



## FACING THE FUTURE

### The FACTS II (Aspen FACE) Newsletter

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**David F. Karnosky and Janet M. Pikkarainen, Editors**

*Aspen FACE is a highly successful project for global change research. Over 100 scientists and students contributing to the project have written over 170 scientific papers and Aspen FACE remains at the cutting edge of forestry and ecological research. Principally supported by the U.S. Department of Energy's Office of Biological and Environmental Research, the Aspen FACE (Free Air CO<sub>2</sub> Enrichment) project is located on USFS property 10 miles west of Rhinelander, Wisconsin. Since 1998, the project has been examining the impacts of elevated atmospheric carbon dioxide (CO<sub>2</sub>) and tropospheric ozone (O<sub>3</sub>) on the structure and functioning of a northern forest ecosystem dominated by trembling aspen, North America's most widely distributed tree species. The Aspen FACE project became part of DOE's distributed facility in 2003. The Aspen FACE facility is run by Michigan Technological University with MTU's Dave Karnosky as Director. All major decisions at the Aspen FACE facility are made by the Steering Committee which includes Dave Karnosky, Kurt Pregitzer (Univ. Nevada-Reno), Neil Nelson (U.S. Forest Service), Kevin Percy (Canadian Forest Service), and Alistair Rogers (Brookhaven National Laboratory). Dr. Mark Kubiske (USFS) is an ex-officio member of the Steering Committee and coordinates science at the site. **Note:** Previous issues of the newsletter are available at the Aspen FACE web site <http://aspenface.mtu.edu>*



Dr. Neil Nelson (USFS) welcomes the NE-1013 group to Aspen FACE (Photo by David B. Karnosky)

#### **Aspen FACE Hosts NE-1013 Meeting**

The Aspen FACE hosted the annual meeting of the NE-1013 group on May 21-22, 2007. NE-1013 is a project supported by the USDA to bring scientists together to discuss research on the effects of ozone on agricultural crops and trees. The meeting was held at the Holiday Inn Express in Rhinelander, WI with an afternoon field trip to the Aspen FACE facility. Dr. Neil Nelson (USFS) welcomed the group to Aspen FACE and Dr. Dave Karnosky (MTU), Dr. John King (NCState), Joseph Darbah (MTU), and Dr. Kevin Percy (CFS) assisted with the tour.



The NE-1013 group at Aspen FACE (Photo by David B. Karnosky)



Dr. Kevin Percy (CFS) demonstrates passive sampling system in use for O<sub>3</sub> at Aspen FACE to the NE-1013 group.



### Aspen FACE Hosts DOE Program for Ecosystem Research (PER) Annual Meeting

The annual meeting for DOE's PER Program was hosted by the Aspen FACE science team on June 19-21, 2007. The meeting was held at the Holiday Inn Express in Rhinelander, WI with a field trip that included a morning tour and lunch at the Aspen FACE facility. USFS Project Leader Dr. Neil Nelson welcomed the group to the USFS Harshaw Farm site and Aspen FACE Director Dr. David Karnosky (MTU) gave a brief overview of the Aspen FACE experiment. PER Program Director Dr. Jeff Amthor was awarded a plaque, in honor of his foresight and dedication in sponsoring and promoting global change research. The award was presented by Dr. Karnosky. Some 40 participants attended the meeting. Speaking at the field trip were Dr. Bill Mattson (USFS), Dr. Don Zak (UMI), Dr. Kevin Percy (CFS), Dr. Rick Lindroth (UW), Dr. Alistair Rogers (BNL), Ron Teclaw (USFS), Dave Karnosky, and Neil Nelson.



Dr. David Karnosky presents PER Program Director Dr. Jeff Amthor a plaque acknowledging his contribution to the support of climate change research.



Dr. David Karnosky presents a brief history of the Aspen FACE experiment.



Dr. Jeff Amthor prepares for scaffold climbing training session with Adam Wiese (USFS) and Paula Marquardt (USFS).



Dr. Rick Lindroth (UW) addresses the PER group in ring 1.4 (+CO<sub>2</sub>+O<sub>3</sub>).







Dr. Karnosky delivers his acceptance speech.



Dr. Karnosky (right) is congratulated by Estonia's President Veljo Tormis.

