NSSL Briefings

Volume 2 No. 2 Winter 1998

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

Photo courtesy of Frankie Lucena who was photographing Jupiter from the south coast of Puerto Rico. Jupiter is the white dot on the right edge of the picture.

NSSL promotes improvements in lightning education

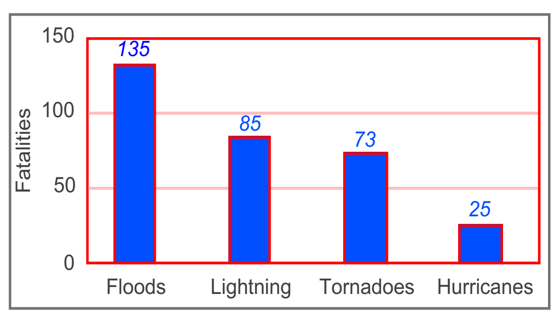
by Ron Holle, Raúl López, and Susan Cobb

Lightning is the most dangerous and frequently encountered weather hazard that most people experience each year. Summaries of weather-related fatalities continue to show lightning as the second most-frequent killer in the United States (flooding and flash flooding are number one). The National Lightning Detection Network (NLDN) shows that lightning strikes the ground in most locations of the country each year. It also occurs every day in the summer and on all but a few days during the rest of the year. The NLDN locates an average of over 20 million cloud-to-ground flashes a year in the U.S.! About 100 people are killed and more than 500 are injured by lightning every year-- and, in the U.S. since 1959, 91% of lightning incidents involving deaths had only one fatality. Lightning is a single-victim event.

Watches, warnings, statements, and advisories for weather hazards ranging from thunderstorms to blizzards are issued to the public by the NWS through the media. Since lightning is so widespread and so frequent, it would not be possible to issue lightning warnings for every flash for each person. The responsibility of lightning safety must be shouldered by each individual.

Stories of surviving close lightning strikes, which are well publicized in the media, have lead to a wide public misperception of the risk of death from lightning exposure. These misperceptions lead one to take risks based on casual attitudes towards lightning. There is a need for the public to understand basic characteristics of lightning e.g. how to identify safe shelter from lightning, and how lightning travels along the ground and through water.

Using new knowledge about lightning, NSSL is leading an effort to collaborate with other groups to develop educational resources aimed towards informing the public of lightning hazards and improving planning for lightning avoidance. Flashes detected by the NLDN have been used to develop climatologies that better define the lightning risk for several states including: Arizona, Colorado, Florida, New Mexico, Georgia and South Carolina. This information was even used, more specifically, to identify the lightning risk at various venues during the Summer Olympic Games in Atlanta. Climatologies for other states are planned. Another study is using NLDN data to



Average annual number of storm-related deaths in the U.S. from 1966 to 1995

In Brief.....

NSSL News Briefs

AMS's Meisinger Award goes to NSSL scientist

The American Meteorological Society's Meisinger Award was given to Dave Stensrud, NSSL Meteorologist, during a ceremony at the AMS Annual Meeting in Phoenix, AZ. Dave was recognized for his innovative research into the structure, dynamics, and predictability of mesoscale convective systems and their impact on larger scale weather patterns.

NSSL's VORTEX web page voted best in OAR

At the NOAA Webshop at Environmental Research Lab headquarters in Silver Spring MD, NSSL was awarded first place for having the Best Webpage in Oceanic and Atmospheric Research located at: *(www.nssl.noaa.gov/noaastory)*. This webpage is a prototype developed by Ann McCarthy and Joan O'Bannon to become part of the recently revised NOAA Homepage. It is the first in a series of "NOAA stories" that will be developed by various ad hoc groups to tell some of the interesting stories within NOAA as part of an accelerated outreach effort. In this case, "VORTEX, Unraveling the Secrets" tells the "true" story about tornado intercept using the Verifications of the Origins of Rotation in Tornadoes Experiment project as an example.

