

## Monfort Professor Award: Progress Report 2004

Scott Denning – Atmospheric Science

The second and final year of the Monfort Professor award is now complete. This was a very busy year and I am very grateful for the Monfort Foundation's support of research activities during this period.

In the Fall 2003 semester, the new carbon cycle data assimilation course material developed with Monfort Foundation support was delivered as part of *AT760: Global Carbon Cycle*. The new material challenged students in this area, and was well attended both by graduate students in Atmospheric Science and the Graduate Degree Program in Ecology. Xx students took this course, and reviewed it quite favorably. The course will be offered again in 2005. It is my intention that this new course material, in association with our existing curriculum and research activities supported by the Federal Government, will help alleviate the current shortage of data assimilation specialists that work on carbon cycle and climate problems.

The Monfort Foundation Gift supported three graduate students and two undergraduate students during the 2003-2004 academic year. Under Monfort Professor support, Kathy Corbin continued her research into potential biases associated with satellite retrievals of atmospheric CO<sub>2</sub>. Her results focuses on the impact of clouds and small-scale variations on a satellite product that can only represent small swaths of the atmosphere under clearsky conditions.

Lara Prihodko was supported by the Monfort Foundation to investigate sources of error in regional models of terrestrial CO<sub>2</sub> exchange with the atmosphere. Her work has quantified the magnitude of these errors for a forested region in the upper Midwest, centered on an instrumented television transmission tower. She received a PhD for this work, and we would be happy to send a bound copy of her dissertation when it is available.

Kevin Schaefer used a numerical simulation model to investigate interannual variability and trends in seasonal exchange of CO<sub>2</sub> between the atmosphere and the terrestrial biosphere over the past 45 years, using observed weather records and satellite imagery. He found that climate fluctuations associated with a phenomenon known as the Arctic Oscillation modulate the seasonal "breathing of the Earth" by controlling the timing of the appearance of green leaves on the northern continents in spring. These climate fluctuations occur mostly in winter, but are able to control summertime CO<sub>2</sub> exchanges because of "climate memory" in the land surface associated with heat storage in soils and water storage in continental snow pack. These changes have led to earlier springtime drawdown of atmospheric CO<sub>2</sub> and to a statistically-significant trend in the amplitude of the seasonal cycle of CO<sub>2</sub> in the northern hemisphere. Kevin also received a PhD for his research, and we will happily send a bound copy of his dissertation when it is available.

The Monfort Professor gift also supported undergraduate student Owen Leonard, who received his B.S. degree in 2003.

Finally, we have used the last of the Monfort gift to procure a state-of-the-art “mini-supercomputer” comprised of 20 separate Intel processors linked as a “cluster” running the Linux operating system. This system will facilitate the further development of our modeling tools for the analysis of the global sources and sinks of atmospheric CO<sub>2</sub>.

I want to personally thank the Monfort Foundation for supporting our successful research program these past two years. It has been an honor to work with this Gift, and I want to assure the Monfort Family that their gift has really made a difference in the research. Perhaps most importantly, the Monfort Professor gift has enhanced the training and education of a new generation of emerging scientists who will carry on this work in the years to come.