SDSM&T Weather Club

Club continues to remain active

On Wednesday, December 19, 2012 several Atmospheric Science students volunteered at Vandenberg Elementary, Box Elder, SD, as part of the SDSMT Weather Club’s community outreach program. They set up several stations at which students could ask questions and participate in some hands-on activities to learn about severe weather, atmospheric electricity, and a host of other weather-related phenomena. In the photos below, Alana Ballweber, current MS major in Atmospheric and Environmental Science, visits with students about lightning; Gretchen Berg (MS 2012) demonstrates how tornadoes form; and Erin Walter (current master’s degree student) discusses dew. Other students participating in this volunteer activity included Jacey Wipf and Cody Moldan, students in the BSIS-Atmospheric Science program. For more stories about what our students have been doing please read the rest of the newsletter.

Climate is what we expect, weather is what we get.

Mark Twain

Continued on page 2
Research Updates

• Squall Lines and Supercells

Dr. Adam French, Assistant Professor, is continuing his research investigating mergers between squall lines and supercells. The results of the initial part of this research project, focused on observations of these merger events, were published in the April 2012 issue of *Weather and Forecasting*. Ongoing research involves analyzing idealized simulations of a supercell merging with a squall line and comparing the results to a simulation run without the supercell to isolate the key storm-scale processes at work. The overall goal of this research is to determine the effect that the merger has on storm morphology and ultimately how it impacts severe weather production. Dr. French presented some of this research at the American Meteorological Society’s Conference on Severe Local Storms this past November in Nashville, Tennessee.

Student research on this project:

Kenny Miller is continuing to work with Dr. French on a project funded by the South Dakota Board of Regents investigating cases where an initial squall line evolves into one or more isolated supercells. To date, Kenny’s work has focused on first identifying a set of representative cases and then analyzing sounding-derived parameters for each case. The goal of this project is to identify important environmental parameters and storm-scale features that may explain this unique convective storm evolution.

Erin Walter is continuing to work with Dr. French, Dr. Bill Capehart and Mr. Darren Clabo on a project examining cases of drylines interacting with the Black Hills. Thus far, Erin has analyzed a year’s worth of archived model analyses from the Rapid Update Cycle (RUC) model to identify some common characteristics of cases where a dryline develops west

Continued on page 3

Figure: (From Severe Storms Poster). Simulated radar reflectivity (grey shading), vertical vorticity (colored shading), and surface winds and -2 K potential temperature from a simulated squall line-supercell merger. Low level vertical vorticity and winds increase following the merger, contributing to bow echo development.

Figure: Example of a case of a squall line evolving into isolated supercells over North Carolina on 16 April 2011.

From the Dept. Head, continued from page 1

more opportunities for the next generation to contribute to economic growth and a higher standard of living.

We have alumni working across the country and around the world. Please stay in touch! Send us an email with a picture, or even a postcard. Let us know what you are doing and how life is treating you.

Yours atmospherically,
Andy Detwiler
of the Black Hills and moves east. From this initial analysis she has found that in many cases the dryline appears to “lag” in the vicinity of the hills, due to a local maximum in mixing ratio over the hills. Subsequent work will focus on identifying the respective roles of terrain and land-use in modulating dryline motion over the hills. It is anticipated that her work will be helpful for forecasting convective storm initiation and fire weather conditions in the vicinity of the Black Hills.

• The Next Generation Storm Penetration Aircraft Project

(funded by the National Science Foundation): The lead organization for the project is the Center for Interdisciplinary Remotely-Piloted Aircraft Studies, at the Naval Postgraduate School. The Air Force is still working on the aircraft, getting it ready to turn over to Zivco Aeronautics, in Guthrie, OK, where the conversion into a research platform will be done. At SDSMT Professors Kliche and Detwiler, and students Aaron Ward and Aaron Carmichael, continue their work on software for coordinating missions, and software to process the data after a flight.

• Didymo project

A nuisance freshwater alga, Didymosphenia geminata, aka Didymo, has been spreading its range and abundance in streams and rivers across the western US. Mats of Didymo can be up to 20cm thick even in nutrient poor rivers. Under the direction of Dr. P.V. Sundareshwar, we are examining the influence of iron on Didymo growth and abundance.

