ECOMOD

June 1999

Contents

Perspectives	1
President's Address	12
Welcome New members	12
Book Reviews	12
Meetings of Interest	16
Note from the Editor	23

About ISEM

Perspectives

Tobias Gabele, Joachim Benz, Ralf Hoch

University of Kassel, Faculty of Agriculture, Department of Grassland Ecology D-37213 Witzenhausen,
email: gabele@wiz.uni-kassel.de, benz@wiz.uni-kassel.de, hoch@wiz.uni-kassel.de

Standardization of model documentation

Part II: Usage of the ECOBAS model documentation system - a short introductory manual

Abstract

Keywords: Model documentation, model database, modular, WWW-interface, manual

To facilitate an efficient usage of mathematical models, the documentation standard ECOBAS-MIF was designed. The objective of the project is to enable complete and consistent documentation of models to make them accessible and comparable. The usage of the WWW-embedded documentation program is explained.

Introduction

If we analyze the task of modeling an ecological process we find that an "observed" complex natural system is subject to a large number of unknowns that the modeler cannot and does not want to explicitly account for in his/her virtual system. This implies that ignored features of the natural system become part of the virtual system implicitly. It is common practice to communicate ecological models either in the form of computer model source code or in the form of mathematical equations. Due to the complexity of many ecological models, all too often the implicit and explicit assumptions about the qualities of the modeled system are not self-evident to model users. Complete, consistent and correct model documentation requires that the environmental conditions for which the model was developed or validated are included in order to make the modeling efforts reproducible and thereby scientifically valuable to others (see *Benz and Knorrenschild,* 1997, *Oreskes et al.* 1994) .

As part of a two level information system, the ECOBAS model documentation standard is being developed at the University of Kassel (*Hoch et. al.*, 1998). Components of ECOBAS are

- a standardized file format for platform independent model specification (ECOBAS-MIF; Model Interchange Format), containing categories for mathematics, information about the valid ecological context, detailed variable declarations and explanatory text
- a WWW-accessible database containing mathematical formulations of ecological models in the form of MIF modules
- a WWW-based front-end to ECOBAS-MIF (documentation program),
- several converters and code generators that allow for transfer of MIF to text processing tools, simulation systems and algebra packages.

At the ISEM international meeting in Baltimore Aug. 1998 the ECOBAS-MIF model documentation standard has been presented. The purpose of this paper is to show by example the usage of the documentation program.

Creating a Model-Documentation

Module Specification in ECOBAS-MIF

A complex ecological model can be seen as a system consisting of several subsystems. For the scope of this paper we will term these subsystems *module* meaning a submodel or process-model that can be treated separately from the whole system for scientific, historical or practical reasons. An example is the process *photosynthesis* in a forest ecosystem model. Specifying a set of more or less independent process-modules one by one rather than large models facilitates model reuse and modularity (*Reynolds* and *Acock* 1997). Modules can be interfaced at a later stage to construct large models using the full declaration of inputs and outputs of each module.

Documentation of a module in MIF consists mainly of five steps:

1. Supply of general information
2. Variable declaration
3. Equation and function definition
4. Supply of information characterizing the valid ecological context
5. Description in free text form, literature references

There is only a limited set of language elements that are unique to MIF, therefore users can start to use the format without prior training. However, MIF is a block-structured file format and makes extensive use of labels to organize the user's input. Therefore, to free the user from syntax issues as far as possible, usage of the WWW-embedded documentation program to generate MIF files is recommended.

For each module, three main categories of information are distinguished in ECOBAS:

a) ***Type*** contains the abstract model, i.e., definition of the mathematics and variable declarations.

b) ***Specification*** contains parameter values and ranges making the module specific for a given ecological process.

c) ***Domain*** contains a declaration of the valid environmental context.

To minimize redundancy these three categories of information are stored in separate files. A new module can be created by combining existing *Type* and *Domain* files with a new *Specification* file.

Example Documentation

What follows will be a step by step description of the documentation of a small module using the WWW-embedded documentation program. As an example, we will document a module describing water content change of winter wheat grains during ripening, adopted from the ontogenesis model ONTO-WW (*Wernecke* and *Claus*, 1992). It consists of a conditional ordinary differential equation describing water content (Eq.1) and an algebraic equation summarizing the influence of environmental factors (Eq.2, see page 5). Once the necessary material is at hand, the ECOBAS documentation program can be started by opening the link http://dino.wiz.uni-kassel.de/ecobas/ ecobas.html with a Java-script compliant browser such as Netscape4.

Entering General Information

First, the user is prompted for his/her e-mail-address and for the names of the type, specification and domain files to be created. By pressing the "start" button, a task-identifier, some template files and HTML-forms are created. The task identifier is sent back to the user via e-mail and is used to continue work on an existing documentation. Each user may have several different tasks stored on the ECOBAS-Server.
We chose the names "grain_watercontent" to identify our *Type*-file, "ripening_winterwheat" for the *Specification*-file that holds the winterwheat-specific constants and "whinterwheat" for the *Domain*-file that describes the environment of the process. The first screen sent back to the user's browser contains the main menu in the right frame (Fig. 1).

Pressing a menu item opens the appropriate dialog in the right frame of the browser. The "General Information" dialog is used to enter or modify the tile of the module, version, origin and a list of keywords.

Declaration of model variables

The information of variable declaration is split over the sections Type and Specification. In the dialog "Declaration of Variables" (Fig. 2) each model quantity has to be declared. Numeric default values or ranges for each quantity can be later assigned in the "Quantity" dialog. A variable declaration consists essentially of the obligatory entries **name, unit, and type**. A variable type is a compound of selections in the groups

- `(time, state, input, output, parameter/auxiliary, constant, space)`
- `(scalar, vector, matrix, logical)`
- `(alphanumeric, float, integer)`
- `(metric, ordinal, nominal)`

ECOBAS-Process-Documentation
Task-identifier: gabele_0
Transaction-counter: 10
Type: grain_watercontent
Specification: ripening_winterwheat
Domain: winterwheat

Select/delete/create/upload MIF-files

Type (File-header)**:**
General information
Declaration of Variables
Declaration of functions
List of Equations
List of Constraints
Description
Literature

Specification (File-header)**:**
Quantities
Classification of domain
Description
Literature

Domain: (File-header)**:**
Classification of domain
Description

Figure 1: Main navigation menu during the documentation

- `(deterministic, random)`

In each group one item has to be selected. This detailed type declaration is necessary to allow for conversion of MIF into languages of simulation platforms and for consistency checks. If the variable is assigned a vector or matrix type, the dimensions must also be specified. There are several other entries that can be specified during variable declaration such as textual description, meaning, and aggregation type, for details see (*Benz* and *Hoch* 1999).
Once a variable is declared , it is added to a table of variables displayed in the right browser window. Each variable can be edited at any stage of the documentation by selecting the "modify" button next to it in the list of variables
A part of the table of variables for our example is shown in Fig. 3. In this case all variables are of type scalar, float and metric, additionally ***t*** is of type time, ***W*** is a state variable and the others are

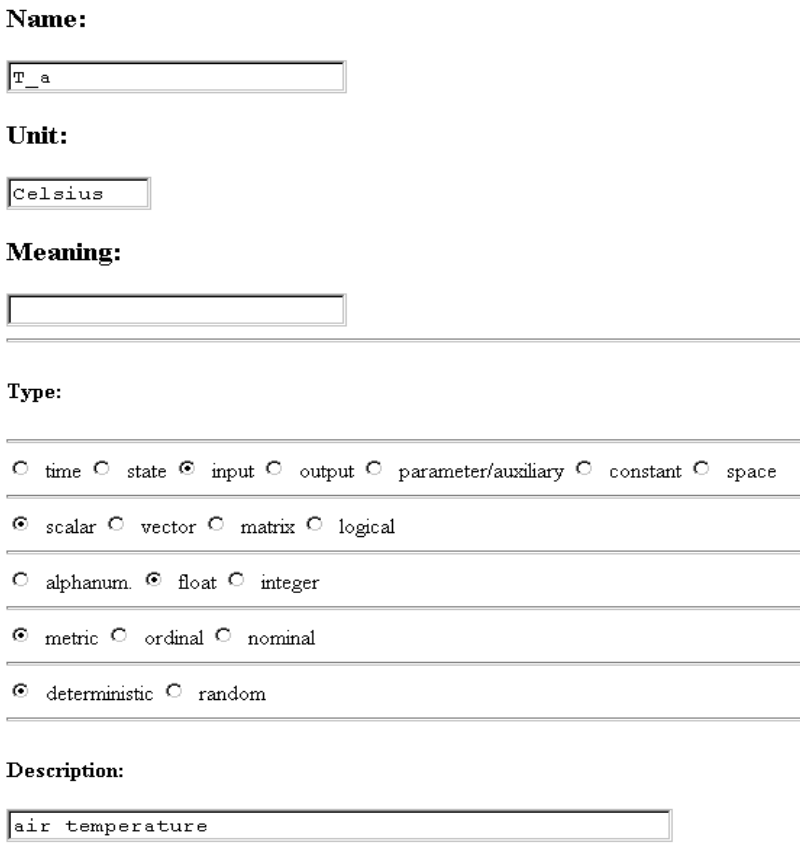


Figure 2: Dialog for declaration of variables

inputs and auxiliaries (not shown in the figure).