NSSL scientist receives Presidential Award

Erik Rasmussen, a Research Meteorologist with NSSL and the Cooperative Institute for Mesoscale Meteorology Studies (CIMMS), has received the Presidential Early Career Award for Scientists and Engineers. This is the highest honor bestowed by the U.S. Government upon outstanding scientists and engineers at the beginning of their careers. Erik is one of 60 chosen for the award, which gives him $10,000 a year for the next five years to conduct independent research of his choosing.

Erik was honored for his work to plan and direct VORTEX, a field experiment designed to improve tornado predictions and warnings by studying them at close range. He is currently a member of SRAD at NSSL facilities in Boulder, Colorado.

find the distances between successive flashes; this knowledge will improve planning for lightning avoidance.

Recent studies of lightning victims revealed commonly-occurring highly-vulnerable situations and activities. For example, taking shelter under trees has been found to be a widespread problem. A poster on this threat was developed in English and Spanish with Ken Howard of NSSL. Over 12,000 copies have been distributed to teachers, NWS staff, and others. A large and growing portion of lightning casualties in the last few decades has occurred during recreation and sports situations. We work with sports medicine staff at William and Mary College and at East Carolina University to spread information about lightning, and we assisted in the development of a lightning policy for sports that was recently published by the National Collegiate Athletic Association. A broader audience for soccer, baseball, and other leagues for school children and adults also exists.

In addition, we are collaborating on guides and studies with medically-oriented people and others at the Lightning Data Center in Denver, its outgrowth at the National Lightning Safety Institute, with medical staff at the University of Illinois at Chicago and the University of Queensland in Australia, and with staff members of the NWS at Chicago IL, Denver CO, Fort Worth TX, Medford OR, Melbourne FL, Sioux Falls SD, and Tampa FL.

We have also written papers with a science teacher for education publications to bridge the gap between textbooks that often do not treat new topics in weather, and the meteorological literature that tends to be too complex for general science teachers. These articles describe the flash-to-bang method, lightning safety and other weather subjects, and received a wide positive response. They have been published in The Earth Scientist of the National Earth Science Teachers Association, and in state teachers magazines for Illinois and Indiana.

It is important that research results are synthesized into concepts that are understood by the public. Presenting this information in various forms such as posters, policy statements, and educational materials seems to be effective. We also present talks to groups, with an emphasis on speaking to educators in order to reach as many people as possible. As expected, interviews with the media have become frequent during the spring and summer, and the effects of lightning are receiving more visibility: Lightning is highlighted at the "Powers of Nature" exhibit that recently opened at Philadelphia's Franklin Institute. We hope that our efforts with collaborators will reduce the number of lightning victims. ◆

For more information contact Ron Holle at: holle@nssl.noaa.gov or Raúl López at lopez@nssl.noaa.gov

On acronyms. . .

Most people are faced with a large number of acronyms every day. We pay taxes to the IRS, mail things through the USPS, UPS, FedEx, and others, and when we get home from work we turn on the TV to watch ABC, CBS, CNN, or NBC. We here at NSSL, an ERL lab under the OAR umbrella and part of NOAA which is a branch of the DOC realize that this acronamia is unavoidable.

In this issue of *NSSL Briefings* we define at least 26 acronyms, and they are used 46 times on the first two pages alone. With no strict rules on how to handle acronyms, the task of defining each one is laborious. So, in this and future issues of *NSSL Briefings*, we will try to have a short section at the beginning of the newsletter where we define the most commonly used acronyms. We will call the section "**AUITI**" , or "**A**cronyms **U**sed **I**n **T**his **I**ssue." We hope you find it helpful. ◆

Support staff integral part of the NSSL team

by Doug Forsyth, Deputy Director

In previous editions of *NSSL Briefings*, we have recognized the scientific divisions of NSSL: the Mesoscale Research and Applications Division and the Stormscale Research and Applications Division. The accomplishments of these two divisions over the last several years has been outstanding, but another part of our team shares in these outstanding achievements, and that is the staff assigned to the Director's Office. With a total staff of 19, the Director's Office includes the Central Support Services (CSS) group (bottom photo) and the Administrative group (top left photo) along with one position assigned to the Joint Operational Support Services Division of the University Corporation for Atmospheric Research. Those in the Director's Office management are in the top right photo.

