



## Objectives and Scope

The usefulness of predictive simulations obtained by ground-water models is often hampered by the inability to indicate and preferably quantify the reliability of model results. Uncertainty in model predictions primarily stems from a number of errors relating to the model formulation, such as:

- inadequate concept of processes and interactions;
- inadequate description of processes and interactions;
- inadequate description of spatial and temporal variability;
- inadequate description of state of system (geometry, initial and boundary conditions, system stresses);
- incorrect coefficient values (parameter values) and improper specification of error bounds.

In recent years, significant research has been conducted resulting in a variety of approaches that can be used to incorporate the information about these errors into the modelling process and to establish the level of uncertainty in model-based decision-making. Increasingly, these new techniques are being applied to a variety of problems and sites.

ModelCARE'2002 is a follow-up to the successful conferences ModelCARE'90 (the Netherlands), ModelCARE'96 (USA), and ModelCARE'99 (Switzerland). The conference aims again at providing an international forum for state-of-the-art presentations on relevant methodologies and techniques, and to identify needs for future development. The conference will also attempt to illustrate the applicability of various innovative techniques through advanced case studies on calibration and reliability assessment.

Contributions are solicited addressing problem identification, and process description and modelling, with special emphasis on uncertainty. The ultimate aim is to help participants determine critical factors and methods in their evaluation of uncertainty throughout the modelling process.

## Topics addressed in the conference will be:

### • Comprehensive use of field information

- environmental tracer data
- satellite images
- geostatistics
- geophysical data
- combined use of geological, hydrogeological and geophysical data
- combined use of hydraulic and quality data
- upscaling and regionalization

### • Aquifer heterogeneity and scaling issues

- hierarchical sedimentary/geological structures
- aquifer analogue studies
- facies and permeability mapping
- geology-based modelling of heterogeneity
- indicator geostatistics, transition probability, and modelling of facies assemblages

### • Model calibration

- parameter estimation (inverse modelling)
- structure identification
- sensitivity analysis
- interpretation of pumping and tracer tests
- uniqueness of calibration results
- conditioning with data (prior information)
- handling of ill-posed problems

### • Reliability of model prediction

- sources of uncertainty
- statistical information on model input data
- quantification of uncertainty
- covariance matrices and confidence intervals
- post-auditing

### • Stochastic modelling

- stochastic partial differential equations
- Monte Carlo techniques
- linear estimation
- perturbation theory
- upscaling and effective parameters
- generation of stochastic fields
- conditioning with data (prior information)

### • Modelling concepts

- verification of model equations with physical models
- cellular automata
- microscale models
- fuzzy-rule based modelling

### • New developments in numerical techniques

- equation solvers
- optimization techniques
- methods for coupled processes (multiphase, multispecies, density)
- parallel computing
- discretization and error estimation

The conference encompasses among others the following **fields of modelling**:

- saturated and unsaturated zone;
- porous media and fractured rock;
- groundwater flow (heads, pathlines, etc.);
- groundwater quality;
- geochemical and biochemical processes;
- coupled reactive transport;
- density and temperature effects;
- single phase and multiphase flow (NAPL's);
- vapour transport;
- surface processes, including recharge, evapotranspiration, and groundwater/surface-water interactions.

Though the conference will cover the entire field of groundwater modelling, **two special areas of focus** have been selected, namely (1) "*Conceptual Model Uncertainty and Scale*" [Conceptual modelling and the multi-scale nature of medium heterogeneity constitute major sources of uncertainty in the analysis of subsurface flow and transport. There is no established methodology to assess conceptual model uncertainty and its impact on the reliability of hydrogeological models. We seek papers that shed light on these and related issues (with particular but not exclusive emphasis on multiscale flow and transport phenomena) through rigorous reasoning and illuminating case studies] and (2) "*Calibration and Reliable Prediction: Journeys and Lessons*" [Innovative practical applications of assessing calibration and reliability are solicited from practitioners who have accomplished this task. Explanations of the problems that often are not reported, because they are viewed as a weakness of the work, are encouraged. We welcome presentation of project histories including: the obstacle; how it was recognized and dealt with to meet the deadline; how the solution impacted the predictions and their certainty; and insights on preferred solutions, had schedule and funding allowed].

## Call for Papers

The conference will include both plenary oral presentations and poster presentations. Participants intending to present a paper are requested to send a 1-2 page abstract in English to the Conference Secretariat. The abstract should include the full address (also phone, fax and email) of the corresponding author. The abstract should be received by September 30, 2001. Authors will be notified of acceptance by November 10, 2001. Authors of accepted oral and poster contributions will be invited to submit a camera-ready copy of their paper, which will be prepublished in a conference proceedings volume (Charles University publication series *Acta Universitatis Carolinae, Geologica*). Subsequently all papers will be reviewed by the Scientific Advisory Committee for acceptance in a postpublished IAHS Redbook.

## CONFERENCE SECRETARIAT ADDRESS

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