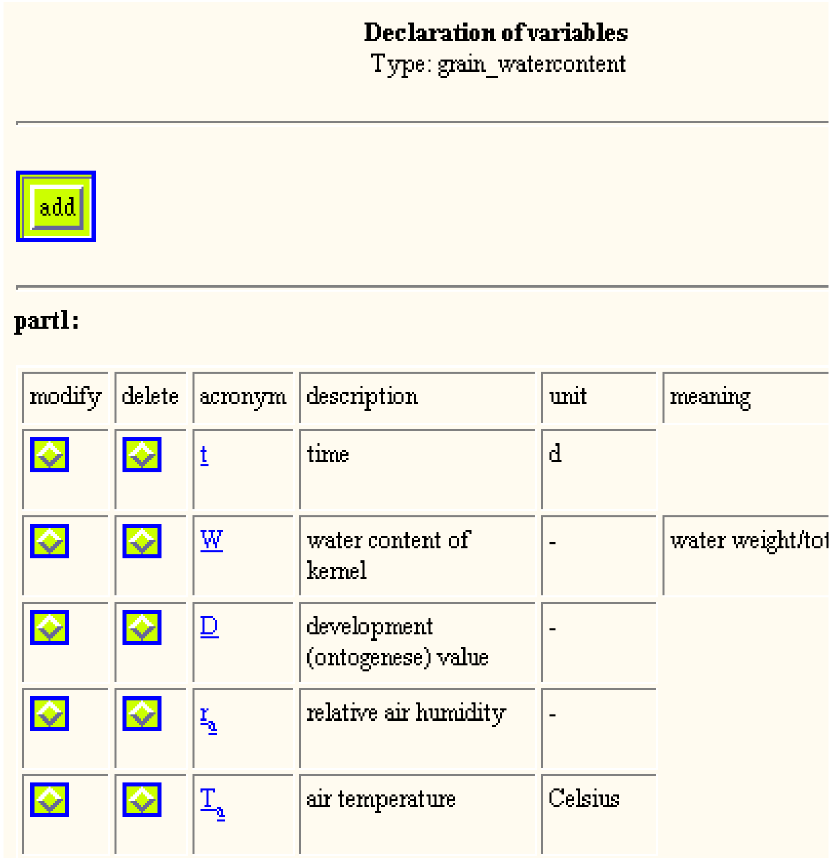
Entering equations, functions and constraints

In order to describe the mathematics of ecological processes we distinguish between equations, functions and constraints. The section equations contains the "real" mathematical equations. Furthermore you have the possibility to store user defined functions in a own section and finally there is a separate section for constraints. Because the dialogs are much the same for all these types, we will describe here only the main section equations. In the equations dialog shown in Fig. 4, the mathematical type of equation is specified by choosing from a list: (algebraic equation, table, difference equation, ordinary differential equation , partial differential equation, Markov-Chain , Markov-Process).

A short description of each equation in the section "comment" is recommended. The mathematical expression is entered in the field "equation". Allowed operators are similar to most other mathematical computing systems and a growing list of supported standard mathematical functions is available online (see *Benz* and *Hoch* 1999).

To document our first example equation describing water content change of kernels, we enter " `ODERIV(W,t,1) = -R_W*U_4*W IF D >= D_{an}; 0` ", which is the MIF expression for the conditional ordinary differential equation

and "`W(D=D_an)=W0`" in the field "Bounds" to define the start condition for this equation.
Our algebraic equation describing influence of temperature and humidity on water content is



Declaration of variables
Type: grain_watercontent

add

part1:

modify	delete	acronym	description	unit	meaning
		t	time	d	
		W	water content of kernel	-	water weight/tot
		D	development (ontogenese) value	-	
		r_a	relative air humidity	-	
		T_a	air temperature	Celsius	

Figure 3: Table of variables during documentation (shown only partially)

$$\frac{dW}{dt} = \{ -R_w * U_4 * W \text{ IF } D >= D_{an} \; W \text{ ELSE } 0 \} \quad (1)$$

```
“U_4=(1-r_a)*EXP((-E_A/
R_G)*(1/(T_a+273.15)-
1/(T_a0+273.15))) ",
```

which is equivalent to

$$U_4 = (1 - r_a) \cdot \exp\left(\frac{-E_A}{R_G}\right) \cdot \left(\frac{1}{T_a + 273.15} - \frac{4}{T_{a0} + 273.15}\right) \quad (2)$$

Variables in Eq. (1) and (2) are explained in Table 1.

As soon as the equation-entryform is submitted, the new equation is added to the list of equations and a HTML-formatted view of the equations is sent back to the browser. Each Equation can be edited by pressing the < ¿ **modify**> buttons next to the equation.

If applicable, functions and constraints are entered under the respective menu options in the same manner

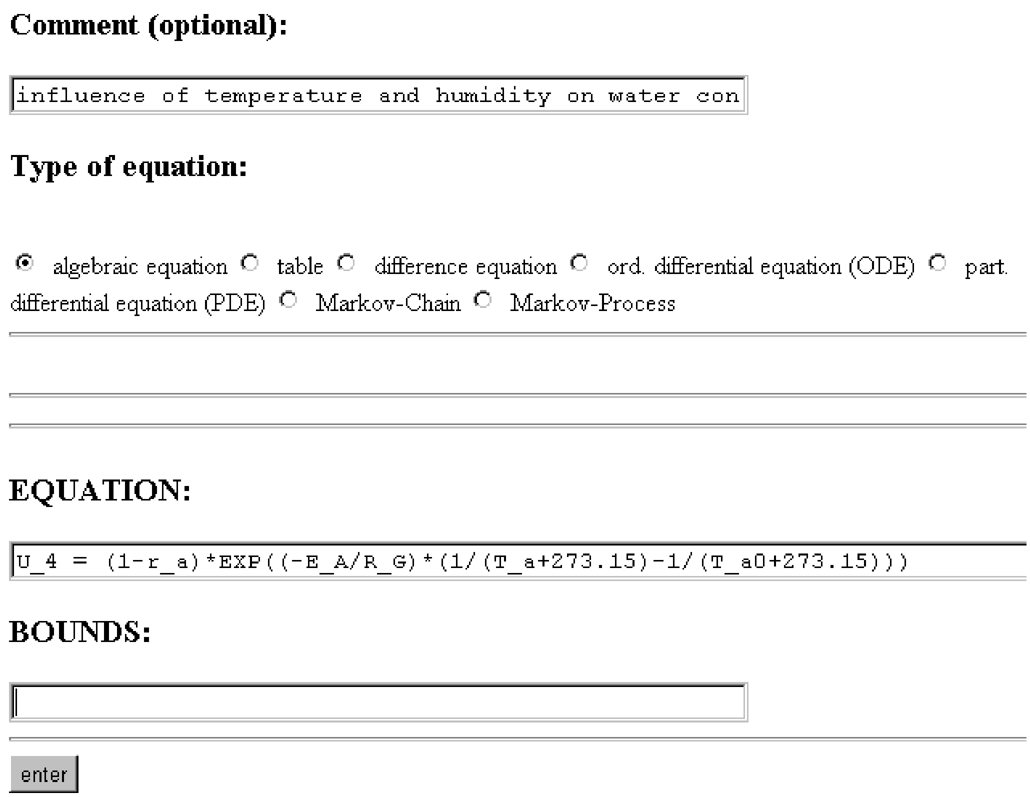


Figure 4: Equations dialog

Table 1: Variables used in the example equations

Acronym	Comment
t	time
W	water content of kernel
D	development (ontogenesis) value
r_a	relative air humidity
T_a	air temperature
U_4	influence of air temperature/humidity on water content
R_W	fitting parameter in waterloss equation
D_{an}	characteristic value for anthesis (flowering)
EA	activation energy for water transport
W0	initial value of W
R_G	universal gas constant
T_{a0}	reference air temperature

Equation (1): **Dynamics of water content**

modify delete check unit

$$\frac{dW}{dt} = \begin{cases} -R_W * U_4 * W & \text{if } D >= D_{an} \\ 0 & \text{else} \end{cases}$$

bounds:

