

GREAT-ER - TECHNICAL POSITIONING

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GREAT-ER (Geo-referenced Regional environmental Exposure Assessment Tool for European Rivers) is a model for environmental risk assessment and management of chemicals in river basins.

Description

The GREAT-ER model is an advanced environmental exposure model for chemicals in river basins, for use e.g. in the European chemicals risk assessment process (REACH), and in the EU Water Framework Directive (WFD). The model is implemented as part of a software system that combines a GIS (Geographic Information System) with fate models to produce a simple and clear visualisation of predicted chemical concentrations and water quality along a river. Conceptually similar exposure models exist, e.g. US Basins, iSTREEM (<http://www.cleaninginstitute.org/istreem/>).

Applications

GREAT-ER is a tool to study the impact of chemicals emitted by point sources into rivers by calculating GIS-based equivalents of 'PEClocal' and 'PECregional' for the aquatic environment. It is most suited for modeling chemicals that are emitted down the drain from wide dispersive consumer use, or from defined point sources such as waste water treatment plants, or industrial production plants. The use for modeling the exposure of ingredients of detergents, personal care products and pharmaceuticals is well documented (refs).

An additional sediment module was developed at a later stage in order to not only predict concentrations of chemicals in the water phase, but also in the river sediment phase. GREAT-ER can also be linked with the 'TERRACE' model (<http://cefic-lri.org>) which allows to include diffuse emissions to the river via agricultural run-off.

GREAT-ER is currently implemented for a variety of European river basins: 5 in the UK (Aire, Calder, Went, Rother, Exe), 1 in Italy (Lambro), 6 in Germany (Itter, Unter-Main, Main, Rur, Rhine in Northrhine Westfalia, and Elbe), 1 in Belgium (Rupel), 1 in France (Mayenne), 1 in Spain (Llobregat) and 1 in Switzerland (Glatt). The applicability of the model is however generic and not limited only to European river basins.

Software versions

The most current version is GREAT-ER 4 (Kehrein et al., 2015).

GREAT-ER 3.0 Desktop (2011) was designed for Microsoft Windows® XP and 7. The entire system is based on open source software and can be installed without any licence fees under the GNU Public Licence. Most notably the database has been replaced by the Open Source Software PostgreSQL.

The GREAT-ER 2.0 Desktop version for Microsoft Windows® 2000 and XP, released in 2003, replaced the previous Arc-View GIS implementation. It was based on the platform-independent and free GIS data viewer 'THUBAN'. This system also required the use of an Oracle® v. 8.1.7.database. A web-based version with more limited functionality was released at the same moment for easy public access.

The original GREAT-ER 1.0 model was released in 1999. It was designed for use with Microsoft Windows® NT 4.0 Operating System, and ESRI ArcView® 3.0a, 3.1 or 3.2 GIS Software. This project was an initiative of the Environmental Risk Assessment Steering Committee (ERASM) of the

Association Internationale de la Savonnerie, de la Détergence et des produits d'Entretien (AISE) and the Comité Européen des Agents de Surface et de leurs Intermédiaires Organiques (CESIO), in cooperation with the UK Environment Agency, Yorkshire Water and ECETOC.

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