The CSS staff carries out numerous tasks that include computer hardware and software support and maintenance, network support, data management, graphics support, library support, equipment maintenance and preventive maintenance, World Wide Web support, outreach, public relations, and property management.

The Administrative staff also has numerous functions in support of NSSL that include procurement, budget tracking and analyses, invoice and billing, payroll transmission, facility maintenance, safety, security, personnel actions, record keeping, supplies and secretarial support.

Our Joint Operational Support Services position supports and facilitates our data management efforts and field programs.

People are our most important resource. We have excellent people providing outstanding support for our research and application programs. As we reflect on the past and look toward the future, let us remember the excellent work that has been accomplished as a result of our outstanding teamwork.

Everyone contributes to our successes. Let us continue to work together, not only internally, but externally, to improve the quality of our nation's severe weather forecasts and warnings.

NSSL News Briefs

SRAD team receives DOC Bronze Medals

OAR has awarded the Department of Commerce's Bronze Medal to J.T. Johnson, DeWayne Mitchell, Phillip Spencer, Arthur Witt, Greg Stumpf and Pam MacKeen for their work in developing and transferring severe weather detection algorithms to the WSR-88D. J.T. Johnson, in addition to the team award, also received a Bronze Medal for his work with the Olympic Weather Support Office at the 1996 Summer Olympic Games.

The Bronze Medal is granted to employees and offices that have made contributions of exceptional value in support of overall Departmental goals that serve the nation.

AUITI (Acronyms Used in this Issue)

NLDN - National Lightning Detection Network
NWS - National Weather Service
AMS - American Meteorological Society
NOAA - National Oceanic and Atmospheric Administration
ERL - Environmental Research Laboratories
OAR - Office of Oceanic and Atmospheric Research
VORTEX - Verifications of the Origins of Rotation in Tornadoes Experiment
MRAD - Mesoscale Research and Applications Division
SRAD - Stormscale Research and Applications Division
CSS - Central Support Services
WDSS - Warning Decision Support System
AWIPS - Automated Weather Information Processing System
WWW - World Wide Web
DOC - Department of Commerce
NASA - National Aeronautic and Space Administration
OU - University of Oklahoma
SPC - Storm Prediction Center
NCAR - National Center for Atmospheric Research

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

NSSL Briefings *is a publication from the National Severe Storms Laboratory (NSSL) 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; or email: klynn@nsslgate.nssl.noaa.gov.*

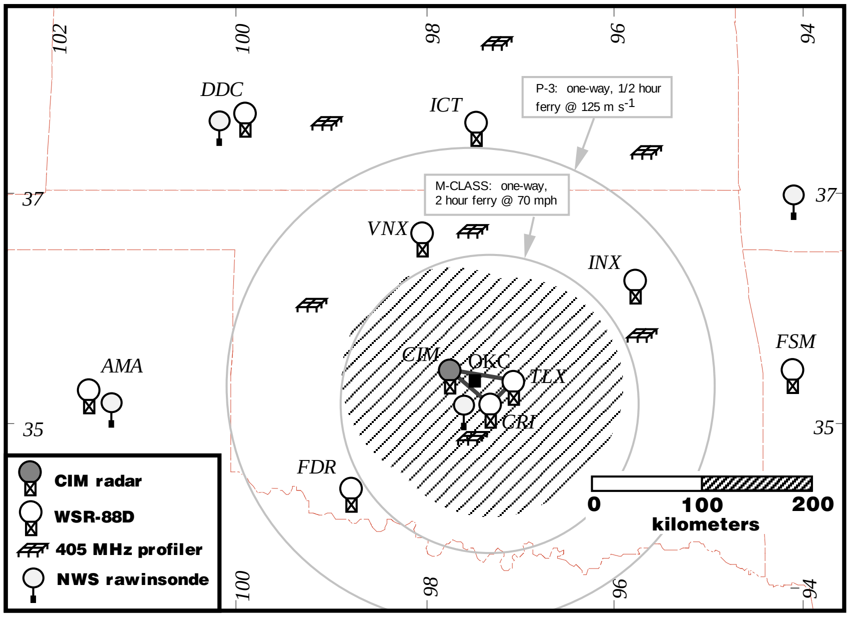


Figure 1: Operational domain of the MEaPRS experiment. Cross-hatching denotes the area of combined 100 km-in-range coverage of CIM and the Oklahoma City (KTLX) and NEXRAD-OSF (KCRI) WSR-88D.

