



GREAT-ER

Version 2.0

Overview

01.10.2003

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1 Introduction

The European project GREAT-ER (Geography-referenced Regional Exposure Assessment Tool for European Rivers, 1996 - 1999) was launched as an international effort to develop and validate a model system applicable in the risk assessment of detergents. Well known models for the compartments Sewer, WWTP and River have been coupled to a chain of models. To consider spatial aspects like aquatic systems geometry or multiple discharges numerous chains have been linked to a model network. To consider temporal variability the deterministic models have been overlaid with a Monte-Carlo simulation. To reflect the specific situation in the area under investigation the models are driven by geography-referenced data in difference to generic region approaches. The GREAT-ER software released between 1996 and 1999 was the version 1.0x.

The aim of the follow-up GREAT-ER project (software version 2.x) was to further improve GREAT-ER by developing a modular system including a database management system (storing geography-referenced data as well as non-geography-referenced, e.g. substance data) with a grained user concept; a scaled set of user interfaces with GIS capabilities; and a model server providing operations on the data specified through the interfaces; as well as a more flexible and quality-controlling tool to prepare data for the modelling.

This document intends to describe the separate modules briefly and reference to the extensive documentation which has been written within the GREAT-ER project.

2 Installation

As said above, GREAT-ER follows now a modular approach in application design, hence various parts of the system can be installed separately or at once. The various options and necessary actions are all described within the installation guide:

Documentation_installation.PDF (19 pages)

3 Overview

The figure below illustrates the architecture of GREAT-ER version 2.0: The entire system is founded on a database management system, the Application Programming Interface (API) provides an additional abstraction layer. A specific administration tool offers functionality to manage the relevant parts of the GREAT-ER database including import / export of simulation data. An interface to an optional IUCLID database provides an easy option to upload substance data into GREAT-ER from a second source. Two variants of a repository provide access on the parameters from a database view and the management of related documents.

The model server performs simulation runs issued by the two user interfaces. All data exchange between model server and user interfaces is handled via the database. The full featured desktop interface is based on a geographic data viewer (Thuban) and connects directly to database and model server. The web based user interface is provided via a webserver with an underlying application server (Zope) for application and session management and a mapping server (UMN Mapserver) providing the map rendering and navigation component.