• UPLIGHTS

Upward lightning from ten towers in Rapid City, South Dakota has been observed using high-speed cameras since 2008. Many studies have examined leader propagation speeds using high-speed cameras, but most focused on downward leaders. This study’s intent is to expand understanding of natural upward lightning leader characteristics and to gain further insight into leader physics.

• NSF OEDG

Dr. Donna Kliche is the principle investigator for the National Science Foundation (NSF) Opportunities for Enhancing Diversity in the Geosciences (OEDG) project. The project is called “Embracing Science – From the ‘Field to the Fair’” and addresses the underrepresentation of Native Americans in the geosciences by establishing and strengthening geosciences learning paths through the South Dakota School of Mines and Technology (SDSMT). ‘Field to the Fair’ addresses the proof-of-concept activities planned by Oglala Lakota College (OLC) and SDSMT to broaden Native American high school students’ participation in Earth and Atmospheric Sciences education and career pathways.

The targeted population is 8th through 12th grade Native Americans in the region served by OLC’s 11 campus centers and SDSMT. For this proof of concept project, the main themes addressed were: (1) a summer 2012 one-week field camp held on the SDSMT campus, (2) followed in the fall 2012 and spring 2013 by mentoring the students in preparing their science projects which were presented at the 58th Annual High Plains Regional Science and Engineering Fair in March 2013, and (3) community outreach through participation in local relevant Native American cultural events such as the Lakota Nation Invitational which took place in December 2012 in Rapid City, SD.

Kathy Haselhorst, graduate student in the Department of Atmospheric Sciences, and Ms. Harriet Brings, teacher of Lakota language and culture at Rapid City Central High School, worked on the project with Dr. Kliche. The selected 8th grade and 9th grade students met twice a month to first learn about the Lakota traditions and language. Students were also mentored by graduate and undergraduate students at SDSMT in their area of interest for their science fair project. During the spring 2013 semester, the meetings changed to every week, or even twice a week, to make sure each project was translated in Lakota Language as well. The translation involved a lot of work from both Ms. Brings and students, one reason being that some of the technical English words do not have Lakota equivalent words. The results of this hard work were presented in the 58th Regional Science and Engineering Fair, and the judges were really impressed to see these projects presented in both languages. This was the very first time ever to have projects presented by Native American students in both English and Lakota language.
58th Annual High Plains Regional Science and Engineering Fair

Dr. Donna Kliche was the chair of the 58th Annual High Plains Regional Science and Engineering Fair which was held on March 22, 2013, at the South Dakota School of Mines & Technology. Over 450 students from 9 high schools and 10 middle schools competed in this year’s fair. More than 80 professionals and some SDSM&T graduate students did the judging for this fair. The overall winner of this Regional Science Fair was Conrad Farnsworth from Newcastle High School (12th grade), photo below, and the second place winner was JaeMarie Whitney from Newcastle High School (10th grade). The first overall winner will participate in May at the Intel International Science and Engineering Fair in Phoenix, Arizona. This international fair is the world’s largest pre-college science competition for students in grades 9-12, and it is the annual forum for more than 1,500 high school students from 70 countries to display their ideas and independent research accomplishments.

Faculty publications

To disseminate the findings of their research work, the faculty in Atmospheric Sciences submit papers to scientific journals and make presentations at various conferences and meetings throughout the year. Following is a list of recently published or presented works.


First Snow of the Season Contest Winners for 2012

The National Weather Service in Rapid City received an inch of snow at their offices on Star Village Hill by 10:00 a.m. on Saturday, November 10th. Dr. Andy Detwiler, Dept. Head, is shown presenting awards to Rachel Howard (photo left) the prize in the adult category, and Lindsey Caudle (photo right) in the youth division. Rachel guessed 3:00 a.m. on November 10th, and Lindsey guessed 3:45 pm on Oct. 31st. Dr. Andy Detwiler, Department Head, presented each winner with a certificate and a $25 check for their holiday shopping. Thanks to all who entered and congratulations to the winners!

