NSSL Briefings

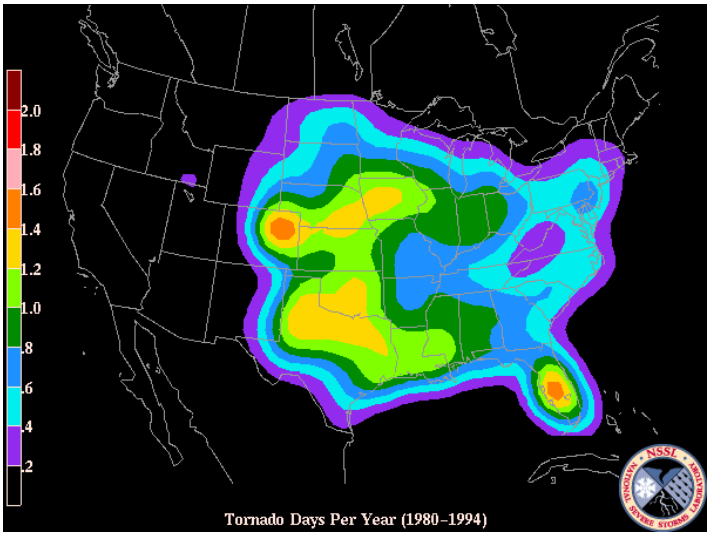
Volume 3 Summer 2000 Number 2

A newsletter about the employees and activities of the National Severe Storms Laboratory

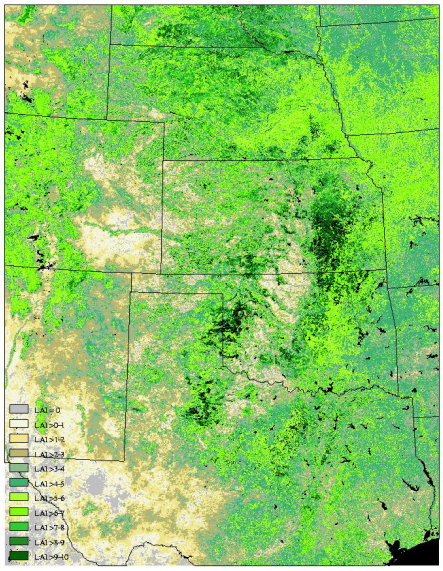
Severe Weather Climatology (*http://www.nssl.noaa.gov/hazard/*)

NSSL scientists have been collaborating with the Storm Prediction Center (SPC) to build statistical models of severe weather occurrence for any day of the year in the United States. The models tell us when and where severe weather happens anywhere in the country and how consistent it is from year to year. They are based on reports of severe weather as far back as 1921.

The models provide information for many users. For forecasters, they give an estimate of the long-term probability of an event as a starting point for making a forecast for a particular day. For emergency managers and the risk industry, they show the overall threat of severe weather at any place in the country. And, because the models provide an estimate of variability, they can be used to evaluate the likelihood of observed events. In addition, they form a baseline for possibly detecting changes in severe weather frequency associated with climate change. ◆



Average number of days per year with a tornado occurring within 25 miles of any point from 1981-1995



Values of leaf area index calculated over a two-week period ending July 17, 1997, from the Advanced Very High Resolution Radiometer (AVHRR) data available from the NOAA polar orbiting satellites. The brown area across western Oklahoma is the region where winter wheat is grown, which typically is harvested in late May and early June. By July, the winter wheat region is characterized by very low values of leaf area index (due to harvest) as indicated in the image.

Satellite-derived land cover data valuable for improving model temperature forecasts

Most numerical weather prediction models represent land surface effects rather crudely by assuming that vegetation characteristics do not change from year-to-year. In reality, vegetation (or land cover) characteristics change substantially from one year to the next, and these changes are difficult to predict. Scientists from NSSL's Models and Assimilation Team, collaborating with remote sensing specialists from the University of Nebraska-Lincoln, have developed and implemented a technique to determine various land cover characteristics from National Oceanic and Atmospheric Administration (NOAA) satellite data. The goal of this work is to insert the observed land cover characteristics into a numerical weather prediction model with a state-of-the-art land surface scheme.