NSSL plans field experiment to study MCSs

by Conrad Ziegler

Mesoscale Convective Systems (MCSs) are large complexes of thunderstorms that account for over half of the annual warm-season precipitation in the United States east of the Rocky Mountains. MCSs generate frequent cloud-to-ground lightning and additionally may produce severe weather including hail, tornadoes, and strong straight-line winds. Hence, MCSs present a major public safety concern owing to effects on flooding, agriculture, transportation, communications, and property. NSSL is planning a field experiment called the "MCS Electrification and Polarimetric Radar Study" (MEaPRS), to investigate polarization radar signatures and electrification processes in MCSs. In July 1997, NSSL hosted a meeting with collaborating scientists from Colorado State University, the University of Mississippi, Texas A & M University, the University of Oklahoma, NASA/Marshall Space Flight Center (MSFC), National Center for Atmospheric Research (NCAR), the Los Alamos National Laboratory (LANL), and the Atlantic Oceanographic and Meteorological Laboratory (AOML) to refine the scientific focus for MEaPRS. An operations plan for MEaPRS (*http://www.nssl.noaa.gov/projects/meaprs*) is presently nearing completion.

MEaPRS will be conducted over the Oklahoma-Texas-Kansas region from May 15 to June 15 1998, seven days a week.

MEaPRS will be conducted over the Oklahoma-Texas-Kansas region during the period from 15 May to 15 June 1998, seven days a week, using an array of fixed and mobile sensors to simultaneously sample a target MCS (Fig. 1). These special mesoscale observing facilities include a P-3 Orion "hurricane hunter" aircraft (Fig. 2), operated out of Oklahoma City by the NOAA/Aircraft Operations Center (AOC), the NSSL Cimarron radar (Fig. 3), and several mobile laboratories (Fig. 4a) from which atmospheric sounding profiles of the MCS will be obtained

Figure 2: The P-3 (NOAA-42) will make in-situ measurements of pressure, temperature, humidity, and winds (i.e. "state variables"), while also sampling cloud and precipitation content. The helically scanning tail radar alternately points ahead of and behind the aircraft axis, thus providing crossing or "pseudo-dual Doppler" wind and reflectivity measurements as the P-3 flies through the storm.

Figure 3: NSSL's Cimarron radar (CIM) will obtain measurements of polarimetric quantities along with reflectivity and Doppler velocities.

Figure 4a: A mobile laboratory.

(Fig. 4b). A lightning mapping system will provide detection of all in-cloud and cloud-to-ground flashes produced by a target MCS.

A typical operations day in MEaPRS will begin with the preparation of a forecast for deep convection and MCSs for the current day and an outlook for MCSs for the following day over the target region. During the afternoon, nowcasters (short-range forecasters using observations) will monitor the initial convection, and the P-3 and mobile labs will be vectored toward the developing MCS. Both forecasting and field coordination will be conducted from the Science Support Area jointly maintained by the National Centers for Environmental Prediction (NCEP)/Storm Prediction Center (SPC) and NSSL. The nowcasters will remain on duty through the night, passing information on MCS location, movement, and evolution to the P-3 and mobile labs in the field. The P-3 will perform multiple horizontal passes and ascent or descent soundings, both ahead of the leading convective line and within the trailing, non-convective or stratiform precipitation region of the MCS. In close coordination with the P-3 legs, soundings with the balloon-borne electric field meters will also be obtained within the leading-line convection and the trailing stratiform region. As a target MCS moves into the central Oklahoma area, polarization measurements of the MCS will be collected by the Cimarron radar. A typical MCS mission may last around seven hours, ending somewhere between midnight and sunrise the following morning.