![Award ceremony photos]

Student Accomplishments and Activities

Storm Chaser Tim Samaras at SDSMT

The SDSMT Weather Association hosted a special presentation by Mr. Tim Samaras, a well-known storm chaser who pursues tornadoes and studies lightning with a passion. He has been featured in National Geographic Magazine and the Discovery Channel’s show “Storm Chasers”. His talk centered on his research work studying the dynamics of tornadoes and his experiments using high-speed cameras to photograph lightning strikes to better understand what triggers a lightning strike and to see what we normally do not see with the naked eye. His talks ended with a slide show of his most dramatic tornado chases, including those in Bowdle, SD in 2014 and the tornado that destroyed Manchester, SD.

The event was held as a fundraiser by the Club. The 100 pounds of food collected at the door went to benefit the Feeding South Dakota program. Other sponsors of the event were Modrick Bursch Travel, Malone Engineering, Black Hills Federal Credit Union, Black Hills Chapter of the American Meteorological Society, Simpson’s Printing, Chamberline Architects, and Aramark.

![Event photos]

(Photo: Weather Association members with Mr. Tim Samaras, credit John Hamilton)
Patrick Ealy Attends International AISES Conference

Patrick Ealy, a BSIS-ATM graduate (2012) and member of the local AISES chapter, attended the national AISES (American Indian Science and Engineering Society) Conference in Anchorage, Alaska in November, 2012. Patrick’s oral presentation entitled “Comparative Analysis of Atmospheric Thermal Inversion Conditions Reported by South Dakota WRAN Network” placed second in the undergraduate section of the conference. He was awarded $400 and a new iPad for his presentation.

The conference was attended by thousands of native students in STEM fields from over 400 nations. SDSMT was represented by Abena Songbird, Program Assistant, Multicultural Affairs and Co-Advisor to AISES; Jesse Herrera, OMA Director and AISES Advisor, and our SDSMT AISES Officers – Gabriel McPherson, President, Domingo Tamayo, Vice President and members, Adonnis Martinez and Derek Youngman.

WAY TO GO!

SDSMT Weather Club wins the Circle K Trick or Treat for Canned Goods contest!!

Last fall, several members of the club formed a team and competed in the Circle K trick or treat for canned goods. The canned food drive benefited Feeding South Dakota. Awards were given out to the best dressed and the top three teams that generated the largest amount (weight-wise) of canned food from trick or treating throughout the city. Teams had about two hours to try to get the most weight. The club, dressed as the famous Peanuts characters, obtained over 100lbs of canned goods—enough to take the first prize by a large amount! Great job!

Atmospheric Science Float Awarded Best Overall in Homecoming Parade

The students in the Department of Atmospheric Sciences outdid themselves for this year’s float in the Mines Homecoming Parade, Saturday, October 13, 2012. The theme for homecoming was “Stars Shine Brighter at Mines”, and in keeping with that theme, and the fact we are a “weather” group, the students chose the Wizard of Oz for their float. Congratulations! We also wish to thank all those who contributed props for this entry.

To see more photos of the students' activities, please visit the website at: http://www.ias.sdsmt.edu/Archived_news.html.
Weather Club participates in Engineers’ Week at SDSMT

The SDSMT Weather Club gave presentations on hail to middle school students from area schools who attended Engineers’ Week activities on Thursday, February 21st. Alana Ballweber, Chip Redmond, Cody Moldan, Aaron Ward, Kathy Haselhorst, and Gretchen Berg explained how hail is formed and how to stay safe during a hailstorm.

In the photo above left, Kathy Haselhorst explains how hail is formed; and in the photo at the right, Kathy and Gretchen Berg prepare to simulate the updraft that causes hail to be forced upward into a storm cloud before gravity causes it to fall to earth.

2013 Health and Wellness Expo at SDSMT

The Weather Club at SDSMT sponsored a booth at this year’s Health and Wellness Expo. The topic of their display was “Are You Weather Ready?” and contained information about tornado and severe weather safety, handouts, and a chance to win a weather alert radio.