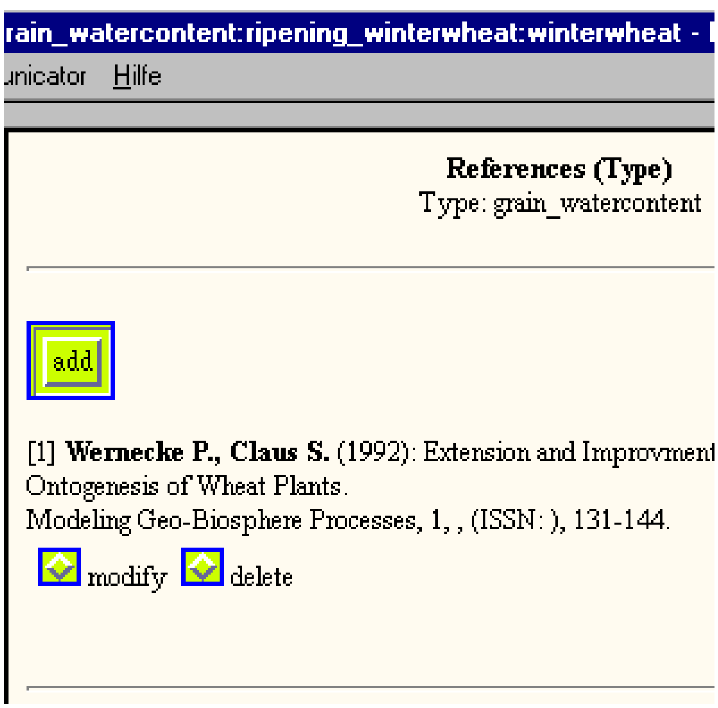
W(D=Dan) = W0

Equation (2): **influence of temperature and humidity on water content**

modify delete check unit

$$U_4 = (1 - r_a) * \exp\left(\frac{-E_A}{R_G} * \left(\frac{1}{T_a + 273.15} - \frac{1}{T_{a0} + 273.15} \right) \right)$$

Figure 5: List of Equations menu after completion of two equations



6

Figure 5 References menu

Sections Quantities, Description and References

After completing variable declaration and equation definition the essentials of our mathematical model are documented. To complete the documentation, numerical default values and allowed ranges are assigned to the variables as appropriate by opening the "Specification->Quantities" dialog. An statement explaining the purpose of the module, hypotheses and equations in free text form is required in section Type->Description. Literature references are essential for any later use of the module and should be entered in the "References" dialogs. Similar to variables and equations, references are listed in the right browser window (Fig. 6).

Classification of the valid ecological environment

In order to make the necessary documentation of the ecological context as painless, efficient and comparable as possible, ECOBAS_MIF uses international standards to communicate site-characterizing information.
The following categories of additional information can be specified in the "Domain" - section:

- soil type according to FAO-classification (*Driessen* and *Dudal*, 1991)
- soil texture according to US Soil Survey nomenclature (*Klute*, 1986)
- climate type according to (*Walter* and *Lieth*, 1967) and (*Walter*, 1973)
- ecosystem according to (*Ellenberg*, 1988)
- biological taxonomy (according to international nomenclature)

In addition, a free-text description of the valid environment can be given.
For our example domain characterizing a winter-wheat we select the "Domain->Classification of Domain" menu and open the "soil classification" dialog (Fig. 7. We assume that the process described is not restricted to a special soil class and enter "all" in the classification list. The soil texture dialog shown in Fig. 8 is self explanatory.

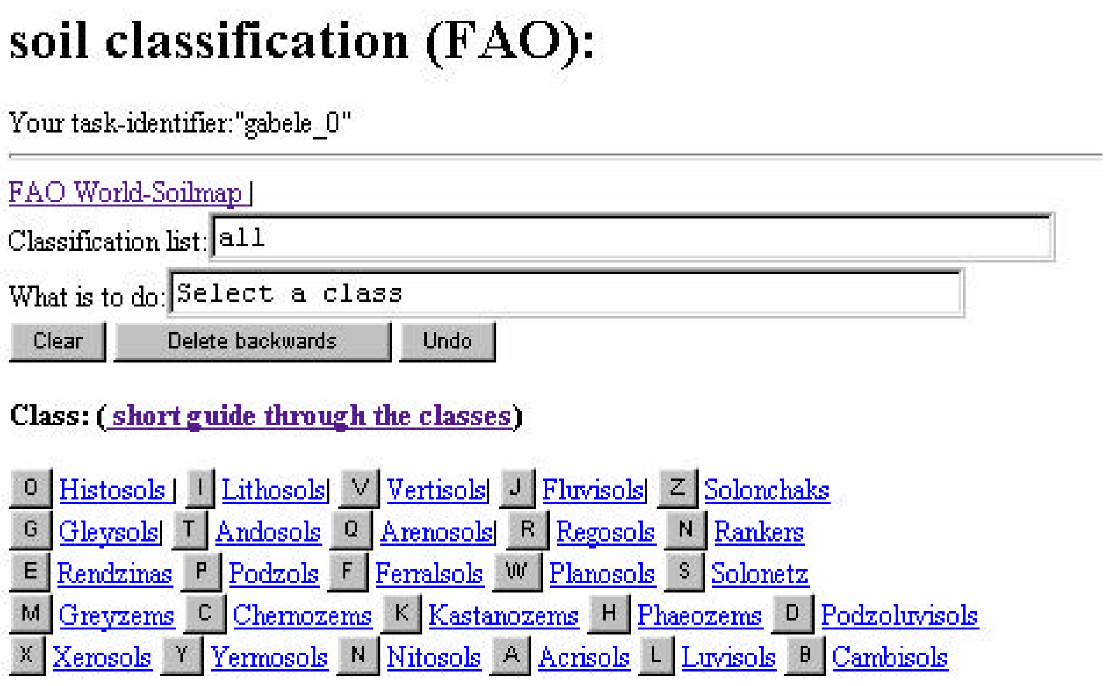


Figure 7: Soil class dialog

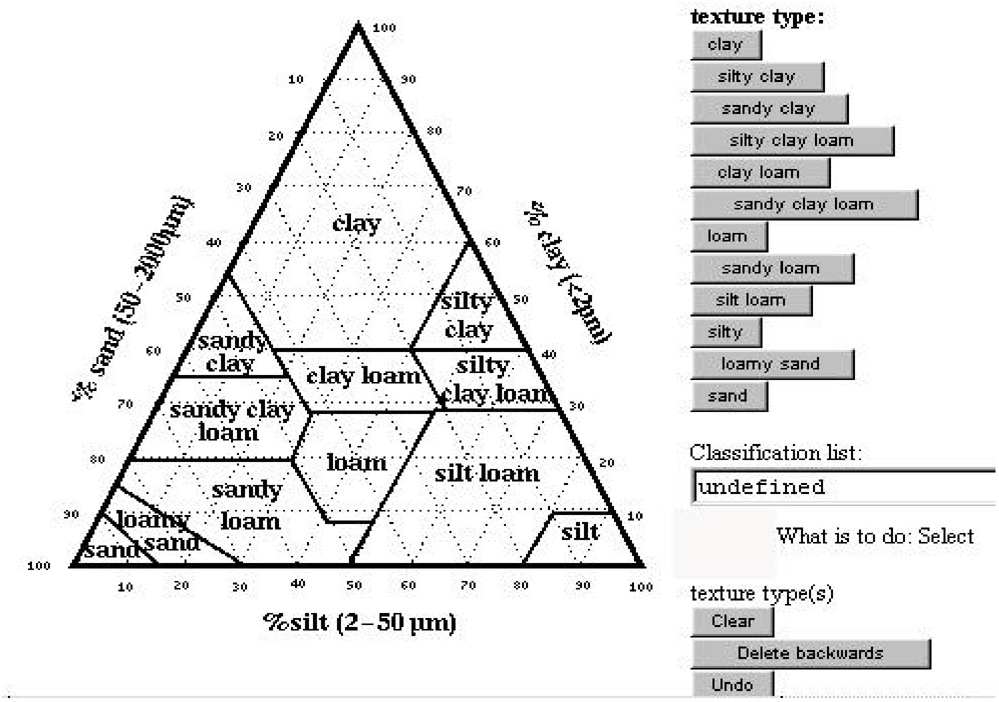


Figure 8: Soil texture dialog

In our example, we have no information about the soil textures used in the study of *Wernecke* and *Claus* (1992), therefore we leave the soil texture list undefined. In the Climate classification dialog (Fig. 9) we first read the description to become familiar with the nomenclature of *Walter* and *Lieth* (1967) and then select class VI, which is the code for "temperate humid zone". In the Ecosystem type dialog (Fig.10) we proceed accordingly and select "t" which is the abbreviation for terrestrial ecosystems. Finally we enter "Triticum aestivum" in the biological classification dialog. If we want to comment our selections in the "Domain" section or give a free text characterization of the valid ecological context, we provide a description in the "Domain->Description" dialog.