Values of fractional vegetation cover, leaf area index, and surface albedo calculated from satellite data were used to initialize the model for selected days during July 1997 (see figure). The land surface scheme was implemented using the satellite-derived vegetation data, and high temperature forecasts were shown to be significantly more accurate than those produced with climatological values of vegetation parameters. Surprisingly though, high temperature forecasts were better when the sophisticated land surface scheme was not used at all. This emphasizes the important notion that adding complexity to a numerical model will not necessarily improve it.

However, the forecasts using high-resolution land cover data were significantly better than those without the land-surface scheme at the warmest one-third of the sites. This suggests that use of the high-resolution land cover data will be most beneficial in improving forecasts of extreme temperatures, where current operational numerical models perform poorly. The positive results from this study illustrate the enormous value of using satellite-derived land cover data. Future work will involve more accurate initializations of soil moisture as well as an investigation of how the use of the high-resolution land cover data improves forecasts of convective initiation. ◆

News Briefs

Mike Eilts, J.T. Johnson, and Matt Orr move to Weather Decision Technologies, Inc.

After 20 years of service at NSSL, Mike Eilts has left to become President and CEO of a new private company called Weather Decision Technologies (WDT). The company offers "On-Alert," an all-weather hazards decision support system over the Internet (see www.on-alert.com). The company plans to continue to bring advanced weather technologies to the commercial marketplace. Jeff Kimpel, Director of NSSL said, "Mike has been a real asset to NSSL. He had many excellent ideas on extending NSSL science and technology into the forecast environment. His talents in leadership and managing large projects certainly will be missed."

J.T. Johnson, employed at NSSL for 13 years, will also make the move to WDT. J.T. helped develop NSSL's Warning Decision Support System, which has received much recognition over the past few years.

Matt Orr, NSSL's microcomputer support specialists, has also joined WDT. Matt handled unpredictable computer crises and helped test and deploy OAR-wide projects such as video-conferencing and Netscape email.

Don Burgess named SRAD Chief

NSSL welcomes back Don Burgess as the new Stormscale Research and Applications Division (SRAD) Chief, replacing Mike Eilts. Don returns to NSSL after being Chief of the Operation Training Branch at NEXRAD's Operational Support Facility for the past nine years. Don was previously with NSSL from 1970-1991, and worked on the Joint Doppler Operations Project which led to the development of the NEXRAD Doppler weather radar.

Ron Holle retires

"Ron Holle Ends His Electrifying Federal Career" says the caption under a photo from Ron's retirement party. Ron has retired from NSSL after 38 years of federal service. He is best known for his research and applications of lightning network data as well as lightning casualty and damage studies and safety and education issues.

Post-docs

Three scientists are completing post-doctorate work at NSSL. David Dowell is working on convective storm data assimilation; Ted Mansell is assimilating lightning into mesoscale models; and Harald Richter is modeling mesoscale convective initiation.

Passport to Knowledge broadcasts live from NSSL

"Live from the Storm," an interactive electronic field trip produced by "Passport to Knowledge," broadcast live from NSSL this spring. "Passport to Knowledge" is an ongoing series of interactive learning experiences designed to inspire students about science by providing information more current than that found in textbooks.

The first program, called "The Who, What, Where, When and Why of Weather," aired March 7 and had a segment on IPEX, NSSL's Intermountain Precipitation EXperiment. The second program "Research to the Rescue," was broadcast live from NSSL on April 11. Both programs were broadcast on PBS nationwide. A panel of NOAA Weather Partners scientists and forecasters answered questions during the broadcasts that were emailed by students watching the program around the country. This real-time interaction with NOAA forecasters and scientists through broadcast TV, videotape, email, and the Internet gave students an up-to-date look at how cutting-edge research and new technologies can make our lives safer. ◆

For more information on the web go to: http://passporttoknowledge.com/storm

NSSL/NOAA Weather Partners host press conference and Severe Weather Workshop

To kick off the severe weather season, the NOAA Weather Partners (NSSL, SPC, NEXRAD OSF, and NWSFO) in Norman, OK, hosted a press conference and workshop for national media on March 2 and 3, 2000. Before and after the news conference, experts were available for one-on-one interviews.

