

Preface

Founded in 1971, COST is an intergovernmental framework for European cooperation in the field of scientific and technical research, allowing the co-ordination of nationally funded research on a European level. COST actions cover basic and pre-competitive research as well as activities of public utility. In particular COST action 629 is focussed to improve the scientific base for the development of integrated indicators of the environmental risks created by presence of pollutants in water with emphasis on the water body of natural porous media. Establishment of a set of integrated indicators to evaluate the pollution status and risk of the European water resources will aid environmental agencies, administration and regulators considerably and profit the society as a whole.

In May 2004 an International Workshop subjected to ‘Saturated and unsaturated zone: integration of process knowledge into effective models’ was organized at University of Rome “La Sapienza”, Italy. It results from the joint activity of working groups 3 and 4 of COST Action 629 but have contributions from all other working groups as well. Working group 3 “Biogeochemical dynamics from soil to groundwater” concentrates on the study of processes that influence sorption, mobility and persistence/degradation of pollutants in groundwater and thus the input pathways from soil to groundwater. Working group 4 “Modeling of reactive transport in soil and subsoil” including both the transport and the soil interaction phenomena.

The need for a profound discussion on coupling processes and modeling stems from the major problems related to contamination of soil and subsoil in the EC countries and elsewhere. Technologies for remediation and restoration require deep knowledge and understanding of the involved processes with an adequate modeling approach in order to reach the plausible results which are applicable in practice. These topics are central to COST 629 objectives and the focus of this workshop was to increase our integrated process understanding and modeling capabilities and the key questions are how “processes” can be integrated into “modeling” and how to integrate processes when working at different scales.

Topics for the conference included:

- Numerical methodologies for the simulation of reactive transport from soil to groundwater

- Procedures for deriving model parameters from lab or field studies
- Procedures and protocols for model calibration
- Examples of coupled models (soil, subsoil, groundwater) for describing reactive transport
- Integration of process studies and numerical modeling
- Influence of scales on biogeochemical processes
- Understanding biogeochemical processes with modeling.

Though the conference covered the entire field of the topics which were mentioned before, three special focuses were selected, namely the process knowledge from laboratory and field studies, the modeling method, and the connection of the one to the other one. The relevant papers have been included into these three chapters, named *processes*, *modeling*, and *integration*.

This book contains 20 papers selected out of 67 pre-selected papers from both oral and poster presentation. The selection was performed by an Editorial committee consisting of members from working groups 3, 4 and COST 629 management board, and a subsequent peer-review process of each paper. The Editors would herewith like to thank the Editorial committee and the reviewers for their effort. We also thank Barbara Kobisch and Luisa Tonarelli for their technical help and proper relief during processing this book.

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Processes and Models

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