“Science is a Contact Sport”

Prof. Samson is Associate Chair and Professor in the Department of Atmospheric, Oceanic and Space Sciences at the University of Michigan. He holds an Arthur F. Thurnau Professorship at the University of Michigan in recognition of “outstanding contributions to undergraduate education.” Perry is the recipient of one of the inaugural “Teaching Innovation Awards” at the University of Michigan and a past recipient of the College of Engineering Excellence in Teaching Award.

Professor Samson is the co-founder of The Weather Underground (http://www.wunderground.com), which was originally developed with the support of the National Science Foundation (NSF) as a resource for K-12 teachers and students to obtain real-time weather information. The Weather Underground subsequently has grown into one of the top 100 most visited web sites on the Internet. He has also created new web applications for the exploration of tornadoes (http://www.tornadopaths.org) and air quality (http://www.sharedair.org).

Prof. Samson has also created LivingText LLC, an enterprise dedicated to revolutionizing delivery, function and format of textbooks (e.g. http://www.xamrep.com). Outsell Inc., a research and advisory firm focused on the publishing, information, and education industries, said this about Samson's XamPREP in their Insights Newsletter for publishing clients on March 4, 2009:

“XamPREP has quietly disrupted the traditional textbook model, creating an online version of a textbook that deserves greater notice.”

This venture, funded in part through the NSF Small Business Innovative Research (SBIR) program, is designed to grow into a new Michigan industry capable of aggregating existing textbook content and integrating it with in-class note-taking tools.

Prof. Samson believes that science learning is a “contact sport” where learning is best served through hands-on experiences. Prof. Samson embraces this philosophy at every level of learning, from introductory science courses for non-majors to upper-level majors of his department. He organizes and conducts summer expeditions to introduce undergraduates to the demands of planning and performing research in unusual atmospheric situations. But, in addition to the field experiences afforded majors, Prof. Samson has invented a new suite of free web applications that allow instructors at the University of Michigan and elsewhere to bring data and virtual field experiences to large, introductory courses. His in-class web application, LectureTools (http://www.lecturetools.com), was a finalist for the Software & Information Industry Association 2009 CoDIE Awards as “Best Educational Use of a Technology Device” and “Best Postsecondary Instructional Solution.”

Undergraduate Field Experiences

Every summer for the past four years Prof. Samson has conducted expeditions with AOSS majors at the junior level to what might realistically be described as once-in-a-lifetime experiences. The expeditions have included trips to Greenland where students set up instruments to measure fluxes of heat and radiation to and from the Greenland ice sheet. Students hiked miles to a site established by the University of Michigan in the 1920's and collected data on heat flux at this location, away from the glacier. They were then flown to Summit Camp in the middle of the Greenland ice sheet at 11,000 feet elevation to perform similar experiments. Students worked outside on the glacier at temperatures near -35°F and camped in tents during their stay (Figure 1). These experiences were life changing for the students, represented by eight undergraduate women and two men, including two underrepresented minority students. All these students noted that this opportunity galvanized their interest in science and all these students continued on the graduate studies.

More recently, for the past four years, Prof. Samson has organized a summer expedition with students to join a team from Texas Tech University to chase and study supercell thunderstorms in the Great Plains. In
these expeditions the students (Figure 2) film storms and either drive under and through them with specially instrumented vehicles or place “StickNet” sensor packages perpendicular to the path of the storm. The data collected are used by the students to better understand the complex wind flow in the vicinity of these potentially tornado-bearing thunderstorms.

One field experience stands out as it presented a situation that illustrated that, even when equipped with as much advanced technology for real-time radar display and atmospheric sensors as are available these expeditions are genuinely authentic experiences with the realities of field research. On May 22, 2008, Prof. Samson and a team of undergraduate students from the University of Michigan prepared for an encounter with a supercell thunderstorm near Oberlin, Kansas. The goal on this day was to film the genesis of the thunderstorm and hope that it might ultimately produce a tornado so the team could collect data in its vicinity (but at a safe distance).

As the team sat pondering their next move, a dark cloud formed to their south. The cloud seemed to extend to the ground, making it impossible to distinguish any features. Radar indicated that the cloud contained rotation, but many clouds on this day had rotation, and not one had spawned a tornado. Suddenly, the cloud lifted, and a suspicious formation became visible beneath the cloud base. The sky at this point was so dark that blinking flasher lights from passing cars reflected off the dry road surface. Strong turbulent motions were visible inside the cloud as it moved northward...