DOWNLOADING AND FILE-CONVERSION

After completion of our MIF-documentation, we select the "Download" menu in the left frame of the browser , which allows us to download our work in ECOBAS-MIF, TEX, Postscript and HTML format. These options are available for the individual *Type*, *Specification* and *Domain* files. Furthermore we can download "Object" files that combine the information of the former to a single document. Object files can be downloaded in the formats mentioned above and additionally in the simulation languages SIMPLEX-MDL (*Schmidt* 1995), VSS-MDL as well as in Mathcad 5.0 format. The list of available file formats is increasing as converters are under development.

Finally, if the user wants to make his/her module available to the modeling community, an e-mail message can be sent containing the task-identifier to the ECOBAS-group, who will include it in the ECOBAS-database. A possibility to have MIF-Documentation reviewed by ISEM-Members is currently under discussion. Once the documentation is submitted to the database, it can be referenced in papers to make the details of a model available to readers. Furthermore the user can access, modify or reuse his/her work by entering the task-identifier in the startup dialog of the documentation program.

Summary and Conclusion

To give a flavor of the usage of model documen-

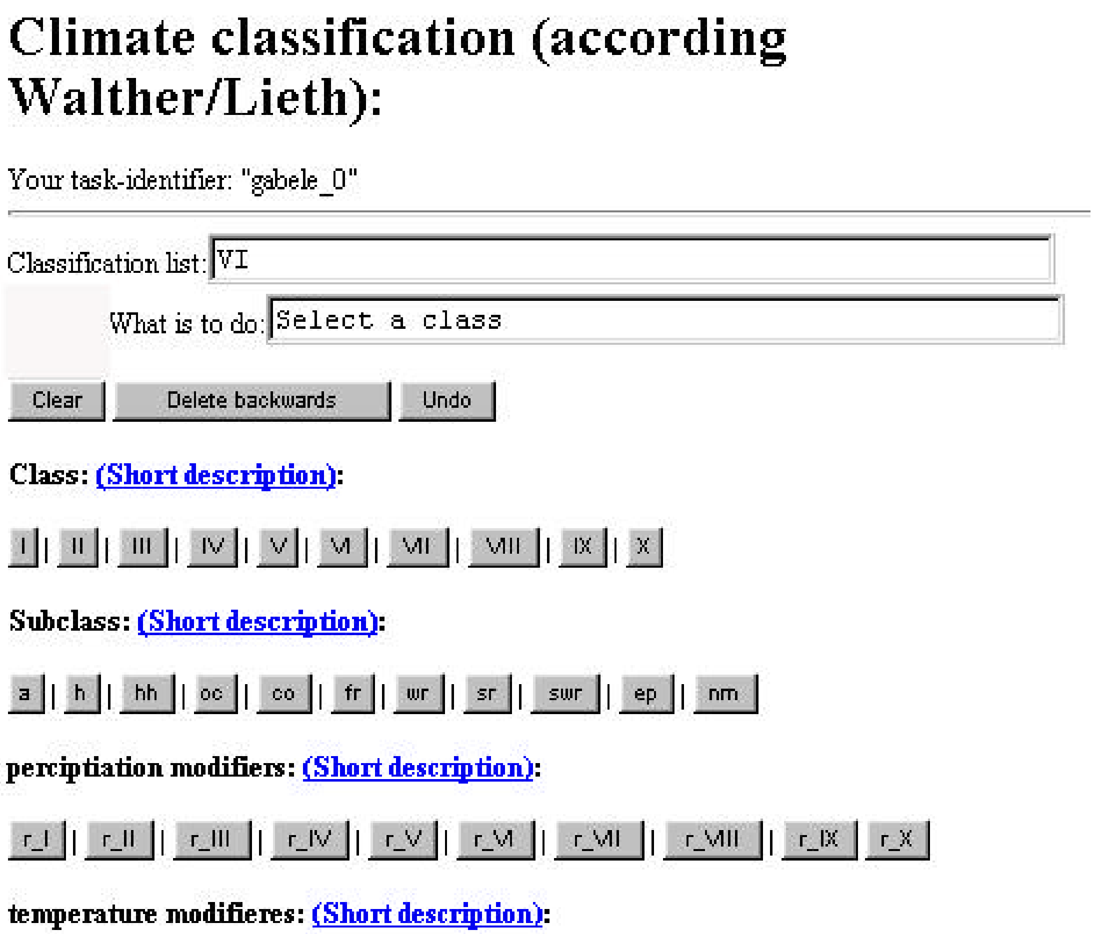


Figure 9: Climate classification dialog

tation using the ECOBAS-MIF standard, the online-documentation program has been demonstrated from the users point of view. Due to space limitations, not all details could be explained and further reading is recommended (e.g., *Benz and Hoch*, 1999).
At present, a major drawback in online-editing projects are slow Internet connections. However, it can be expected that average data transfer rates will increase. Platform-independent implementation offers distinct advantages over local solutions. For example, ECOBAS users can access, modify and demonstrate their modeling projects on any Internet-connected computer. The system has also been successfully applied in teaching a simulation class. The WWW-based documentation program is constantly under development and user feedback would be very helpful to identify and remove shortcomings and improve the utility of this interface. Concluding, we encourage anyone who is interested to connect to http:/dino.wiz.uni-kassel.de/ecobas/ecobas.html, spend half an hour to investigate the system by documenting a simple module, download and examine the documents and report comments to the authors.

References

Benz J., Knorrenschild M. (1997): Call for a common model documentation etiquette. *Ecological Modelling*,97, 141-143.
Benz J., Hoch R. (1999): Documentation of the mathematical documentation of ecological processes, Description of the ECOBAS-Model-

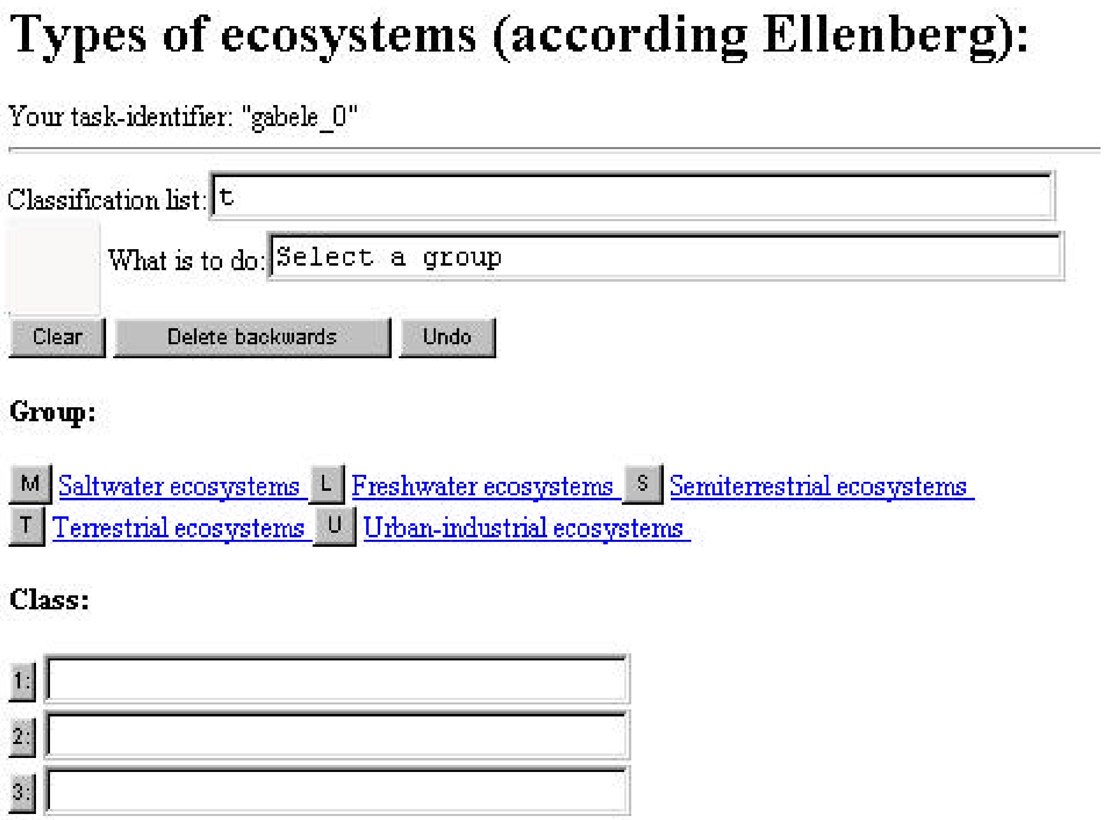


Figure 10 Ecosystem type dialog

Interchange-Format (ECOBAS_MIF Version 2.0), ***http://dino.wiz.uni-kassel.de/ecobas/syntax_mif/syntax2_mif.ps.*** and /ecobas/syntax_mif/html/

Driessen, P. J. and Dudal, R., editors (1991): The major soils of the world. Agricultural University Wageningen.

