

ELCOM-CAEDYM

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Abstract	
Name	ELCOM-CAEDYM (Estuary, Lake and Coastal Ocean Model - Computational Aquatic Ecosystem DYNamics Model)
Description	Three-dimensional lake, estuary and coastal ocean water quality model
Local Contact	David Hamilton, University of Waikato
Wiki URL	https://teamwork.niwa.co.nz/display/IFM/ELCOM-CAEDYM

Scope	
Intended biophysical domains	Lakes Estuaries Coastal
Does the model address water quality	Yes
Water quality parameters	Nitrogen Phosphorus Microbes Sediment Generic Other Includes chlorophyll (multiple phytoplankton groups), dissolved oxygen and physical variables
Intended purpose	Spatially resolved, coupled hydrodynamic-ecological model intended for simulation and prediction of water quality in lakes, reservoirs, estuaries and the coast
Intended types of user	Scientists, academics, students, consultants
Intended breadth of user base (in-house specialist to widespread)	Wide breadth of users and can be picked up by users with moderate expertise in modelling
Geographic range limitations	Applicable globally
Spatial resolution	Three-dimensional; grid sizes depend on size of domain (e.g., lake) and time step
Spatial extent	Farm or small catchment/aquifer/river network/lake/estuary Medium or large catchment/aquifer/river network/lake/estuary or coastal embayment
Steady state or dynamic	Dynamic
Temporal resolution	Time step from seconds to hours (depends of domain size and grid sizes)
Temporal extent	Can simulate for typically up to one year. Occasionally for periods of 2-3 years.
Spatial types	Other Grid x-y-z domain
Spatial dimensions	3D
Supermodel Membership	If part of a supermodel, describe

Inputs

Climate	Climate data
Topography and topology	Lake bed surface
Soils	
Landcover/use	
Groundwater	
Water quantity/quality flux and state	Stream flow Stream concentrations and/or mass Details: Initial data required to resolve 3-D variations in lake concentration

Input data required: old items to be removed once transferred to new template

Outputs	
Climate	
Topography and topology	
Soils	
Landcover/use	
Groundwater	
Water quantity/quality flux and state	Lake concentrations/or and mass Details: 3-D variations in lake water concentrations resolved at hourly or daily time scale

Output data produced: old items to be removed once transferred to new template

Development history	
Main developers	Centre for Water Research, The University of Western Australia (www.cwr.uwa.edu.au)
Other development organisations	Several organisations undertake development activities by agreement with Centre for Water Research, The University of Western Australia
Current custodian organisation	Centre for Water Research, The University of Western Australia (www.cwr.uwa.edu.au)
Funding mechanism	Has been funded through alignment with applied projects
State of development	stable release
First development year	1997
Latest release year	2012
Latest version	2.2
Current development activity	Several organisations undertake development activities by agreement with Centre for Water Research, The University of Western Australia
Likely longevity	Persistent

Cost and IP	
Purchase or licence cost	AUD \$5,000
Support cost	Options are given for various levels of support and cost beyond obtaining the executable at AUD \$5,000
Licence type	Executable
Commercial or IP constraints on use	No restrictions on academic use. Commercial use by arrangement but generally encompassed within AUD \$5000 fee
Open/Closed Source	Closed Source
Applications	

Locations	Organisations	Description	Publications
Lake Rotoiti	University of Waikato	PhD thesis: N. von Westernhagen 2010. Measurements and modelling of eutrophication processes in Lake Rotoiti, New Zealand	http://hdl.handle.net/10289/4817

Technical considerations	
Languages used	Fortran 95
Is a formal API defined?	
Is the model engine separated from the user interface?	Has separate user interface
User Interface	Graphical Desktop
Techniques/methods for data input	Text input but there are several MATLAB scripts to assist with data preparation
Input data formats	CSV, text
Techniques/methods for data output	Output is NetCDF. Software ARMS (included) is used for visualisation
Output data formats	NetCDF
Techniques/methods for data visualisation	Software ARMS (included) is used for visualisation
Techniques/methods for user interaction and control	ARMS software
Methods included for calibration and uncertainty	User-driven
Operating system / platforms	MS Windows Linux OS X
Quality of code and systems engineering	Quality control on code is exercised by the owner of the code (see www.cwr.uwa.edu.au)
Willingness of developers to collaborate	By arrangement with Centre for Water Research, The University of Western Australia
Stability	Software is stable; bugs are reported

Availability of documentation of theory and code /software	Has science manual and user's manual
User information	
What do users have to learn?	ARMS is the interface software. Knowledge of MATLAB is useful but not essential. Knowledge of water quality modelling significantly advances the expertise of the user because comprehensive calibration of water quality variables is generally involved. Comprehensive knowledge of lake hydrodynamics also extremely useful.
Ease of learning	Moderate to advanced
Ease of use	Moderate to advanced
Availability and completeness of user documentation /manuals	Manuals are comprehensive (science manual and user's manual)
Availability of support	Manuals are comprehensive (science manual, user's manual and programmer's guide)
Willingness of developers to support users	Moderate - depends on level of support that is purchased
Availability of user forums	Has comprehensive user forums
Other information	
Linkages to other models	Can potentially link to ROTAN and SWAT catchment models for input data and CLIMPACTS (climate model) for input data, but only via outputs from ROTAN/SWAT/CLIMPACTS being used as inputs to DYRESM-CAEDYM (linkage is not explicit coupling)
Notes	

Links

Name	URL	Description
Centre for Water Research, The University of Western Australia	p://www.cwr.uwa.edu.au/software1/models1.php?mdid=2	Developer and distributor

References

Ref	Description
http://www.cwr.uwa.edu.au/research/publications.php?special=elcom	ELCOM publications
http://forums.cwr.uwa.edu.au/viewtopic.php?f=4&t=28	CAEDYM publications