The news conference was followed by a workshop that featured internationally-recognized scientists and forecasters discussing tornado climatology, NEXRAD Doppler weather radar, the watch and warning process, lessons from the May 3rd, 1999 tornado outbreak, and safety and preparedness issues. The workshop also included a hands-on forecasting exercise and facility tours. ◆

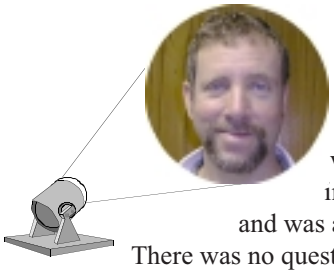
NSSL's Daphne Zaras helps program a NOAA Weather Radio

NSSL staff promotes weather safety at local malls

There were no deaths of people between the ages of 4 and 24 in the Oklahoma City metropolitan area during the May 3, 1999 tornado outbreak. Experts credit school-age children with knowing the rules of tornado safety. The value of weather safety education is receiving increasing attention, and in March staff from NSSL joined personnel from the other three NOAA Weather Partners to answer questions at the local mall in Norman. The events included displays by all four NOAA Weather Partners and one of NSSL's mobile laboratories. Staff provided tornado safety information, explained Doppler radar images, and answered questions about severe weather research and forecasting.

Also during the event, NOAA staff helped NOAA Weather Radio owners program their radios with special codes that allow the weather alarm to be activated when watches and warnings are issued for the counties in their immediate area. NOAA Weather Radios, with alarm and battery back- up, are considered one of the best ways to provide protection from tornadoes, especially at night. ◆

Employee spotlight: Bob Rabin



"Head in the clouds" was the comment on Bob Rabin's report card from a grade school teacher in Evanston, IL. From the very beginning, Bob was preoccupied with the weather. He watched the clouds, observed Illinois storms in both winter and summer, studied the sky with a friend, and was a co-op weather observer for a local television station. There was no question about what profession to pursue, and Bob assumed he would go into forecasting. But his experiences in college pulled him away from forecasting into research. Bob spent two years at Northeastern Illinois University before transferring to McGill University in Montreal, Quebec for his B.Sci. and M.Sci. in meteorology. After his graduate work, Bob decided to take a break and travel by initiating unique training experiences in Germany and Israel before earning his Ph.D. at University Pierre et Marie Curie, Paris, France.

Bob first worked at NSSL as a college student during one of his summer breaks and came back later as a permanent employee in 1978. Now NSSL shares Bob with the Cooperative Institute for Meteorological Satellite Studies (CIMSS not CIMMS!) at the University of Wisconsin-Madison. Currently he spends about three weeks in Oklahoma and one week in Wisconsin per month. Bob says it's good for him to work in two places, and he finds the arrangement "scientifically stimulating."

Bob's main area of work is in satellite meteorology. He has identified an influence of agricultural patterns (such as the winter wheat belt in Oklahoma and deforestation in Brazil) on cumulus cloud formation. Current projects include using satellite observations to determine: the detailed wind flow near the tops of developing thunderstorm systems, stability and moisture and their link to storms, and the water vapor content of air masses and surface winds in fog forecasting off the California coast. He hopes to be involved in a new project to detect storms in the western U. S. that are conducive to starting fires from lightning. He also enjoys training other meteorologists in the use of radar and satellite data.