### **Karnosky Receives Honorary Doctorate**

Dr. David F. Karnosky (Aspen FACE Director) received an honorary doctorate degree from the University of Tartu, Tartu, Estonia on December 1, 2006. Nominated by long-time scientific colleague Dr. Olevi Kull, Dr. Karnosky called the award “a tremendous honor and pledged his continuing interest in collaboration with the University of Tartu. The highlight of the affair was meeting Veljo Tormis, President of Estonia”, said Dr. Karnosky.



Dr. Karnosky (center) receives his honorary doctorate from the President of Tartu University while the Dean of Biology (left) looks on.

### **Jim Moore Debugs Aspen FACE Control Computers Again**

Jim Moore, System Administrator at Michigan Tech's School of Forest Resources and Environmental Science, had to work his magic to rid Aspen FACE control computers of viruses. Jim recommended replacing the most seriously affected machine, which we did. The other computers were salvageable. This is the second time in the past three years that Jim has cleaned up our computers. He again requested all Aspen FACE personnel to not use these control computers for any other purpose. Thanks Jim!



### **Dr. Kurt Pregitzer Takes New Position**

Dr. Kurt Pregitzer (Aspen FACE Steering Committee Member) has taken a new position as Chair, Department of Natural Resources and Environmental Sciences, University of Nevada-Reno. One of Aspen FACE's founding scientists and leader of the belowground effort on the project, Kurt will continue to be actively involved in Aspen FACE research. Good luck in your new position, Kurt!



Dr. David Karnosky (left) presented Aspen FACE awards to Dr. John Nagy (BNL – middle) and Keith Lewin (BNL - right).

### John Nagy and Keith Lewin Earn Aspen FACE Recognition

Dr. John Nagy and Keith Lewin (both of Brookhaven National Laboratory) received recognition plaques for their development and support of Aspen FACE operating and monitoring over the past decade. “These awards were long overdue for these guys as they have helped us out phenomenally over the last 10 years”, said Aspen FACE Director David Karnosky at the Aspen FACE Annual Scientists Meeting, held on December 14, 2006 at the UW-Stevens Point Treehaven retreat center of Rhinelander, WI.

### The FACE Community Loses One of Its Leading Scientists: Dr. Olevi Kull

Dr. Olevi Kull, a world’s leading ecophysiologicalist and a key scientist at numerous FACE experiments around the world died January 31, 2007 of a massive heart attack. Those who knew Olevi knew of his tremendous enthusiasm for life, for his work, and for his family. Olevi had visited Aspen FACE regularly since its inception and had spearheaded gas exchange and LAI studies. He was very proud of his recently built “Humidity FACE” system near Tartu, Estonia which he and former Aspen FACE site operator Jaak Sober established to examine the effects of elevated humidity on forest tree growth and physiology. Dr. Asko Noormets (NCSU) has organized a fund-raising effort to develop a memorial fund in Olevi’s honor. Those wishing to contribute can contact Asko at [anoorme@ncsu.edu](mailto:anoorme@ncsu.edu).



Dr. Olevi Kull (left), Anu Sober, and Dave Karnosky during a visit to Dr. Kull’s “Humidity FACE” on December 1, 2006.



The “Humidity FACE” system that Dr. Kull established near Tartu.



Cheers, Olevi! We will miss you!!



**Drs. David F. Karnosky and Gail Taylor Speak at a Wilton Park (UK) Conference on Climate Change**

Drs. David F. Karnosky (Aspen FACE Director) and Gail Taylor (Univ. Southampton, UK) presented an invited talk entitled “Direct Effects of Elevated CO<sub>2</sub> on Forest Productivity” at the Wilton Park (UK) Conference on “Forestry: A Sectoral Response to Climate Change” on November 21-23, 2006. The presentation was co-authored by graduate students Matt Tallis (University of Southampton, UK) and Joseph Darbah (MTU). The presentation has been developed as a chapter for the book from the conference entitled *Forestry: A Sectoral Response to Climate Change* and edited by Peter Freer-Smith, Mark Broadmeadow and Jim Lynch.



Drs. David Karnosky (left) and Gail Taylor (right) at the 2006 Wilton Park Climate Change Conference.



**Wendy Jones Returns from Unplanned Leave**

Wendy Jones, Site Operator at Aspen FACE, has recently returned to work after a several month battle with a broken shoulder and badly damaged wrist. The shoulder eventually required surgery and a long stint of rehab. Glad to have you back, Wendy!