2013 Graduates

Five students in the Atmospheric Sciences masters’ degree program are set to receive their degrees this spring: Kurt Chowanski, Chris Hammrich, Kathy Haselhorst, Christopher Redmond, and Christine Sandvik. Kurt and Christine completed their degree studies under the direction of Dr. P.V. Sundareshwar and Dr. Lisa Kunza. Kathy Haselhorst and Chris Hammrich completed their degree work with Dr. Andy Detwiler, and Chip Redmond with Dr. John Helsdon.

Also graduating in May are three students in the undergraduate BSIS-Atmospheric Science program: Cody Moldan, Jacey Wipf, and Jed Lemaster. Dr. Adam French is the program advisor for this group.

Erin Walter at the Weather Club booth.
Harold and Laura Orville Fellowship Update...

Foundation Fund Drive Yields Excellent Support from Alumni and Staff

Harry and Laura Orville started this fund at the SDSMT Foundation with their personal investment of $25,000 in 1998. They never stopped giving, and now Laura continues a commitment to give routinely toward Harry’s goal.

- In 2003, Dr. Orville suggested we invite others to invest in creating this fund that will forever serve the department.
- At the time of Harry’s passing in June 2011 the endowment balance was $60,000 plus it had paid out $20,000 total, distributed to eleven graduate students (one per year) to help them pay for college.
- 23 people/couples/families made memorial gifts in summer 2011 or responded to the challenge last spring in honor of Dr. Orville.

Today the balance of the Orville Graduate Fellowship is $130,813 plus $46,400 pledged to come over these next four years.

A $200,000 endowment is expected to provide an $8,000 award (4% of principal) annually. Dr. Orville knew how important this would be for the department.

2013 Fellowship Awarded

Miss Alana Ballweber has been named the recipient of the Orville Fellowship for Spring 2013. Ms. Ballweber, first-year master’s degree student in Atmospheric Sciences, is from Maple Lake, MN and received her B.S. in Meteorology from St. Cloud State University.

You Can Help!

Harold and Laura Orville Graduate Fellowship

In 1998, Dr. Harry Orville and his wife, Laura, established the Harold and Laura Orville Graduate Fellowship. His dream of having $1 million in endowed funding to support students in the Department began with a “phase one” goal of $200,000, starting with their personal $25,000 investment.

This endowment fund has supplied a portion of support to twelve entering or current graduate students in atmospheric sciences or an environmental field.

The fund balance is at $130,813 and the current campaign is aiming for the Phase One goal of $200,000. There are several ways you can contribute to this fellowship fund.

Please contact the SDSM&T Foundation at 1-800-211-7591 (toll free); locally at 605-394-2623; or visit the website at http://foundation.sdsmt.edu.
**Poster Presentations by the students of ATM 450: Synoptic Meteorology**

During the fall 2012 semester, undergraduate and graduate students in Darren Clabo’s synoptic meteorology class studied the synoptic-scale processes responsible for the development of precipitation and severe weather phenomena. They analyzed surface synoptic weather, upper air, and vertical temperature-moisture soundings, and the structure of extratropical storms. They made use of software tools such as GEMPAK and NCL for analyzing observed data and model output.

Their end-of-semester exercise included the preparation and presentation of a poster depicting their analysis of a severe storm event. Other faculty in the atmospheric sciences department, as well as second-year masters students, quizzed and critiqued each presenter.

Poster topics included Hurricane Sandy; March 2010 Tornado outbreak; the blizzards of 1990, 1993, and 1996-97; Hurricane Irene; the 2012 Duluth, MN flood; the Colorado tornado outbreak, and South Pacific Convergence Zone modeling dilemma. Students presenting were Jacey Wipf, Trisha Michael, Jed LeMaster, John Hamilton, Kenny Miller, Kelsey Kramer, Cody Moldan, Aaron Ward, Aaron Shaw, and Anna Robertson.