Ellenberg, H. (1988): Vegetation ecology of Central Europe, 4 ed. Univ. Press, Cambridge

Hoch, R., Gabele, T., J. Benz (1998): Towards a standard for documentation of mathematical models in ecology *Ecological Modelling*,113, 3-12

Klute, A., editor (1986). Methods of soil analysis. Part 1: Physical and mineralogical methods. American Soc. of Agronomy, Madison, Wisc., 2 edition.

Oreskes, N, Shrader-Frechette, K, Belitz, K (1994): Verification, validation, and confirmation of numerical models in the earth sciences. *Science*,263, 641-646.

Reynolds J.F., Acock B. (1997): Modularity and genericness in plant and ecosystem models. *Ecological Modelling*, 94, 7-16.

Schmidt B. (1995): SIMPLEX II. SCS Publications, San Diego.

Walter, H. (1973) Vegetation of the earth. Springer, New York.

Walter, H. and Lieth, H. (1967): Klimadiagramm-Weltatlas. EB G. Fischer, Jena

Wernecke P., Claus S. (1992): Extension and Improvment of Descriptive Models for the Ontogenesis of Wheat Plants. Modeling Geo-Biosphere Processes, 1, 131-144.

President's Address

One of the functions of a professional scientific society is to recognize the contributions of individuals to both the scientific enterprise represented by the society and to the society itself. Accordingly, I am please to announce the establishment of two awards by the International Society for Ecological Modelling.

1. The George M. Van Dyne Systems Ecology Award. An annual award to an individual in recognition of outstanding contribution to the science of systems ecology and ecological modelling.
2. The ISEM Distinguished Service Award. An annual award in recognition of distinguished service to the International Society for Ecological Modelling.

We will need to establish an Awards Committee to administer these awards and provide for the possibility of additional awards in the future. In the interim, the ISEM Board of Governors will serve as the acting Awards Committee. Recipients of these awards for 1999 will be announced in the next issue of ECOMOD.

I also want to take this opportunity to invite volunteers to serve on the ISEM Awards Committee. If you are able and willing to serve on this committee, please contact me (email to awk@ornl.gov is best!). As is true of other ISEM committees, most of the committee's business will be done by email.
As Per Bak has noted, "Good science is fun science." Here's wishing you good science and happy modelling

Tony King
President ISEM

Welcome New Members

We would like to welcome the following colleagues to ISEM:

Thomas Barnwell, USA
Harry Valentine, USA
Henning Schroeder, Germany
Kathleen Bergen, USA
Nancy Luckai, Canada

Welcome to ISEM, and thanks for joining ISEM.

Book Reviews

By A. Henderson-Sellers, Australian Nuclear Science and Technology Organisation, Menai, NSW, Australia

* "The Regional Impacts of Climate Change. An Assessment of Vulnerability. A Special Report of IPCC Working Group II", edited by R.T. Watson, M.C. Zinyowera, R.H. Moss and D.J. Dokken, A$69.95, Cambridge University Press, Cambridge, 1998, ISBN 0-521 632560 (hardback) 0-521 634555 (paperback)517pp.

Assessing regional impacts of climate change and, in particular, the vulnerability of human and natural systems to future climate change, is, in my opinion, the single most important challenge for those of us who earn our livings postulating and practising the art of climate impact evaluation. This text is therefore an important first step along a road which is potentially of fundamental importance.

This report was produced by the Working Group II of the Intergovernmental Panel on Climate Change (IPCC) and builds on Working Group II's contribution to the Second Assessment Report of the IPCC. It has been developed since the conclusion and publication of the Second Assessment Report in 1996 and draws on research since mid-1995 when final results for the Second Assessment were collected.

The report consists of vulnerability assessments for ten regions which, together, comprise the entire Earth's land surface and adjoining coastal seas. The chapters are on

Africa, the Arctic and Antarctic, Australasia, Europe, Latin America, the Middle East and arid Asia, North America, the Small Island States, temperate Asia and tropical Asia. In each of these chapters, the assessment of vulnerability to climate change follows the same model: regional climate, climate trends and projections followed by impacts in key sectors including terrestrial ecosystems; hydrology and water resources; agriculture and food security; coastal zones; human settlements, energy, industry and transport; wildlife tourism and recreation; and human health.

If the key finding of the Intergovernmental Panel on Climate Change's Second Assessment Report, which is that "the balance of evidence suggests a discernible human influence on global climate" proves to be correct, then assessment of vulnerability of natural and human systems to future climate change are of great significance. Policy changes to reduce identified vulnerabilities are crucial and it is in this context that I warmly applaud the authors and organizers of this report.

Having stated my strong support for the endeavour upon which the IPCC embarked in constructing this first regional impacts report, I also feel obliged to indicate my reservations. The most important of these is that this critically important report has been constructed in the same manner as all IPCC reports. This means that it is a "bottom up" collection of individual contributions from many hundreds of scientists and social scientists around the world. Each geographical collection of inputs has then been edited and massaged into a single chapter by around a dozen lead authors, themselves led by 2-4 convening lead authors. Such a process inevitably generates a heterogeneous and somewhat out of date overview.

Still more importantly in my opinion, the result is the same as an attempt to understand the way a cat works by dissecting a passing "moggy". The outcome is, often, some furtherance of knowledge but it is also combined with the demise of the cat.

As an illustration of the heterogeneity of scientific understanding, which is the inevitable result of the IPCC process, I review the references to the impact of tropical cyclones in a greenhouse-warmed world. The IPCC Second Assessment Report was equivocal about tropical cyclones. Working Group II's report, "Impacts, Adaptation and Mitigation of Climate Change", (Watson et al., 1996) stated that Reinsurers have noted a fourfold increase in disasters since the 1960s. This is not due merely to better recording, because the major disasters -which account for 90% of the losses and would always be recorded - have increased just as quickly. Much of the rise is due to socioeconomic factors, but many insurers feel that the frequency of extreme events also has increased. It also stated that Insurers had at least one "billion dollar" storm event every year from 1987 to 1993. With such an unexpectedly high frequency, some local insurance companies collapsed, and the international reinsurance market went into shock.

This IPCC report went on to note that traditionally, insurers have dealt with changes in risk in four ways: restricting coverage so that the balance of risk-sharing shifts toward the insured; transferring risk; physical risk management (before and after the event); or raising premiums. However, in view of the increasing costs of weather claims, insurers now are considering a more fundamental approach. Lack of information about extreme events hampers such activity and makes insurers wary of committing their capital.

At the same time, the IPCC Working Group I in its report entitled "The Science of Climate Change" (Houghton et al., 1996) stated that "the-state-of-the-science [tropical cyclone simulations in greenhouse conditions] remains poor because (i) tropical cyclones cannot be adequately simulated in present GCMs; (ii) some aspects of ENSO are not well simulated in GCMs; (iii) other large-scale changes in the atmospheric general circulation which could affect tropical cyclones cannot yet be discounted; and (iv) natural variability of tropical storms is very large, so small trends are likely to be lost in the noise.

In conclusion, it is not possible to say whether the frequency, area of occurrence, time of occurrence, mean intensity or maximum intensity of tropical cyclones will change. Since the publication of the IPCC Second Assessment Report, there has been a commissioned study conducted under the auspices of WMO's Committee on Atmospheric Sciences (Henderson-Sellers et al., 1998). Although this report was completed in March 1997 and was therefore available to the authors of this IPCC Special Report, it is only partially recognized and heterogeneously (mis)quoted.

- Latin America: There is no mention of tropical cyclones in climate change section: an embarrassing failure to foresee the devastation due to Hurricane Mitch in Honduras?
- North America: There is no mention of tropical cyclones in climate change section despite the known destruction by Hurricane Andrew in Florida.
- Small Island States: The climate change section purports to "contrast" a prediction by Holland (1997) of increased intensity with an observation by Nicholls et al. (1997 - still unpublished?) of increased intensity.
- Tropical Asia: The section correctly quotes the WMO/CAS results of small or no change while misspelling the lead author's name.
- Australasia: The section correctly quotes WMO/CAS results but then claims that "nested regional (climate) models may provide scenarios of tropical cyclone changes in the future" citing two reports reviewed in the WMO/CAS study and found wanting e.g. "mesoscale model-based predictions for tropical cyclones in greenhouse conditions have not yet demonstrated prediction skill" (Henderson-Sellers et al., 1998, p35).