The MEaPRS data set will be used to advance NOAA's forecasting and warning capabilities by:

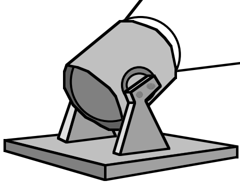
- determining the usefulness of polarization radar to identify precipitation types and intensity (this will set the stage for a possible upgrade of the WSR-88D network to include the polarization detection capability);
- refining conceptual models of how thunderstorms and MCSs develop charges and electric fields strong enough to produce lightning;
- developing new conceptual models to explain how MCSs form, move, and change their rainfall rates and airflow circulation intensities.

These advances in understanding and monitoring MCSs will assist the NWS by setting the stage for improved forecasts of dangerous flash flooding and hazardous cloud-to-ground lightning. ◆

For more information, contact Conrad Ziegler at: Conrad.Ziegler@nssl.noaa.gov

Figure 4b: Each mobile laboratory will release a linked "train" of instrument packages for measuring atmospheric profiles of temperature, humidity, winds, electric field strength, and other cloud properties.

Employee spotlight



J.T. Johnson

by Susan Cobb

J.T. Johnson is still amazed how he got here--"Things just seemed to happen the right way." Mike Eilts, SRAD Chief, hired him when he was a sophomore in college to work on a variety of projects including researching downbursts and microbursts. But being hired wasn't the amazing thing: It was how he ended up in Oklahoma in the first place.

J.T. grew up watching the weather from the outfield of his high school baseball team in Arkansas. "I had a lot of time to stand around," he says. When he graduated, he thought he might pursue meteorology, but the job potential seemed uncertain. J.T. had spent a little time at the NWS in Little Rock, AR, but he admits he didn't have a feel for research. But, first things first, he needed to find a school. He decided to attend Henderson State University to work on the basics while continuing to check out colleges that offered meteorology. J.T. had not even considered coming to OU until his dad, while teaching a week-long course in Norman, investigated the meteorology program. His dad insisted that he take a look the next week. J.T. says, "I was sold in 10 minutes." He transferred to OU after his first semester and earned his B.S. and M.S., working at NSSL the entire time. NSSL hired him full time in 1992.

A career-defining experience and a "crowning success," J.T. says, was his participation in the 1996 Summer Olympic Games in Atlanta, GA. He moved his family to Atlanta and spent 20 months helping set up the Olympic Weather Support Office (OWSO) and providing expertise on NSSL's Warning Decision Support System (WDSS). He was also able to help with hardware, software, and forecaster training for the OWSO. J.T. loved being involved in everything from defining what new variable needed to be added to the database to how many people need to be on shift to cover storms. "It was the ideal situation for my left-brain, organized personality -- I helped define the goals, develop a strategy, work on the project for 20 months, finish the project, and claim that it was a success."

His experiences in Atlanta helped J.T. better define his career goals: to further develop the relationship between research and operations. As a result, one of his current roles is to dialogue with the weather service community to find out what their needs are from a severe weather warning perspective. With that information he helps direct or redirect research strategies and tool development at NSSL. J.T.'s second role is in the broad area of applications development. The development of NSSL systems, such as WDSS and WATADS and development of applications for AWIPS are under his management. A third role is to find out how people are using the tools that NSSL has developed and determine what can be done to improve them.

About his life away from the lab J.T. says, "I don't relax--I feel like I have to get a lot out of life." He describes himself as in constant motion. He likes to spend as much time as he can with his wife, Lori, and their two sons Ryan (3 1/2) and Kyle (1 1/2). J.T.'s other activities include Bible study, maintaining a web page for his church, playing softball, and skiing. He sees himself as a "pretty positive person" and likes to "find good in everything." Amazed as he is at the process, it is evident to J.T. that he met the right people at the right time and ended up in the right place. ◆

Bio Box

Current position: *Team Leader, NWS Liaison/Real-time Application Prototyping and Idea Development Team*

Current project: *WDSS integration into AWIPS and development of a prototype AWIPS application*

Education: *B.S. Meteorology, 1989*

University of Oklahoma

M.S. Meteorology, 1992 University of Oklahoma

50th Anniversary of the first tornado forecast to be celebrated March 23-25, 1998

by Charlie A. Crisp

On the evening of March 25, 1948, a tornado roared through Tinker Air Force Base, Oklahoma, causing considerable damage, a few injuries, but no fatalities. However, the destruction could have been much worse. A few hours earlier Air Force Captain Robert C. Miller and Major Ernest J. Fawbush correctly predicted that atmospheric conditions were ripe for tornadoes in the vicinity of Tinker AFB. This first official tornado forecast was instrumental in advancing the nation's commitment to protecting the American public and military resources from the dangers caused by natural hazards.