**Students serve as SDSMT ambassadors**

Alana Ballweber and Erin Walter, atmospheric science masters’ degree students at SDSMT, attended the 93rd Annual Meeting of the American Meteorological Society, held in Austin, Texas, the first week in January, 2013. A student conference is held just prior to the regular annual meeting activities, which is a time for students to network with others. Our department usually hosts a table and this year, Alana and Erin volunteered to be our ambassadors. They answered questions and took names of prospective students. Chip Redmond, another MS student, and faculty members Darren Clabo and Bill Capehart, also attended the meeting.

**Chip Redmond receives Outstanding Graduate Student award**

Chip Redmond was honored at the annual Honors Convocation in April with a second-place award as Outstanding Graduate Student. Students were judged according to their scholarly activity (projects and presentations, publishing of peer-reviewed papers, assisting with grant preparation or patent application, and demonstrating a high level of initiative on a research project). They were also scored on leadership qualities (innovative assignments, supervisory responsibility for undergrads or other grad students, membership in professional organizations, involvement in department functions, creating an atmosphere that causes other students to perform at a higher level, and creating a sense of community) that elevate the level of the graduate program. Chip was nominated by Darren Clabo, one of his faculty members.

Visit our website at: http://www.ias.sdsmt.edu/dept
Faculty background and interests

Andrew G. Detwiler
Professor, Dept. Head
Ph.D., Meteorology, State University of New York-Albany.

Dr. Detwiler’s areas of expertise include airborne meteorology measurements, atmospheric physics, and atmospheric electricity.

William J. Capehart
Assoc. Prof.
Ph.D., Meteorology, Pennsylvania State University.

Dr. Capehart’s expertise lies in hydro-meteorology, regional climate modeling, and the modeling and remote sensing of surface processes.

Darren Clabo
State Fire Meteorologist
M.S., Atmospheric Science, South Dakota School of Mines and Technology.

Mr. Clabo serves as the state wildland fire meteorologist in support of the state wildland fire crews during the fire season. His areas of interest lie in fire, radar, and mesoscale meteorology. He also is an instructor in the Department of Atmospheric Sciences during the academic year.

Richard D. Farley
Research Scientist
M.S., Meteorology, South Dakota School of Mines and Technology.

Mr. Farley’s areas of expertise involve the development and application of numerical modeling to studies of various meteorological phenomena including cloud physics, hail, severe storms, weather modification, atmospheric electricity, and lightning.

John H. Helsdon, Jr.
Professor Emeritus, Research Scientist
Ph.D., Atmospheric Science, State University of New York at Albany.

Dr. Helsdon, a professor emeritus with the department, is still active in lightning research. His other areas of interest and expertise include thunderstorm electrical modeling and cloud physics.

Mark R. Hjelmfelt
Professor Emeritus, Research Scientist
Ph.D., Meteorology, University of Chicago.

Although retired from active teaching, Dr. Hjelmfelt is still conducting research for a special project. His past areas of work include mesoscale and radar meteorology, severe storms, and cloud physics.

Donna V. Kliche
Associate Professor
Ph.D., Atmospheric and Environmental Sciences, South Dakota School of Mines and Technology.

Dr. Kliche’s areas of expertise include microphysics of clouds, atmospheric physics, and scientific analysis of airborne meteorological measurements and surface precipitation data.

Adam French
Assistant Professor
Ph.D., Atmospheric Science, North Carolina State University.

Dr. French’s areas of expertise are the dynamics of convective storms, mesoscale meteorology, numerical modeling, and forecasting.

Paul L. Smith
Professor Emeritus
Ph.D., Electrical Engineering, Carnegie Institute of Technology.

Although retired, Dr. Smith continues to support the department in many ways. His area of expertise is radar meteorology.

Lisa Kunza
Post-doctoral Associate
Ph.D., Ecology, University of Wyoming.

Dr. Kunza’s research focuses on aquatic ecology, biogeochemistry, phycology, and outreach.

Pallaoor V. Sundareshwar
State Carbon Scientist
Ph.D., Biology, University of South Carolina.

Dr. PV’s areas of expertise involve biogeochemistry, wetland and systems ecology, water quality, coastal zone ecology and management, and global change. In addition to being the state carbon scientist, Dr. Sundareshwar is an associate professor in the Atmospheric Sciences department and the director of the Biogeochemistry Core Facility lab at the university.