My point is to enquire if this geographically composited review of the potential impacts of tropical cyclones in a greenhouse-warmed world has further advanced understanding of if/how they may change and if/how this might matter? On the contrary, I believe it tends to further confuse an already vexed subject.

There are, of course, very many excellent aspects of this report. For example, I very much like Table 6.9 which lists adaptation options, other benefits and potential obstacles that require consideration for the Latin American area. I wonder why such tables were not included in all of the geographically focussed regional reports? In contrast, an important, but apparently picky, point is forced upon me by my adopted discipline, geography. I see absolutely no reason why a United Nations (the IPCC is a joint undertaking by the WMO and UNEP) spawned assessment of the vulnerability of land-based ecosystems and human activities should illustrate its assessment using equal latitude/longitude maps. A glance at those of North America (e.g. page 262) will confirm the silliness of employing a projection which shows Baffin Island to be about twice the size of Texas whereas it's only about half the area of the Lone Star state. It is important to continue to repeat the geographical (human and physical) truism that "much of the mapped climate data from satellite monitoring or computer simulation models, especially on the topic of anthropogenerated enhanced 'greenhouse' warming, are biased, not because of any deficiency in the science, but because they are not plotted as equal area projections" (Bryant, 1997, pxiii).

Overall, I am afraid I can only give this report a '6 out of 10'rating. It is a good effort, well meant and addressing a crucially important area. On the other hand, it is precisely because the issue of assessing vulnerability to possible future climate change is so important that I worry about the structure, mode of development, use, and mild confusion of, of research findings and method of geographical display. We understand the cat a little better - but the poor puss is dead. I wonder whether the highly inclusive consensus-finding processes of the IPCC are becoming obstacles to its progress. It will be a pity, and a serious handicap for us all, if such an excellent organization is reduced to mediocrity by its own bureaucratic processes.

References

Bryant, E., 1997, Climate Process and Change, Cambridge University Press, Cambridge, 209pp

Henderson-Sellers, A., Zhang, H., Berz, G., Emanuel, K., Gray, W.M., Landsea, C., Holland, G., Lighthill, J., Shieh, S-L., Webster, P. and McGuffie, K., 1998, Tropical cyclones and global climate change: a post-IPCC assessment, Bulletin of the American Meteorological Society, 79(1), 19-38

Holland, G.J., 1997, The maximum potential instability of tropical cyclones, J. Atmos. Sci., 54, 2519-2541

Houghton, J.T., Meira Filho, L.G., Callander, B.A., Harris, N., Kattenberg, A. and Maskell, K., 1996, Climate Change 1995: The Science of Climate Change, Contribution of Working Group I to the Second Assessment of the Intergovernmental Panel on Climate Change, Cambridge University Press, 572pp

Nicholls, N., Landsea, C. and Gill, J., 1997, Recent trends in Australian region tropical cyclone activity, Meteorology and atmospheric Physics special edition on tropic cyclones (in press)

Watson, R.T., M.C. Zinyoweya and Moss, R.H. (eds), 1996, Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses.Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change,Cambridge University Press, Cambridge, 879pp

* Climate Process and Change by Edward Bryant, Cambridge University Press, Cambridge, 1997, A$29.95, ISBN 0521 48189 9 (hardback) and 0 521 48440 5 (paperback), 209pp

It is fairly rare for a reviewer, at least this happens rarely to me, to feel that they genuinely wish they had themselves written a book they have agreed to review. Climate Process and Change by Edward Bryant is such a text for me. The only other recent example which I can call to mind is Laboratory Earth: the Planetary Gamble We Cannot Afford to Lose by Stephen Schneider. In both cases, I am attracted by the holistic nature of the text. I believe that it is of great importance for students, policy makers and practising researchers to be reminded frequently of the small component that their particular effort comprises in the overall scheme of global change or perhaps we might more correctly say global stability.

Edward Bryant delivers a text which emphasizes this message in a clear and persuasive way. He achieves this goal by first considering the Earth's climate as a function of its planetary status and the timeframe of the lifetime of the solar system. Chapter 2 reviews climate processes, again considering the largescale and holistic components of radiation balance first and foremost. Chapter 3 reviews heat and mass transfers in the atmosphere and begins a unique and very attractive process of emphasizing to readers that there are two hemispheres. Most of us who claim to be atmospheric or climate scientists are so used to our text books being written by and for Northern Hemisphere dwellers that we rarely remember to describe or picture the way processes work in the Southern Hemisphere. Dr Bryant balances every Northern Hemisphere picture with a sibling from the Southern Hemisphere as for example in Figure 3.2, 3.6, 4.2 and 4.5+4.6. I also believe I recognize Wollongong or a similar geography in Figure 3.8.

Of course, I cannot only praise since reviewers have a duty to mention areas or topics which they feel could have been better or more completely treated. For me, this text slightly short-changes readers by its somewhat dated descriptions of projections of greenhouse change. This can be seen in, for example, Figure 7.2 and the section on general circulation climate modelling relating to greenhouse change which draws on and refers to Mitchell et al. (1990) and Washington (1992). Surely, the Intergovernmental Panel on Climate Change First and Second Assessment Reports of 1990 and 1996 can and should have been referred to here? This issue of slightly dated science is particularly important because Bryant is brave enough to end this book with a section discussing "processes favouring ice ages". I could take issue with his arguments here and also with his treatment of feedback processes in Figure 10.2 and radiative forcings listed in Table 10.1. However, I accept the challenge to his readers and believe that it is well posed.

I am more sceptical about Dr Bryant's assertions pertaining to some aspects of climate modelling. For example, I wonder about the wisdom (or basis) for his very assertive claim that, in relation to soil-vegetation-atmosphere parameterization schemes, "one of the best models is the Simple Biosphere Model (SiB)". Similarly, while I acknowledge and appreciate the chapter (8) on health impacts and climate change, I am somewhat confused by Table 8.5 both in terms of the simplicity of the "climate variables controlling disease" and the degree of impact assessment (the latter two columns in the table).

Bryant makes no bones about his belief that greenhouse warming is only one component of future climate change and, in his opinion, probably not the most important. He says "it would be foolish for policy makers to assume that enhanced 'greenhouse' warming will be the only climate outcome over the next 50 years" (page 142). This is true; but it is equally true of the projections of a future ice age or, and more importantly, of an optimistic policy framework which ostrich-like presumes no change.

Overall, I like the book and believe it restores some balance to the teaching of climate fundamentals. That I, personally, disagree with the author's stated views and still like and recommend the book is praise indeed!

References

Mitchell, J.F.B., Manabe, S., Meleshko, V. and Tokioka, T., 1990, Equilibrium climate change - and its implications for the future, in Climate Change: The IPCC Scientific Assessment (eds. J.T. Houghton, G.J. Jenkins and J.J. Ephraums), Cambridge Univ. Press, Cambridge, 93-130

Washington, W.M., 1992, Climate-model responses to increased CO2 and other greenhouse gases, in Climate System Modeling (ed. K. Trenberth),Cambridge Univ. Press, Cambridge, 643-688

1999 Meeting of the North American Chapter of ISEM

The 1999 annual meeting of the North American Chapter of ISEM will be held jointly with The Ecological Society of America (ESA) in Spokane, Washington, August 8-12. All the members should have received by now the preliminary program/registration brochure. Information is also available on the ESA web site (http://esa.sdsc.edu/99meet.htm). This joint meeting is a great opportunity, as it will be possible for ISEM members to attend both ISEM and ESA symposiums, workshops, oral sessions, field trips and social functions.

Keeping up with the tradition, we have quite an impressive scientific program this year. There will be one workshop, one symposium, one poster session and five oral sessions. The workshop, organized by Michael Corson and Bernard Patten, will consist of lecture and laboratory sessions on basic elements of systems analysis and simulation applied in ecology and natural resource management. The symposium, organized by William S. Currie, will be on modeling nitrogen in forest ecosystems. The poster and oral sessions cover different subjects, such as population dynamics, risk assessment and carbon cycle in forest ecosystems. For more details, see the program below. Do not forget to attend the business meeting and mixer on Tuesday evening at 5:00 PM. Most of the activities will take place in Bay 2 of the Riverpark Convention Center, which can sit approximately 200 people.

I would like to take the opportunity to extend my sincere thanks to Katherine McCarter, Ellen Cardwell and Kathy Johnson, from ESA, for their help and advice in the organization of the meeting.

I am looking forward to meeting you in Spokane.