Fawbush and Miller, 1951. Photo courtesy of ***Take-Off,*** *Tinker AFB newspaper.*

On March 23-25, 1998, NOAA's NWS (including the SPC, Norman Forecast Office, and WSR-88D Operational Support Facility) and NSSL, in cooperation with the University of Oklahoma, Tinker AFB and the U.S. Air Force Weather Agency will host an extended celebration in Norman, Oklahoma, and at Tinker AFB as a tribute to the first 50 years of tornado forecasting. This celebration will recognize the milestones in tornado forecasting over the past half-century, including the rapid advancements in severe weather watches and warnings that have been realized during the past few years through new observational systems (WSR-88D, GOES), increased knowledge, and better interactive computer systems (AWIPS).

The Golden Anniversary Celebration will also highlight the exciting future which lies ahead for integration of better scientific understanding and rapidly advancing computer systems into operational meteorological forecasting.

Since NSSL and SPC in Norman are direct descendants of the first tornado forecast 50 years ago, special events will be scheduled highlighting severe weather research and forecasting. Special tours of NSSL and SPC will be available for interested groups. Included in the tours will be the opportunity to view SPC forecasters at work issuing severe thunderstorm and tornado watches for the U. S. A number of distinguished guests are invited to participate in the ceremonies including the Secretary of Commerce, NOAA Administrator and Directors of the NWS and Office of Oceanic and Atmospheric Research, officials from Tinker AFB and Director of the U.S. Air Force Weather Agency. Invitations have also been extended to the Vice President, federal, state and local elected officials, and constituents.

For latest information about the celebration, use the internet to access the Golden Anniversary of Tornado Forecasting homepage at: *http://www.nssl.noaa.gov/GoldenAnniversary/* Come join us in celebrating the Golden Anniversary of Tornado Forecasting: 50 years of Service to the American Public. ◆

Tornado forecasting and research symposium

by Jeff Trapp

Nine internationally-recognized scientists will deliver invited presentations

The Central Oklahoma Chapters of the American Meteorological Society and the National Weather Association will conduct a scientific symposium on tornado forecasting and research on March 24, 1998, on the University of Oklahoma campus in Norman, Oklahoma. This is one of several activities scheduled for the three-day celebration of the 50th Anniversary of the First Tornado Forecast, sponsored by the Oklahoma Weather Center and Tinker Air Force Base (see related article by Charlie Crisp). Nine internationally-recognized scientists will deliver invited presentations on topics ranging from tornado forecasting techniques and future activities of the Storm Prediction Center to the history of storm and tornado intercept efforts. In addition, a tribute to Air Force Col. Robert Miller will be paid by Dr. Robert Maddox, who will also discuss the first tornado forecast of Miller and Maj. Ernest Fawbush.

Registration forms and additional information can be found on the World Wide Web at *http://www.nssl.noaa.gov/symposium* or requested from symposium@nssl.noaa.gov or Tornado Symposium, c/o NSSL, 1313 Halley Circle, Norman, OK 73069. Early registration is encouraged because seating is limited. ◆

Excerpts from "The Unfriendly Sky" *by* Robert C. Miller, Colonel USAF-Ret

Transcribed by Charlie A. Crisp from parts of an unpublished manuscript (written middle to late 1970's)

I was assigned forecasting duty in the Tinker Air Force Base Weather Station, under command of Major E. J. Fawbush, on the first of March 1948. The evening of March 20th, while on the evening shift, I was rudely awakened to the sometimes vicious vagaries of Mother Nature. There were two of us on shift that night. My backup forecaster was a Staff Sergeant, also new to the Tinker Weather Station. In course of idle conversation we found we had much in common - we were both from Sunny Southern California and had no weather experience in the Midwest portion of the United States. We analyzed the latest surface weather maps and upper charts and arrived at the sage conclusion that except for moderately gusty surface winds, we were in for a dry and dull night. We were not astute enough to note that the upper-air analyses, received in completed form over the facsimile net from the USWB in Washington, depicted erroneously analyzed moisture fields. We issued a Base warning for gusty surface winds up to 35 mph without thunderstorms, effective at 9 p.m. local time.