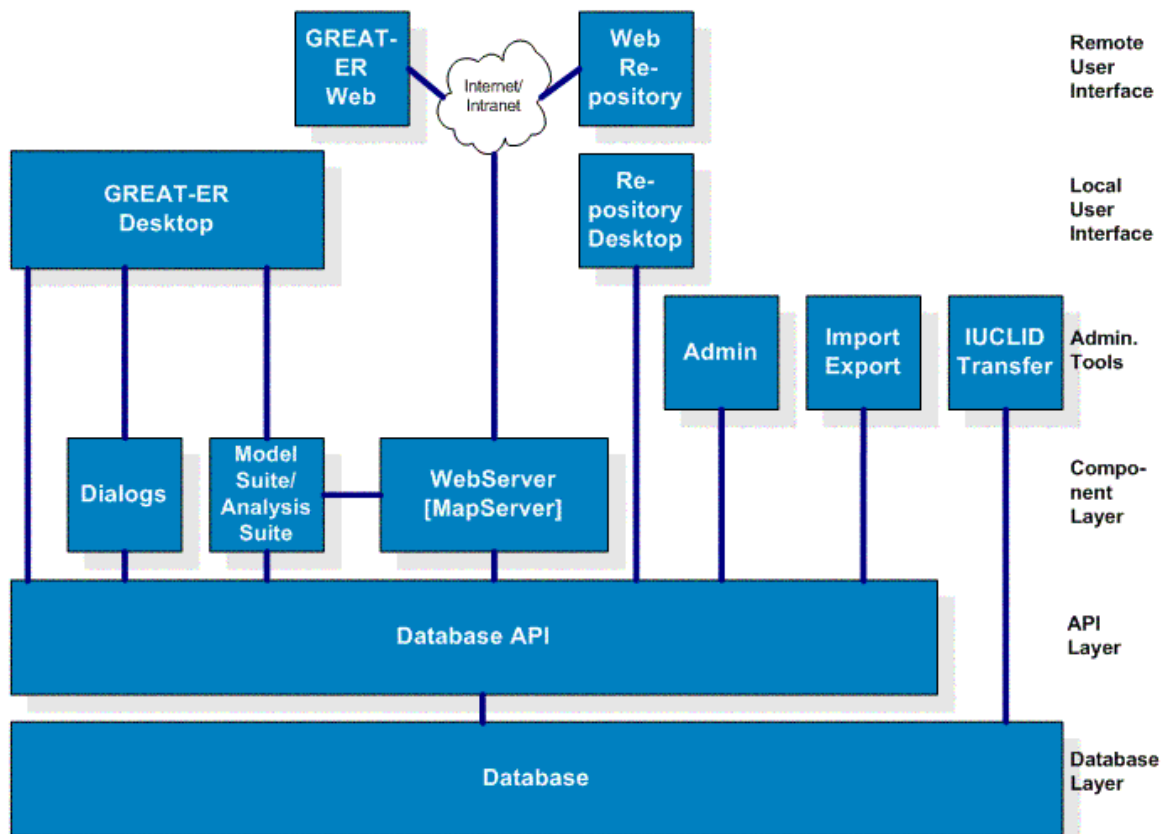


Figure 1: GREAT-ER System Overview

4 Basic User Interfaces

4.1 Desktop

Under the desktop version of the GREAT-ER user interfaces most components of GREAT-ER are usually running on the users local desktop system. The concept is highly flexible and scales very well but generally this definition fits for most cases.

4.1.1 GREAT-ER Desktop

GREAT-ER desktop user interface provides full featured access to the GREAT-ER system: It provides the user with the session management interface and options to enter substance and environmental parameters with quality control and assistance on parameter requirements (SciParam-dialogs, Scientific Parameters). Implemented model modes can be selected and simulation results can be analysed under various options, including concentration profiles and map exports. The interface is based on the platform independent GIS data viewer Thuban, hence GREAT-ER specific features are documented in the GREAT-ER manual while more general GIS functionality is described in the Thuban manual:

great-er_manual.pdf (95 pages)
thuban-manual.pdf (31 pages)
sciparam-manual.pdf (33 pages)

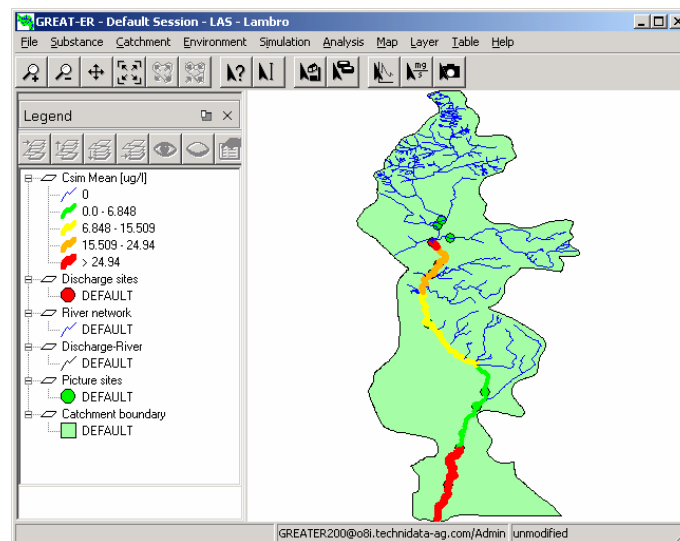


Figure 2: GREAT-ER Desktop

4.1.2 GREAT-ER Repository

The GREAT-ER repository is a structured collection of substance data and related documents. All this information can be stored and searched for within the database sorted according to categories. The definition of a substance structure is not fixed. So the user has the possibility to store also data which are not necessary for the simulation but also important in the same data base (e.g. water quality data, legislation data, water classification). There is a separate manual for the repository:

documentation_repository.PDF (36 pages)

