

Database for Radioecological Models

Part I

Basic information

Name of Model	A MO del-based computerized system for management support to I dentify optimal remedial strategies for R estoring radionuclide contaminated A quatic ecosystems and drainage areas	
Name of Model (abbreviated)	MOIRA-PLUS	
Originator of the Model	European Commission, Project N. FI4P-CT96-0036	
Application field (media)	Urban	<input type="checkbox"/>
	Agricultural	<input type="checkbox"/>
	Forest	<input type="checkbox"/>
	Aquatic (marine)	<input type="checkbox"/>
	Aquatic (freshwater)	<input checked="" type="checkbox"/>
	Aquatic (groundwater)	<input type="checkbox"/>
	Semi arid	<input type="checkbox"/>
	Air	<input type="checkbox"/>
	Other (please, specify)	<input type="checkbox"/>
For which geographical area was it developed?	EUROPE	
Main objective	Environmental screening	<input type="checkbox"/>
	Routine discharges	<input type="checkbox"/>
	Accidental release	<input checked="" type="checkbox"/>
	Others (please specify)	Identification of optimal remediation strategies
Radionuclides/Elements considered in the Model	^{137}Cs and ^{90}Sr	
Which input parameters are needed?	<p>Obligatory input: radionuclide deposition or/and input rates into water bodies;</p> <p>From GIS and data bases: longitude, latitude, altitude, socio-economic data (population, aquatic food and water consumption, irrigation rates, land usage, crops and animal consumption, etc.);</p> <p>For rivers: morphometry (length and areas of sub-catchments); run-off, water exploitation strategies (withdrawal, water flux control strategies).</p>	
What is the expected output information (end points)	Levels of contamination in water and fish, doses to humans, quantitative evaluations of the economic, social and ecological impacts of countermeasures, assessment of the most appropriate countermeasure by application of Multi-attribute Analysis procedures.	
Software -name	MOIRA-PLUS	

<p>Availability of software (purchase information, contact)</p>	<p>Contact: Luigi Monte, ENEA (Italy) , monte@casaccia.enea.it; Eduardo Gallego Diaz (Spain), eduardo.gallego@upm.es; Dmitry Hofman (Sweden), dmitry_hofman@yahoo.com</p>
<p>Is it possible to get the software free of charge (under which circumstances?)</p>	<p>Yes (only required to sign an agreement)</p>
<p>Source of this information (institute name, literature, Internet, name of modeler, etc.)</p>	<p>Institutes: ENEA (Italy), Universidad Politecnica de Madrid (Spain), Uppsala University (Sweden), Studsvik RadWaste AB (Sweden), University of Oslo (Norway), NRG (The Netherlands) Modelers: Luigi Monte, ENEA (Italy); Eduardo Gallego Diaz, Universidad Politécnica de Madrid (Spain); Lars Håkanson, Uppsala University (Sweden); Dmitry Hofman (Sweden); John Brittain, Oslo University (Norway); Rudie Heling, NRG (The Netherlands). http://info.casaccia.enea.it/evanet-hydra http://user.tninet.se/~fde729o/MOIRA</p>
<p>Contact for further information (address, e-mail, etc)</p>	<p>Contact: Luigi Monte, ENEA, via P. Anguillarese, 301, Cp 2400, 00100 Rome (Italy) , monte@casaccia.enea.it Eduardo Gallego Diaz, Departamento de Ingenieria Nuclear, E:t:S. Ingenieros Industriales, Universidad Politecnica de Madrid, José Gutiérrez Abascal, 2, 28006 Madrid (Spain), eduardo.gallego@upm.es</p>

Available literature or publications

Copious!

Monte L., Hofman, D. and Brittain, J. (eds) 2005. Evaluation and network of EC-Decision Support Systems in the field of hydrological dispersion models and of aquatic radioecological research. ENEA, RT/2005/49/PROT Roma, Italy, pp. 322

Monte, L. J. Van deer Steen, U. Bergström, E. Gallego Díaz, L. Håkanson, J. Brittain (2002) - A Model-Based Computerised System for Management Support to Identify Optimal Remedial Strategies for Restoring Radionuclide Contaminated Aquatic Ecosystems and drainage Areas (MOIRA). In: E.-H. Schulte, G.N. Kelly, C. A. Jackson (eds) Decision Support for emergency management and environmental restoration. EURATOM, EUR 19793, European Communities

Monte, L. Brittain, J.E., Håkanson, L., Gallego Díaz, E., Zheleznyak, M., Voitsekhovitch, O., Kryshev, I., Marinov Petrov, K. Eds. (2001) Implementing computerised methodologies to evaluate the effectiveness of countermeasures for restoring radionuclide contaminated fresh water ecosystems. ENEA RT/AMB/2001/28 pp. 187.

L. Monte, J. Van deer Steen, U. Bergström, E. Gallego Díaz, L. Håkanson, J. Brittain (Eds.) (2000) - The project MOIRA: A Model-Based Computerised System for Management Support to Identify Optimal Remedial Strategies for Restoring Radionuclide Contaminated Aquatic Ecosystems and drainage Areas. Final Report. ENEA RT/AMB/2000/13

Gallego E., Brittain J.E., Håkanson L., Heling R., Hofman D. and Monte L. (2004) - "MOIRA: A Computerised Decision Support System for the Management of Radionuclide Contaminated Freshwater Ecosystems", Radioprotecção, Revista da Sociedade Portuguesa de Protecção contra Radiações, 98, vol. 2, números 4 e 5, pp. 83-102 (ISSN-0874-7016).

Gallego E., Brittain J.E., Håkanson L., Heling R., Hofman D. and Monte L. (2000) - MOIRA: A Computerised Decision Support System for the Restoration of Radionuclide Contaminated Freshwater Ecosystems. In Proc. 10th International Congress of the International Radiation Protection Association (IRPA-10). Hiroshima, Japan May 14-19, 2000. (<http://www2000.irpa.net/irpa10/cdrom/00393.pdf>)

Hofman D. (2004) "MOIRA DSS - Architecture, Model Integration and User Interface Design". In Pahl-Wostl, C., Schmidt, S., Rizzoli, A.E. and Jakeman, A.J. (eds), Complexity and Integrated Resources Management, Transactions of the 2nd Biennial Meeting of the International Environmental Modelling and Software Society, iEMSs: Manno, Switzerland, 2004. ISBN 88-900787

Part II

Additional information, if available

Are there validation/ uncertainty information available?	Yes
Was this model tested for comparability?	Yes
Is the model related to a project? If yes give the name and year	Yes Project MOIRA: A MOdel-based computerized system for management support to Identify optimal remedial strategies for Restoring radionuclide contaminated Aquatic ecosystems and drainage areas Financed by EC. Project Project N. FI4P-CT96-0036
Is it related to GIS	Yes
Is the model related to a decision support system (DSS)? If yes give the name and year	Yes MOIRA-PLUS is a decision support system
Advantages of model	Driven by input variables that can be easily obtained, user-friendly interface, MOIRA-PLUS offers a quick insight into the effectiveness of countermeasures, and economic, ecological and social impacts are accounted for.
Limitation of model	Applicable for medium and long term predictions (from months to several years). Not appropriate for short term releases (days or hours)
Additional comments	For a full implementation Powersim© (simulation software engine models) is required. MapInfo© (GIS software) is recommended to simplify working with MOIRA GUI and GIS.