Shortly after 9 p.m., stations to our west and southwest began reporting lightning and by 9:30 thunderstorms were in progress and, to our surprise, detectable only twenty miles to the southwest of the Base. The Sergeant began typing up a warning for thunderstorms accompanied by stronger gusts even though we were too late to alert the Base and secure the aircraft. At 9:52 p.m. the squall line moved across Will Rogers Airport 7 miles to our west southwest. To our horror they reported a heavy thunderstorm with winds gusting to 92 miles per hour and worst of all at the end of the message, "TORNADO SOUTH ON GROUND MOVING NE!"

The rest of this story can be found on the web at: ***http://www.nssl.noaa.gov/GoldenAnniversary***.

These damage photos of Tinker AFB from 1948 have been provided by the Tinker AFB historian

50th Anniversary events:

Monday, March 23: Open House at NOAA's four facilities in Norman.

Tuesday, March 24: The local chapter of the American Meteorological Society and the National Weather Association will sponsor a scientific symposium at the University of Oklahoma (OU). The symposium will be followed by a celebration dinner Tuesday evening at OU.

Wednesday, March 25: All sponsors will host a special memorial dedication ceremony at Tinker AFB to commemorate the first tornado forecast, with the ceremonies concluding after lunch at the Tinker Officers' Club.

Other items of interest associated with the celebration:

- the U.S. Postal Service is issuing a canceled post card using the 50th Anniversary of Tornado Forecasting logo as the cancellation symbol
- schools in Oklahoma are holding an essay and poster contest on tornado safety as encouraged by the Oklahoma Climate Survey's Earthstorm Project.
- Fly-over by aircraft from Tinker AFB.
- A special edition of the AMS's technical journal, "Weather and Forecasting", highlighting advances in severe weather forecasting.
- Participation by Chambers of Commerce of the surrounding cities in central Oklahoma.
- T-Shirts and baseball caps with the 50th Anniversary of Tornado Forecasting logo should be available for purchase. ◆

Planning TIMEX: The Thunderstorm Initiation Mobile Experiment

Figure 1: Photograph looking north at newly-developing deep dryline convection at 0040 UTC on 16 May 1991 during the COPS-91 field experiment (courtesy C. Hane, NSSL). The NSSL-2, a mobile ballooning laboratory operated by the Joint Mobile Research Facility (JMRF) of the Oklahoma Weather Center, is in foreground while a developing Wheeler County, Texas storm is in background. Valuable experience gained from COPS and the later VORTEX project on obtaining mobile soundings and other observations both preceding and near developing storms will be applied during TIMEx.

by Conrad Ziegler

Anticipating thunderstorm initiation is a very difficult and challenging problem of considerable importance to both warm season quantitative precipitation and severe weather forecasting. To help improve the accuracy and specificity of storm forecasts, NSSL scientists Jeanne Schneider, Conrad Ziegler, and Erik Rasmussen are leading the planning of the "**T**hunderstorm **I**nitiation **M**obile **Ex**periment" (TIMEx), a field study designed to investigate convective initiation on the mainland United States. Community discussions of the proposed field study are taking place via an interactive web page (*http://www.nssl.noaa.gov/srad/timex*). NSSL has organized two TIMEx planning meetings, the initial meeting hosted in Norman in November 1997 and the second meeting held in Phoenix, Arizona in January 1998 during the AMS Meeting. The TIMEx planning meetings have brought together scientists from several universities, NCAR, other Oklahoma Weather Center elements, the National Weather Service, and other federal laboratories to discuss hypothesized convective initiation processes and the observational strategies required to detect those processes in actual cases. We intend for TIMEx to be one of a series of field programs designed to answer specific questions about the life cycles of storms and Mesoscale Convective Systems (MCSs). (See also the article on the "MCS Electrification and Polarimetric Radar Study - MEaPRS" page 4 in this issue.) As realized in TIMEx we begin with a focus on convective storm initiation.