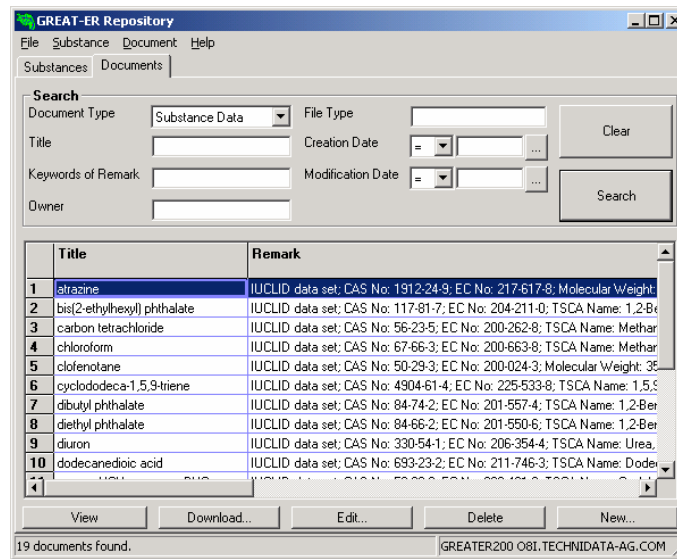


Figure 3: GREAT-ER Repository

4.2 GREAT-ER Web (Browser-based)

The Web version of GREAT-ER provides a lowest barrier entry-point to GREAT-ER: Only a web browser is necessary to access. The model system interface provides a basic set of options to introduce the GREAT-ER concept with access to the model mode 1. A web version of the repository is available as well:

great-er_web_manual.pdf (29 pages)
 documentation_repository_web.PDF (33 pages)

