



THE ECOSYSTEMS CENTER

MARINE BIOLOGICAL LABORATORY

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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.

Attendees: Becky McKeown, Dennis Ojima, Bill Parton, Robin Kelly, David Kicklighter, Yude Pan, Ray Drapek, Tony Fount, Ron Neilson, Chris Field, Tim Kittel, Dave Schimel, Lindsey Rustad, Don Zack, Kathy Hibbard, Steve Running, Tim Ball, Ross McMurtrie, Ruth Norske, Lars Pierce, Lou Pitelka, A. David McGuire, Ian Woodward, G. Marion, Tom M. Smith.

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

<i>VEMAP Overview</i>	<i>Dave Schimel</i>
<i>CMEAL Overview</i>	<i>Chris Field</i>
<i>Water relations and CO₂ Interactions</i>	<i>Steve Running</i>
<i>CO₂ and Nitrogen Interactions</i>	<i>Ross McMurtrie</i>
<i>CO₂ Allocation</i>	<i>Tim Ball</i>
<i>Species Changes in CO₂</i>	<i>Lars Pierce</i>

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

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Date

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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

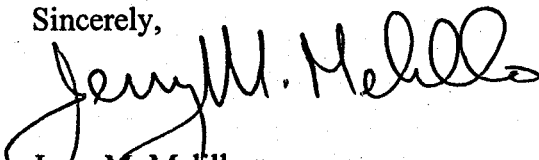
The compensation for decreased leaf conductance with increased LAI

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