**Safety Lines Placed on Center Poles**

St. Paul Tower recently secured a safety cable system similar to our “buddy” system on the elevated scaffolds. Now, our crew can safely tie into the cable while ascending the center pole. Please note: the center pole is only to be climbed by qualified personnel.





## Infrastructure Changes Completed at Aspen FACE

Major changes in the infrastructure at Aspen FACE were completed during the nonfumigation period of October, 2006 to May, 2007. Scott Jacobson (MTU) and Tribin Holbrook (MTU) led the effort to replace the vertical vent pipes to facilitate controlled CO<sub>2</sub> and/or O<sub>3</sub> exposures over the entire canopy of each ring. The team was assisted by USFS technician and carpenter Adam Wiese, who volunteered to help us out. Thanks Adam!

Another major change was the repositioning of all of the micrometeorological control panels of the upper crown wind and PAR sensors. This effort was led by Ron Teclaw (USFS) and Dan Baumann (USFS). Nice work!



Tribin Holbrook (MTU), in the man-lift, and Scott Jacobson (MTU) work on replacing the vertical vent pipes.



Tribin Holbrook (MTU) prepares to extend another vertical vent pipe.



New couplings were inserted into the vertical vent pipes and these were placed on a cement pad to support the taller VVPs.



PAR sensors were replaced at the top of vertical vent-pipe-support poles.



Adam Wiese, USFS technician, helps with the replacement of the vertical vent pipes.



Control panels for the intensive micrometeorological monitoring in each Aspen FACE ring were repositioned on the new center poles.



### **New USFS Lab Takes Shape at Aspen FACE**

The long-awaited USFS laboratory at Aspen FACE is progressing well after groundbreaking earlier this spring. The laboratory will facilitate scientific needs of visiting scientists at Aspen FACE and is scheduled to be completed by the end of this summer.





## Congressman Steve Kagen Visits Aspen FACE

Congressman Steve Kagen, M.D. (D-Wisconsin) visited Aspen FACE on May 30, 2007. Congressman Kagen was joined by his staffers Craig Moser and Elisa Farmilant. The visit started with an impromptu press conference with representatives of local TV, radio, and newspapers. The Congressman's medical background – the study of allergens and their impact on human health – led to his easy grasp of the significance of research ongoing at Aspen FACE. Of particular interest to the Congressman was the finding that birch pollen, a tremendous human allergen, is likely to become more abundant as CO<sub>2</sub> rises in the atmosphere. Aspen FACE Director David Karnosky and USFS Project Leader Dr. Neil Nelson led the Congressman's tour of Aspen FACE.



Congressman Steve Kagen fields questions from local press representatives while visiting Aspen FACE.



Congressman Steve Kagen (center) speaks of the importance of this climate change research. He is joined by Dr. Karnosky (MTU-left) and Dr. Neil Nelson (USFS-right).



Aspen FACE Director David Karnosky (left) presents Congressman a FACE hat as an honorary FACE scientist.



Congressman Kagen is interviewed by local TV Channel 12 reporter Kelly Larsen.



## People at FACE



**Bill Mattson, Chief Insect Ecologist**  
**USDA Forest Service**  
**Rhineland, WI**

**Editors:** What is your correct title?

**Bill:** Chief Insect Ecologist

**Editors:** How long have you worked for the USFS?

**Bill:** Just a short time, a wee 40 yrs.

**Editors:** How long have you been at Rhineland?

**Bill:** 9 yrs

**Editors:** What are your thoughts on the Aspen FACE experiment? What could we have done better in setting up the experiment? What is the best part of the study for you?

**Bill:** In an "ideal FACE world", we would have had much larger treatment plots, perhaps at least as large as 1 ha each. One of the "best" most interesting parts of the FACE study has been the discovery that the treatment effects (plant volatile cues, phytochemistry, etc.) influence insect behavior as much, or more so than insect physiology. Furthermore, we have learned that the FACE insect community has changed markedly over the ontogeny of the stands. From the start, waves of species have entered, "blossomed", and virtually "disappeared", with only a handful of species remaining relatively constant, like the poplar branch borer.

**Editors:** What is the next "big bug" or "disease" attack we can expect at Aspen FACE? Are there any emerging pest problems that could affect the experiment over the next 3 years?