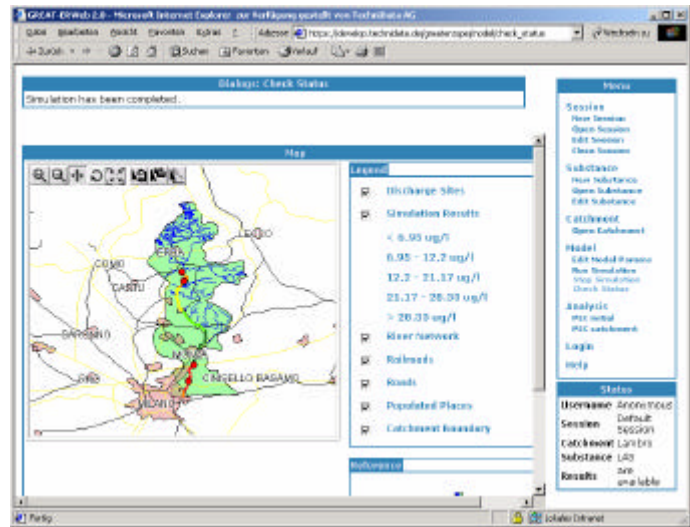


Figure 4: GREAT-ER Web



Figure 5: GREAT-ER Web Repository

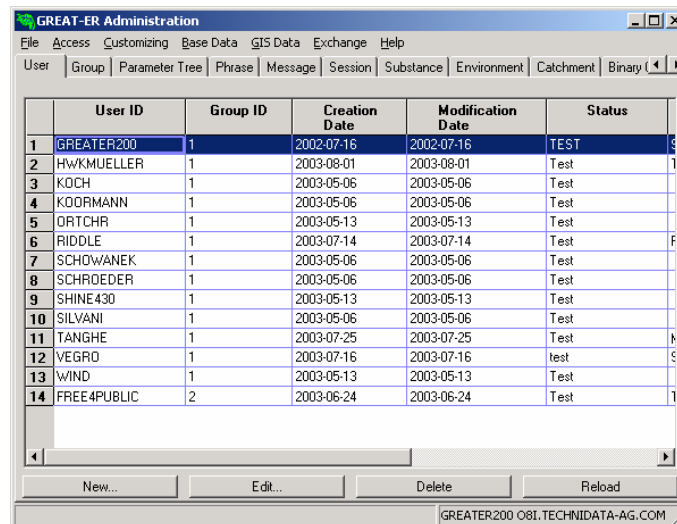
5 Administrative Tools

The Database is the basis for the GREAT-ER system. Hence various documents are focussing on the different tools available and the database structures in general.

5.1 Administration / Import-Export

The administration interface provides administrative access on the basis of GREAT-ER: The tool aids the administrator e.g. to create new users or to upload new geographic data. In addition the tool provides the import-export of session data for exchange with other users.

documentation_administration.PDF (51 pages)



	User ID	Group ID	Creation Date	Modification Date	Status
1	GREATER200	1	2002-07-16	2002-07-16	TEST
2	HWKMUELLER	1	2003-08-01	2003-08-01	Test
3	KOCH	1	2003-05-06	2003-05-06	Test
4	KOORMANN	1	2003-05-06	2003-05-06	Test
5	ORTCHR	1	2003-05-13	2003-05-13	Test
6	RIDDLE	1	2003-07-14	2003-07-14	Test
7	SCHDOWANEK	1	2003-05-06	2003-05-06	Test
8	SCHROEDER	1	2003-05-06	2003-05-06	Test
9	SHINE430	1	2003-05-13	2003-05-13	Test
10	SILVANI	1	2003-05-06	2003-05-06	Test
11	TANGHE	1	2003-07-25	2003-07-25	Test
12	VEGRD	1	2003-07-16	2003-07-16	test
13	WIND	1	2003-05-13	2003-05-13	Test
14	FREE4PUBLIC	2	2003-06-24	2003-06-24	Test

Figure 6: Administration

5.2 IUCLID Interface

With the IUCLID interface it is possible to transfer substance data from the IUCLID database into the GREAT-ER database.

documentation_IUCLID_Interface.pdf (47 pages)

5.3 Administration GREAT-ER Web

Three documents describe the concepts of the GREAT-ER web services. These are for administrators and of minor interest for general GREAT-ER users:

installation and configuration of the webserver.pdf (4 pages)
great-er_web_administration.pdf (22 pages)
great-er_web_specification.pdf (40 pages)

6 Internal Data Structures

GREAT-ER has a flexible, modular approach. If someone would like to enhance the application (e.g. by additional models, other viewer, other import/export interfaces), the technical description of the interface may be interesting.

6.1 Data Model

The data model document describes more general the data structures which have been designed for GREAT-ER:

data_model_specification_3_3.pdf (74 pages)

6.2 Database API

The database API provides an abstract interface to the GREAT-ER Database for the various applications:

API_specification_3_5.pdf (74 pages)

6.3 Model System

GREAT-ER 2.0 implements the models of GREAT-ER 1.0: Emissions, sewer, waste water treatment and rivers. The models and the required parameters are documented in the GREAT-ER model description:

[great-er_model_equations.pdf \(39 pages\)](#)

6.4 Concepts

GREAT-ER implements a modular and flexible scheduler-worker approach for the model system, which is described in detail in the specification. A second document illustrates how to implement models within the GREAT-ER model system :

[great-er_model_specification.pdf \(34 pages\)](#)
[great-er_model.pdf \(57 pages\)](#)

6.5 Data Processing

The GREAT-ER approach is applied to existing areas under investigation in difference to generic region models. Georeferenced data has to be processed to fit the requirements for datastructures and topology. This is mostly automated by the GREAT-ER preprocessing which also quality controls the data to be added to GREAT-ER.

[great-er_preprocessing_manual.pdf \(46 pages\)](#)