gabriels and L.D. Norton

*The Combined Effect of Wind and Rain on Interrill Erosion Processes* 173

Alvaro Garcia-Ocampo

*Physical Properties of Magnesium Affected Soils in Colombia* 183

Mauro Giudici

*Experimental and Modelling Studies of Infiltration* 191

Mauro Giudici

*Inverse Modelling for Flow and Transport in Porous Media* 199

Radka Kodesová

*Percolation Theory and its Application for Interpretation of Soil Water Retention Curves* 209

Radka Kodesová

*Determination of Hydraulic Properties of Unsaturated Soil via Inverse Modeling* 221

Deyanira Lobo Lujan

*Soil Physical Properties Affecting Soil Erosion in Tropical Soils* 231

Joe S.C. Mbagwu

*Aggregate Stability and Soil Degradation in the Tropics* 245

Joe S.C. Mbagwu

*Environmental Control of Soil Structure in Mediterranean Soils* 253

Franco Humberto Obando Moncayo

*Oxygen Transport in Waterlogged Soils, Part I. Approaches to Modelling Soil and Crop Response to Oxygen Deficiency* 261

Franco Humberto Obando Moncayo

*Oxygen Transport in Waterlogged Soils, Part II. Diffusion Coefficients* 281

Svetla Rousseva

*Influence of a Compacted Subsurface Layer on Soil Erosion* 299

Svetla Rousseva

*Ideas for Physical Interpretation of the USLE* 309

Maria Elena Ruiz and Angel Utset

*Models for Predicting Water Use and Crop Yields — A Cuban Experience* 321

Maria Elena Ruiz and Hanoi Medina

*Soil Hydraulic Properties of Cuban Soils* 329
F.K. Salako
Susceptibility of Coarse-textured Soils to Soil Erosion by Water in the Tropics 339

F.K. Salako
Soil Physical Conditions in Nigerian Savanas and Biomass Production 363

Mingan Shao
Boundary Layer Theory for Solute Transport in Soils 379

Mingan Shao
General Similarity Theory and Integral Method for Water Flow in Soils 383

State-Space Approach for Evaluating the Soil-Plant-Atmosphere System 387

Luís Carlos Timm, Klaus Reichardt and Osny Oliveira Santos Bacchi
Dimensional Analysis, Scaling and Fractals 429

Carlos Manoel Pedro Vaz
Use of a Combined Penetrometer-TDR Moisture Probe for Soil Compaction Studies 449

Carlos Manoel Pedro Vaz
Automatic Gamma-Ray Equipment for Multiple Soil Physical Properties Measurements 459

Miguel A. Taboada
Soil Shrinkage Characteristics in Swelling Soils 469

Miguel A. Taboada
Soil Structural Behaviour of Flooded Soils 487