Ref: Grant No. DE-FG02-95ER62108

Technical Report to DOE for the Award 81.049
Support for Two Joint VEMAP Workshops

This award was used to hold one large workshop in Polson, Montana in July 1997 to better understand the response of terrestrial ecosystems to increased CO2 concentrations at large spatial scales and over long time periods; and to develop validation tests for models that attempt to simulate these processes.

The workshop participants included members of the Vegetation/Ecosystem Modeling and Analysis (VEMAP) and the CO2 Models/Experiments Activity for improved Links (CMEAL) groups.


Organization
The workshop was co-ordinated by Dr. Dave Schimel and Dr. Chris Field

Workshop Product
A multi-authored paper addressing the key science issues, and proposing a set of required hypothesis tests, and the model validation tests.

Agenda

- **VEMAP Overview**
  - Dave Schimel

- **CMEAL Overview**
  - Chris Field

- **Water relations and CO2 Interactions**
  - Steve Running

- **CO2 and Nitrogen Interactions**
  - Ross McMurtree

- **CO2 Allocation**
  - Tim Ball

- **Species Changes in CO2**
  - Lars Pierce

Discussions
Took place about defining the critical processes influencing ecosystem response to CO2 on a large scale and over the long term. Consideration was also given to developing validation tests for models incorporating these processes.

DOE Patent Clearance Granted

Mark P. Dvorscak
(630) 252-2393
E-mail mark.dvorscak@ch.doe.gov
Office of Intellectual Property Law
DOE Chicago Operations Office

11/26/02
DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.
DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.
Results

1) With the possible exception of fine root turnover, increased CO₂ does not seem to produce consistent changes in biomass partitioning (rates of allocation as opposed to the consequences of partitioning, which is standing biomass in different pools). At this point it looks like other changes in allocation under increased CO₂ reflect responses to changes in the availability of nutrients and/or water, in relation to the demand for them.

2) There is little evidence for changes in litter C:N under increased CO₂. Changes in green tissue C:N typically disappear before tissues are abscised. If there is altered partitioning, this will lead to altered litter C:N, even if the C:N of each type remains unchanged.

3) A feedback through altered decomposition kinetics does not seem to be important. Even if the decay coefficients were altered as a consequence of decreased decomposability, the consequences for NPP and carbon storage are not very large. Changes in the amount of litter input are much more important.

4) We discussed but did not resolve the question about elevated CO₂ making plants get bigger and grow faster.

We are well poised to continue progress in two areas:

1). Writing a Bio-Science paper on ecosystem responses to elevated CO₂

2). CO₂ / water interactions with uncertainties in three areas:

   The CO₂ response of leaf conductance
   The compensation for decreased leaf conductance with increased LAI
   The modulation of altered canopy conductance

Recommendations

That a paper be written. Steve Running to take the lead on this.

Sincerely,

Jerry M. Melillo
Co-Director