**Bill:** There are no major insect or disease eruptions likely in the next 3 years. However, aspen blotch leaf miners, and forest tent caterpillar populations will likely outbreak again in the next 5 years. Gypsy moth populations are also increasing significantly in nearby forests, though none has yet been found at FACE. *Hypoxylon* canker is now common and relentlessly killing aspens, and likewise for the bronze birch borer which is steadily killing birches. The latter will spike in numbers if the warm, dry summers continue. As the aspen stands open due to planned thinnings and natural death, the large poplar borer will start attacking the sunny sides of aspen trunks.

**Editors:** Is there any need to carry this experiment beyond the next 3 years?

**Bill:** Yes! It would be especially important for more detailed and long-term studies on the soil flora/invertebrate communities and soil-litter nutrient cycling. Long-term studies are so few and far between in ecology, and ought to be encouraged and supported.

**Editors:** Other thoughts?

**Bill:** We still know practically nothing about the impact of enriched O<sub>3</sub> and CO<sub>2</sub> atmospheres on the herbivores' natural enemies (their parasites' and predators' behavior and physiology).



**Anita Foss**  
**Biological Lab Technician**  
**USDA Forest Service, Rhineland, WI**

**Editors:** You have certainly been involved with Aspen FACE for a long time. When did you start working at Aspen FACE and what were your first experiences?

**Anita:** I remember the intense flurry of activity at the Forestry Sciences Lab when the FACE was being established in 1997 but wasn't associated with it until I started working with Bill Mattson in 2001. I've mostly been involved with spring and fall surveys, collections and campaigns. I've never been out at the FACE throughout the summer working on a project, so consequently I've missed some of the ongoing experiences of hornets, heat, and weather as well as seeing seasonal changes in the trees and visiting with people. I've enjoyed helping with tours and being the photographer at some of them.

**Editors:** What have you enjoyed the most in your work at Aspen FACE? And what have you enjoyed the least?

**Anita:** I've enjoyed meeting people from all over the world who are doing their research here. It



truly is an amazing place. The importance of this place tends to get lost on me in the shuffle of everyday work like when the fall measurement campaigns seem to go on forever. After the publications, presentations and reports consolidate the information from our efforts it gains an impressive status and importance. I've also found the insect and disease problems that have changed over the years as the trees have grown to be a fascinating unfolding documentary and a microcosm of what must be happening in the forest. I think what I enjoy least is simply some of the physical discomforts like climbing the scaffolding for canopy work or not having the time to really register all that goes on at the FACE.

**Editors:** What is your background? Where did you grow up? Where did you go to school? Are you a local or an immigrant to Hodag country?

**Anita:** I'm a Minnesota girl having grown up in rural mid-central Minnesota before the family settled in a Minneapolis suburb. I got undergraduate degrees from the University of Minnesota, one in Social Sciences and the second in Plant Sciences with a year as a VISTA volunteer and working in preschools in between the degrees. I've lived in New England and So. Illinois but am now very happy to call Wisconsin home. As to adopting the full Hodag credo, maybe not, but this sure is a pleasant area to live and work.

**Editors:** What is your biggest challenge still remaining in your work at Aspen FACE?

**Anita:** I would like to conduct GIS spatial analyses and mapping of the insect problems that we find during our surveys in order to see the distribution pattern over time. We've discussed the probability of patterns occurring in the incidence of *Hypoxylon* canker on aspen but haven't documented it yet.

**Editors:** What is the main focus of your work at Aspen FACE?

**Anita:** I analyze scanned images of our late season leaf collection across all FACE treatments for percent defoliation and insect damage. My summer work focuses on using constant volume respirometry to measure the metabolic rate (carbon dioxide production and oxygen consumption) of laboratory-reared Gypsy moth caterpillars that are fed aspen and or birch leaves from FACE control and carbon dioxide rings. The challenge of keeping a small population of caterpillars fed and thriving and timing the respirometry recordings makes for a busy summer.



**Editors:** What is your current position? Who is your boss?

**Anita:** I'm a Biological Lab Technician working with Research Entomologist Bill Mattson.



**Angela Piket, Research Associate  
Michigan Technological University  
Houghton, MI**

**Editors:** We have seen you many times and over many years at Aspen FACE with your soils team of MTU students. When did you start with Aspen FACE? And what are you doing there? What are you measuring and how often?