Bob says it is a major part of his personality to be "set in his ways." He says, "If I don't make a real effort to keep active, it's easy to wind down and stay where I'm at." Bob has developed many recreational interests including cross-country skiing (a passion he picked up while he was at McGill), basketball, yoga (he teaches a class at the YMCA here in Norman), and biking. Many of us here at NSSL and in Madison see Bob biking to work, regardless of the weather. He says it's easier to bike than find parking! ◆

NSSL scientists participate in symposium

From April 30 through May 3, 2000, NSSL scientists participated in the National Symposium on the Great Plains Tornado Outbreak, "Toward a Unified Approach of Understanding, Prediction, Warning, Response and Recovery." Speakers from across the country, including research scientists, media, health professionals, representatives of the insurance industry and experts on shelter technology discussed the events of May 3, 1999. The symposium also featured NSSL Director Jeff Kimpel as one of the key note speakers.

NSSL presentations included: "*The May 3 1999 Oklahoma City Tornado: Deaths from the Historical Perspective*" (Harold Brooks); "*Enhanced Detection of Tornadoes on 3 May 1999 using Prototype Fine-Resolution WSR-88D Measurements*" (Rodger Brown and Bim Wood); "*Some Aspects of Mesoscale Model Forecasts for 3 May 1999*" (Jack Kain, Mike Baldwin, Dave Stensrud, et. al.); "*Beyond the Nowcast Range: 24 Hour Forecast Guidance Concerning Convective Initiation and Mode for the Great Plains Tornado Outbreak of 3 May 1999*" (Dave Schultz, et. al.); "*Performance of the WDSS: Warning Decision Support System During the May 3, 1999 Central Oklahoma Tornado Outbreak*" (Patrick Burke, Greg Stumpf, DeWayne Mitchell, Christina Hannon, Valerie McCoy, et. al.); "*Lessons Learned from the Destruction by the 3 May 1999 Oklahoma City Tornado*" (Chuck Doswell.) ◆

Contributors to this issue:

Harold Brooks *Dave Stensrud*
Todd Crawford *Keli Tarp*
Scott Rae(NCTCOG)

REU students arrive

Five undergraduate students from around the country worked at NSSL this summer as part of the National Science Foundation's (NSF) Research Experience for Undergraduates (REU). Each student was paired with an NSSL scientist for 10 weeks working on research projects, writing scientific papers and giving presentations.

The REU program is designed to attract talented undergraduates to careers in mathematics, science, and engineering through an active research program and the mentorship of those who work in these fields.

AUITI (Acronyms Used In This Issue)

CIMMS - Cooperative Institute for Mesoscale Meteorological Studies
CIMSS - Cooperative Institute for Meteorological and Satellite Studies
MRAD - Mesoscale Research and Applications Division
NEXRAD - NEXt Generation Weather RADar, same as WSR-88D
NOAA - National Oceanic and Atmospheric Administration
NSSL- National Severe Storms Laboratory
NCTCOG - North Central Texas Council of Governments
NWS - National Weather Service
NWSFO - National Weather Service Forecast Office
OSF - Operational Support Facility
OU - University of Oklahoma
SPC - Storm Prediction Center
SRAD - Stormscale Research and Applications Division
WSR-88D - Weather Surveillance Radar - 88 Doppler, same as NEXRAD

NSSL's web site can be found at: http://www.nssl.noaa.gov

NSSL Briefings *is a publication from the National Severe Storms Laboratory intended to provide federal managers, staff, and other colleagues in the meteorological community with timely information on activities and employees. If you would like to be added to the NSSL Briefings mailing list, or have a change in your address, please forward requests to Kelly Lynn, NSSL, 1313 Halley Circle, Norman OK, 73069; by phone: (405) 360-3620; or email: kelly.lynn@nssl.noaa.gov.*

NSSL/NWSFO fight public misperception that overpasses are safe shelters in tornadoes

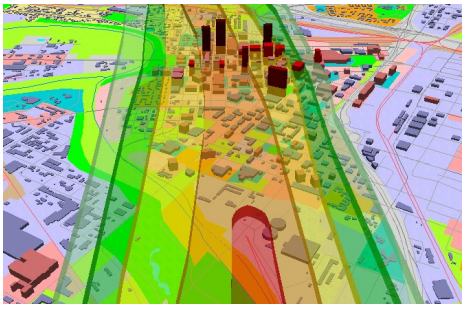
Some people in Oklahoma on May 3, 1999, left their homes to drive to the nearest highway overpass to seek shelter from tornadoes. People jammed overpasses on the interstates 10-15 minutes before a tornado actually struck that night. Three of those people lost their lives. Of about 12 people who took shelter under the Shields Avenue overpass on I-35, one died and 10 others suffered serious and life-threatening injuries.