Guy R. Larocque
Program Chair
Natural Resources Canada
Canadian Forest Service
Ste-Foy, Quebec, Canada
Glarocque@cfl.forestry.ca

ISEM Program

SATURDAY, AUGUST 7

8:00 AM - 5:00 PM

Gonzaga University Computer Laboratory

ISEM WORKSHOP: WK5- Systems Analysis and Simulation in Ecology and Natural Resource Management.

SUNDAY, AUGUST 8

8:00 AM - 5:00 PM

Gonzaga University Computer Laboratory

ISEM WORKSHOP: WK5- Systems Analysis and Simulation in Ecology and Natural Resource Management.

MONDAY, AUGUST 9

1:00 - 5:00 PM

SESSION 1

POSTER SESSION: Ecological Modelling. Posters will be available for viewing. Authors will be available to discuss their presentations.

ISEM-1.1 CHEN, X.*, L.T. WILSON and R.D. WEEKS. An Optimization Model of the Territory Size of Imported Fire Ants.

ISEM-1.2 DREISBACH, T. A.* and J.E. SMITH. Predicting Occurrence of Chanterelles: Habitat Factors Regulating Distribution in the Pacific Northwest.

ISEM-1.3 HERNANDEZ-CARDENAS G., and F. MORA*. Modelling Wildfire Potential from Vegetation and Drought Conditions in Mexico.

ISEM-1.4 KANG, D.* and S. S. PARK. Emergy Evaluation of a Hydroelectric Dam Proposal in South Korea.

ISEM-1.5 MATEJICEK, L. Spatio-Temporal Modelling in the GIS Environment: Dynamic Processes of Water Pollution in Streams

ISEM-1.6 PEDERSEN, E. K.*, W. E. GRANT , J. W. CONNELLY, and J. HENDRICKSON. Multiple use of Rangeland Resources: Simulation of Sage Grouse-Sheep Interactions in a Sagebrush Community in Southeastern Idaho.

TUESDAY, AUGUST 10

8:20- 12:00 Riverpark Convention Center - Bay 2

SESSION 2

Presiding: G.R. LAROCQUE, Natural Resources Canada, Sainte-Foy, Qc, Canada.

CONTRIBUTED PAPERS: Landscape, Resource Management and Risk Assessment.

8:20 **ISEM-2.1** MAILLY, D.*, J.P. KIMMINS and R.T. BUSING. Disturbance and Succession in a Coniferous Forest of Northwestern North America: Simulations with Dryades, a Spatial Gap Model.

8:40 **ISEM-2.2** COLBERT, J.J. * and G. RACIN. Using a Java Applet to Provide Web-Based Access to and Data Management for a Forest Gap Simulation Model.

9:00 **ISEM-2.3** ACEVEDO, M.F.*, M. ABLAN, S. PARMATI, D.L. URBAN and A. MIKLER. Parameterization of a Landscape Semi-Markov Metamodel.

9:20 **ISEM-2.4** PARK, R. A.*, J. S. CLOUGH, H. GALBRAITH, R. JONES, and S. H. JULIUS. Modelling Impacts of Sea-level Rise on Coastal Habitats.

9:40 **ISEM-2.5** BARNWELL, T. O.* and B.M. LEVINSON. Environmental Protection AgencyÕs Research Strategy for Ecological Modelling.

10:00 **Break**

10:20 **ISEM-2.6** FLUG, M.*, S. CAMPBELL, and J. BARTHOLOW. Using a Systems Impact Assessment Model on a Western River Ecosystem.

10:40 **ISEM-2.7** PARK, S. S.*, E. J. KIM, and Y. S. LEE. Development and Application of a Water Quality Model for Large River System with Autochthonous Sources and Denitrification

11:00 **ISEM-2.8** HOFFMANN, M.* and W. KOEHLER. Modelling the Spread of Transgenes by Pollen and the Likelihood of Hybridization between Populations of the Genus *Beta*.

11:20 **ISEM-2.9** SIZONENKO V.P. A model of increased accuracy for forecasting radionuclides transport in the Kiev reservoir.

11:40 **ISEM-2.10** PARK, R. A.*, J. S. CLOUGH, M. C. WELLMAN, D. A. MAURIELLO, and D. J. D'ANGELO. Modelling Stress of Conventional and Potentially Toxic Pollutants on Aquatic Ecosystems.

1:00-5:00 PM Riverpark Convention Center - Bay 2:

SESSION 3

Presiding: W.S. CURRIE, University of Maryland Center for Environmental Science, Frostburg, MD

SYMPOSIUM: Modelling N Turnover in Soils and the Availability of Inorganic and Organic N to Forest Trees. The key issue addressed in this symposium will be to determine the extent to which the complexity of controls on N availability will have to be included in future models of forest biogeochemistry, as existing models sometimes are based on simplified representations of this variable. Organized by WILLIAM S. CURRIE, University of Maryland Center for Environmental Science, Appalachian Laboratory, Frostburg, MD, USA.

1:00 **ISEM-3.1** TIETEMA, A.* and W. BOUTEN. Parameter Identification in Incubation Experiments.

1:20 **ISEM-3.2** HOBBIE*, S. E. and P. M. VITOUSEK. Nitrogen Limitation of Decomposition in Terrestrial Ecosystems: Evidence and Complications.

1:40 **ISEM-3.3** DAVIDSON, E. A. Are Gross Rates of N Mineralization and Nitrification Needed for the Hole-In-The-Pipe Model?

2:00 **ISEM-3.4** HOBBIE, E. A. Incorporating Mycorrhizal Fungi and Isotopes into Models of C and N Dynamics.

2:20 **ISEM-3.5** MCGUIRE,A.D.*,J.S. CLEIN-CURLEY, J.M. MELILLO and D.W. KICKLIGHTER. The Sensitivity of Simulated Net Ecosystem Production in Mature Black Spruce (*Picea mariana*) to Two Different Formulations of Soil Nitrogen Transformations in the Terrestrial Ecosystem Model.

2:40 **ISEM-3.6** PARDO, L. H. Natural Abundance of ^{15}N as a Tool for Improving N Cycling Models.

3:00 **Break**

3:20 **ISEM 3.7** CURRIE, W. S. The Problem Of Coupling C and N Cycles to Model Soil N Turnover in Temperate Forest Soils.

3:40 **ISEM 3.8** Discussion session

5:00 **NA-ISEM business meeting**

6:30 **ISEM mixer.**

WEDNESDAY, AUGUST 11

8:40- 10:00 Riverpark Convention Center - Bay 2

SESSION 4

Presiding: B.C. PATTEN, Institute of Ecology and School of Forestry, University of Georgia, Athens, GA.

CONTRIBUTED PAPERS: Population Dynamics and Wildlife Management

8:40 **ISEM-4.1** BANCROFT, J. S. Using Statistical Moments to Fit Hypotheses for the Mechanism of Dynamics in a Fragmented Population.

9:00 **ISEM-4.2** CORSON, M.S.*, P.D. TEEL, and W.E. GRANT. Modelling Detection of Cattle-fever-tick Infestations in Semi-arid Thornshrublands of South Texas

9:20 **ISEM-4.3** DIXON, K. R.*, S.R. ANDERSON, J.F. FAGAN, D.B. HOGAN, T. HUANG, C.F. MARTIN, J.C. ROBERTS, K.T. RUMMEL and L.L. SHEELER-GORDON. An Individual-Based Model for Predicting Population Effects from Exposure to Environmental Contaminants.

9:40 **ISEM-4.4** NORRIS, K. S.* and W. E. GRANT. Results of a Competitive, Rank- and Interaction-Based Population Simulation Model Applied to Group-Living Primates

10:00 **Break**

10:20- 11:40 Riverpark Convention Center - Bay 2

SESSION 5

Presiding: D. MAILLY, Ministry of Natural Resources, Quebec

CONTRIBUTED PAPERS: Ecological Models used in conjunction with Remote Sensing and Geographical Information Systems

10:20 **ISEM-5.1** KING, A. W.*, T.L. ASHWOOD, B.L. JACKSON and Y.I. JAGER. Spatial Error and Uncertainty Analysis of Ecological Models.

10:40 **ISEM-5.2** MORA*, F. and J.W. MERCHANT. Modelling Interannual Changes in the Onset of Greenness With GIS.

11:00 **ISEM-5.3** YUE, T. X. A General Model for Handling Ordered Data in Huge Number and Its Application.

11:20 **ISEM-5.4** PACHEPSKY, L. B.*, R. A. FERREYRA, L. LU, Zh. LU and B. ACOCK. Measuring Tissue Dimensions on Leaf Cross-Sections Using Supervised Image Classification Techniques.

1:00- 3:00 PM Riverpark Convention Center - Bay 2

SESSION 6

Presiding: E.K. PEDERSEN, Texas A&M University, College Station, TX.