**Angela:** I have been working on this job since June of 2004. I run Dr. Kurt Pregitzer's field crew, maintain all of our instrumentation at the site and manage all the samples and data that are collected from Aspen FACE by that crew. We measure bi-weekly from April to November, depending on weather conditions. There is a wide range of things we measure, but all within the context of carbon cycling below-ground. The main things we work on are collecting water from tension lysimeters and analyzing it for DOC, measuring soil efflux in two ways, one with the LI-8100 and the other by analyzing gas for  $^{13}\text{C}$ , and we take minirhizotron images. I also do a lot with stable isotopes because every solid that is collected by my crew (roots, soil, etc.) is analyzed for  $^{13}\text{C}$ .

**Editors:** How big is your crew? Does it change every year?

**Angela:** This year I have 3 students, but it changes every year based on what we are doing. One fall I had as many as 10 students working for me.

**Editors:** What has been your biggest challenge in working at Aspen FACE?

**Angela:** The biggest challenge is actually the location. Being away from home, and my husband, every-other week eight months out of the year can be difficult.

**Editors:** What has been your greatest reward in working at Aspen FACE?



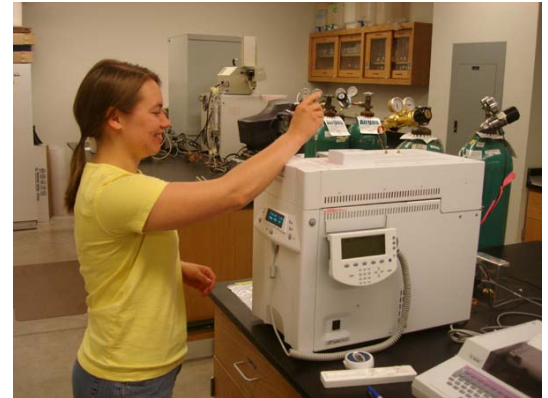
**Angela:** Working with the students has been my greatest reward in this job. I really enjoy teaching them about research and how it is conducted. I had an excellent boss/mentor when I was a student and I strive for the same mentoring quality with the students that work for me.

**Editors:** How are you managing this year with your boss, Dr. Kurt Pregitzer, having taken a new position in Nevada?

**Angela:** I am still doing everything I normally do in a field season and doing my best to get the highest quality data possible.

**Editors:** What is your background? Where are you from? Where did you go to school? How did you end up here on this project?

**Angela:** My interests have changed over the years as I started out working in peat-lands, but over the last 9 years I have worked in studying some aspect of global climate change. I am from Duluth, Minnesota, so moving across 'the Lake' wasn't that big of a change for me. I received my B.S. in biology from the University of Minnesota-Duluth and my M.S. in forestry from Michigan Tech. The project for my master's was at Aspen FACE looking at the nitrogen uptake of the aspen trees and how their associations with ectomycorrhizae affected those rates. My predecessor, Dr. Wendy Loya, knew I wanted to stay in the Houghton area and recommended me for the job as I had helped her out many times with field work at Aspen FACE.



### New Aspen FACE Publications

- Awmack, C.S., E.B. Mondor, and R.L. Lindroth. 2007. Forest understory clover populations in enriched CO<sub>2</sub> and O<sub>3</sub> atmospheres: interspecific, intraspecific and indirect effects. *Environmental and Experimental Botany* 59:340-34
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- Liu, L., J.S. King, and C.P. Giardina. 2007. Effects of elevated atmospheric CO<sub>2</sub> and tropospheric O<sub>3</sub> on nutrient dynamics: decomposition of leaf litter in trembling aspen and paper birch communities. *Plant and Soil* (In Press).
- Lesaulnier, C., D. Papamichail, S. McCorkle, B. Ollivier, S. Skiena, S. Taghavi, D.R. Zak, and D. van der Lelie. 2007. Elevated CO<sub>2</sub> affects soil microbial diversity associated with trembling aspen. *Environmental Microbiology* (In Press).
- Monson, K., N. Trahan, T.N. Rosenstiel, P. Veres, D. Moore, M. Wilkinson, R.J. Norby, A. Volder, M.G. Tjoelker, D.D. Briske, D.F. Karnosky, and R. Fall. 2007. Isoprene emission from terrestrial ecosystems in response to global change: minding the gap between models and observations. *Proc. Royal Society of London* (In Press).
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