Scientists at NSSL and the Norman NWSFO are disturbed by this public misperception that highway overpasses offer protection from tornadic winds, and they are taking steps to change this public mindset. One approach is to improve and intensify current efforts to promote and emphasize existing safety guidelines. The American Meteorological Society has recently adopted this policy: ". . .In spite of what many people might have seen in videos and photos, highway overpasses do not offer reliable protection from tornado winds and wind-driven debris. In fact, an overpass can produce a wind tunnel effect, depending on its configuration relative to the tornado. In addition, congregating under overpasses during threatening weather conditions creates an extremely dangerous traffic hazard."

Another approach is to encourage people to have plans to prepare for tornadoes ahead of time. A third effort is to encourage "situational" awareness -- being aware of what can happen around you - including being aware of NWS forecasts and watches.

The Shields overpass on Interstate 35. Photo by Chuck Doswell.

Ideally, the first option for those in vehicles threatened by a tornado should be to get out of the tornado path. Secondly, they should seek shelter in a well-constructed building. But if their final option is a ditch, overpass, or staying in a vehicle, they are making a decision between bad options. ◆



An example of digitally mapped tornado path information and actual damage contours laid over Dallas-Fort Worth urban and demographic data. Light green represents F1 damage; green, F2; yellow, F3; and dark orange F4. Photo courtesy of Scott Rae, NCTCOG.

More information is at http://www.dfwinfo.com/weather/study.html

NSSL contributes to DFW tornado preparedness study

NSSL played a vital role in a recent study by the North Central Texas Council of Governments (NCTCOG) and the NWS in Fort Worth to make a general assessment of Dallas-Fort Worth's susceptibility to a major tornado outbreak. The goal of the project was to help emergency personnel prepare for such a disaster by better defining the magnitude of the warning, rescue and recovery tasks. The study featured the use of digitally-mapped tornado path information and actual damage contours from the May 3, 1999 Oklahoma City tornado outbreak laid atop Dallas-Fort Worth urban and demographic data. Contributors to the project included NSSL Researcher Greg Stumpf and former NSSL scientist Amy Wyatt.

Ironically, during the evening rush hour on March 28, 2000, a pair of F3 tornadoes hit downtown Fort Worth and Arlington, Texas. Following these tornadoes, Scott Rae, Senior Research Associate at the NCTCOG, expects the study results to be taken more seriously than before. "There were certainly a few people around that dismissed the study results early by thinking that tornadoes could never strike a place like downtown Fort Worth. The ironic strike on March 28 certainly erased many of those views. The scenarios were suddenly that much more viable....Urban areas are not immune to tornado strikes and urban buildings are certainly not invincible." ◆

STEPS studies supercell physics

The Severe Thunderstorm Electrification and Precipitation Studies (STEPS) field program kept NSSL scientists along the Colorado-Kansas border for eight weeks from May 22-July 16, 2000, studying thunderstorms and lightning on the high plains. STEPS scientists have three core areas of interest: how precipitation forms in supercell storms, how these storms produce electricity and lightning, and how polarimetric radars can be used to estimate the type (such as hail, snow, or rain) and amount of precipitation in storms.

NSSL/STEPS researchers were joined by others from the National Weather Service, National Center for Atmospheric Research (NCAR), Colorado State University, New Mexico Institute of Mining and Technology (NMIMT), South Dakota School of Mines, University of North Dakota, OU, and the University of Florida. By combining and coordinating their resources, scientists gathered data on the storms using a network of three Doppler radars, two dual-polarization radars, a T-28 armored aircraft for storm penetration, several mobile sounding systems, mobile ground units including NSSL mobile mesonet vehicles, and a deployable lightning mapping system from the NMIMT. ◆