CONTRIBUTED PAPERS: Theoretical and Methodological Developments in Ecological Modelling

1:00 **ISEM-6.1** PATTEN, B.C.*, B. D. FATH, AND J. S. CHOI. Network Thermodynamics Analysis: Formulation and Unification of Several Ecological Goal Functions.

1:20 **ISEM-6.2** DECURTIS, C.* and R. WIEGERT. Theoretical Behaviors of Ecosystems Developed and Explained Using Simple Mechanistic Simulation Models.

1:40 **ISEM-6.3** YANG, X.H.*, Q. GAO and M. YU. Scaling Simulation Models for Spatially Heterogeneous Ecosystems.

2:00 **ISEM-6.4** WU, J. Hierarchical Modelling: A Scaling Ladder Approach.

2:20 **ISEM-6.5** PATTEN, B. C.* and R. W. SAGE. The Adirondack Whitetail as a Process in an Ecosystem: a Linear Dynamic Model.

2:40 **ISEM-6.6** HERENDEEN, R. A. Dynamic Trophic Cascades for Large Perturbations.

3:00 **Break**

3:20- 4:40 PM Riverpark Convention Center - Bay 2

SESSION 7

Presiding: A.T. KING, Oak Ridge National Laboratory, Oak Ridge, TN.

CONTRIBUTED PAPERS: Modeling Carbon Cycle.

3:20 **ISEM-7.1** LAROCQUE, G. R. Modelling Daily Gross Photosynthetic Rate in Sugar Maple (*Acer saccharum* Marsh.) Stands with Detailed Coupled Photosynthesis and Light Attenuation Functions.

3:40 **ISEM-7.2** FERREYRA, R. A., J. DARDANELLI, D.COLLINO, and L.B. PACHEPSKY.* Water Stress Related Anomalies in the Crop Simulation Model PNUTGRO: Explanation Using a Leaf Gas Exchange Model and Thermodynamic Analysis.

4:00 **ISEM-7.3** JIANG, H.* and M. J. APPS. Modelling the NPP, NEP and NBP Dynamics of Boreal Forest under Fire Disturbance Regime.

4:20 **ISEM-7.4** WOHLFAHRT, G.*, M. BAHN, U. TAPPEINER and A. CERNUSCA. A model of whole plant gas exchange and its application to herbaceous plant species from differently managed mountain grassland ecosystems.

4:40 **ISEM-7.5** VALENTINE, H.T. Modeling stand growth in a changing atmosphere.

5:00 **ISEM-7.6** LUCKAI, N.J.*, D.M. MORRIS, D. DUCKERT and J.M. METSARANTA. Using the CENTURY model to predict effects of intensive management on black spruce stand productivity.

*: Presenting author

2nd EUROPEAN ECOLOGICAL MODELLING CONFERENCE

Pula, Croatia, September 20-24, 1999.

ORGANIZER: European Chapter of the International Society for Ecological Modelling (ISEM) and R. Boskovic Institute

TOPICS: All topics covered by the Ecological Modelling Journal, the scientific journal of ISEM, mathematical models of ecosystems: marine; freshwater and terrestrial; control and management of pollution, biodiversity, sustainability, ecological aspects of global change; systems analysis and computational methods.

DEADLINES: 1) Registration + one page abstract, 15 June 1999.

===>Please send both as an ASCII file to Legovic@rudjer.irb.hr (see below)

2) Papers (see guidelines for Ecological Modelling Journal):

===>Bring 3 copies to the conference.

Papers will be reviewed according to the standard procedure. Accepted papers will appear in Ecological Modelling Journal. (For an example see the issue devoted to the conference in 1997: Ecological Modelling, 113, (1-3), 1-252 (1998).

CONFERENCE WELCOMES: Plenary lectures; oral presentations; posters; panel discussions; workshops; short courses; software and book exhibition.

===>Suggestions by participants for inclusion of their contribution in one of the above categories are welcome.

***>Since we would be happy to meet scientific, cooperative, social and cultural needs of every participant, please send your wish list, workshops that you would like to help organizing; demonstrations that you wish to present.

OFFICIAL LANGUAGE: English.

LATE REGISTRATIONS: The organizer will make every attempt to accommodate an interested scientist.

REGISTRATION FEE: 320 DEM (200 US$) payable at the conference. Accompanying persons are welcome free of charge.

SOCIAL PROGRAMME (free of charge): Welcome party, Conference dinner, Excursion, Concert, Farewell party.

VENUE: The conference will take place at the "Histria" hotel, Pula, Croatia on the request of participants of the conference during 1997. The hotel is located at the tip of the Istrian peninsula with a marvelous view to the northern Adriatic Sea. Bring a swimming suit. We are planning an excursion to the National park Briuni Islands.

ADDRESS CORRESPONDENCE TO: Prof. T. Legovic R. Boskovic Institute E-mail: Legovic@rudjer.irb.hr P.O.Box 1016, Bijenicka 54, Fax: + 385 1 425 497 HR-10000 Zagreb, Croatia Tel: + 385 1 425 498

-cut here---cut here-

To the attention of: T. Legovic, R. Boskovic Institute,
P.O.Box, 1016, Bijenicka 54, HR-10001 Zagreb, Croatia,

Phone: +385 1 46 80 230; Fax: +385 1 46 80 242;
E-mail: Legovic@rudjer.irb.hr

HOTEL RESERVATION FORM
Family name: ______________________Given Name:__________________
Institution: ____
Address: ____
____
Phone: ________________________ Fax: ___________________________
E-mail: ____
I shall be accompanied by:_______________________________________
Arrival date: ________________ Departure date:__________________
Please indicate by putting |*|. Prices are in German Marks (DEM):
1 DEM = 0.63 US $
Histria hotel, Pula
Half-board Full board
| | 50 | | 58 Shared accommodation
| | 88 | | 98 Single use

Note from the Editor

This is my last issue as editor of ECOMOD. I would like to thank Bill Grant, Tony King, and Wolfgang Pittroff for their support, Brian Henderson Sellers for sending book reviews, and all people that contributed to the *Perspectives*, and those members who sent announcements.
Please send an e-mail to Tony King (awk@ornl.gov) or Wolfgang Pittroff (wolfgang@stat.tamu.edu) if you would like to be the next Editor.
For the elected person, I have some tips, and names for prospective contributors to *Perspectives*, if you are interested. Please feel free to contact me if you need any help.
Thank you for your interest in ECOMOD

Ellen Pedersen
Editor

Publication Information

ECOMOD - Newsletter of the International Society for Ecological Modelling is published four times per year. Subscription is included with annual membership dues. Submissions by members and nonmembers of news items, articles, reviews (books, software), comments, and suggestions are welcomed. If possible, submissions over one-hundred words in length should be E-mailed or submitted in Microsoft Word for Windows format on 3.5" high density diskettes. All submissions are subject to editing prior to publication. Signed articles are the opinions of the authors and are not necessarily those of ISEM. ECOMOD articles may be reproduced without permission, but must be accompanied by acknowledgment of the source. ECOMOD is published simultaneously on the Internet: http://ecomod.tamu.edu/ecomod/isem.html. FTP site for paper submission is: ecomod.tamu.edu (anonymous FTP). FTP submissions must be accompanied by e-mail notifcation.

EDITORS:
Ellen K. Pedersen
Wolfgang Pittroff (assoc.)
P. Fred Dahm (assoc.)

ECOMOD c/o Ellen K. Pedersen, US Sheep Experiment Station, HC 62 Box 2010, Dubois ID 83423, USA
Phone: +1 (208) 374-5310
Fax: +1 (208) 374-5582
Internet: ellen@stat.tamu.edu

Submission deadline for next ECOMOD:
August 10, 1999

Please Place Stamp Here

ECOMOD
c/Ellen Pedersen
US Sheep Experiment Station
HC 62 Box 2010
Dubois ID 83423
USA

1999 INTERNATIONAL SOCIETY FOR ECOLOGICAL MODELLING

NAME:
DEPARTMENT:
INSTITUTION:
CITY, STATE/PROVINCE, ZIP:
ELECTRONIC MAIL ADDRESS:

ISEM Membership
Student and Associate members receive ISEM newsletters and discounts on books, software and meeting fees. Full members receive these benefits and a year's subscription to *Ecological Modelling*.

Student Members:	$10.
Regular Members:	$20.
Student Member & Ecological Modelling:	$196.
Regular Member & Ecological Modelling:	$206.
Institutional Membership:	$100.

Payment Enclosed______________________________

Send payment in U.S. funds to:
ISEM c/o Wolfgang Pittroff, Secretary-General
US Sheep Experiment Station, HC 62 Box 2010, Dubois ID 83423, USA
Phone: 208-374-5306, **Fax:** 208-374-5582
Email: wolfgang@stat.tamu.edu