TIMEx is a field study designed to investigate convective initiation on the mainland United States.

Figure 2: Radars capable of measuring clear air velocity are key mobile sensors proposed for deployment during the TIMEx experiment. The "Doppler-on-Wheels" radar is operated under a cooperative agreement between the JMRF and the National Center for Atmospheric Research (NCAR). Coordinated measurements from two DOW radars that have been deployed near boundaries will permit finely resolved analyses of the evolution and spatial structure of airflow in the planetary boundary layer.

The NCAR Electra aircraft carries the ELDORA (Electra DOppler RAdar) Doppler radar, which provides a demonstrated clear air wind field mapping capability. The ELDORA antenna is contained within the "rotodome" assembly mounted behind the Electra's tail section, allowing ELDORA to effect volume scans by rotating through complete 360 ° sectors at an angle to the flight path of the Electra. The ELDORA radar will be flown in various rectangular patterns oriented along boundaries capable of initiating storms.

One of the fundamental issues in precipitation forecasting is the timing and location of the initiation of storms, or in many cases, the failure of initiation. Clearly, any precipitation forecast will fail completely if initiation is forecast and fails to occur, and vice versa. Further, quantitative errors are strongly dependent on errors in the location and time of storm initiation. Moreover, large errors in forecast temperature may be caused by poor forecasts of storm development. Recent case studies of seabreeze lines, drylines, and other sharply defined zones of contrasting winds, temperature, and moisture near ground have documented how airflow convergence and lifting of moist air along such "boundaries" can initiate storms (Fig. 1). Atmospheric airflow disturbances such as gravity waves or strong, localized air currents known as "jet streaks" may help trigger storms along boundaries by providing additional lifting of moist, unstable air. Strong vertical wind shear and mixing of moist rising air with drier air from higher in the atmosphere may limit the tendency to achieve water saturation and cloud formation, thus suppressing the development of deep convective clouds and storms. None of these processes are adequately understood, and may be misrepresented or completely unresolved in mesoscale numerical weather prediction models.

The plan for TIMEx is to conduct a relatively small, very focused field experiment as early as the spring of 2000 to document structure and morphology of the planetary boundary layer and lower troposphere on spatial scales from 2-20 km in the horizontal dimension. Various remote and *in-situ* measurements from mobile platforms will be concentrated in areas with the potential for deep, moist convection. Airflow in the optically clear planetary boundary layer will be detected with existing sensitive airborne and ground-based Doppler radars (Fig. 2), while "lidars" (laser light Doppler radars) that measure water vapor content based on a differential water vapor absorption principle must be developed for mobile application. Following a year of analysis of data collected during the preliminary field phase, a second and more comprehensive TIMEx field phase will be conducted. Though the site of the preliminary field phase has not been firmly decided upon, the scientists attending the planning meetings favored the Texas-Oklahoma-Kansas region owing to the excellent visibility for ground-based mobile Doppler radar observations and the possibility of utilizing dense observing networks already in place on the U.S. Southern Plains.

In TIMEx we plan to collect data on as many types of boundaries as possible, including stationary fronts, warm fronts, outflow boundaries, drylines, and the myriad of other low-altitude features detectable as radar fine lines in WSR-88D reflectivity data but of unknown origin and character. Additionally, a variety of low-altitude shear, temperature, and humidity regimes will be sampled. Analysis of this unique set of observations will assist the NWS by providing the basis for conceptual models of the convective initiation process that in turn will help improve forecasts of storm development. ◆

In TIMEx we plan to collect data on as many types of boundaries as possible, including stationary fronts, warm fronts, outflow boundaries, drylines and a myriad of other low-altitude features.

For more information contact Conrad Ziegler at: Conrad.Ziegler@nssl.noaa.gov

NSSL Briefings
National Severe Storms Laboratory . 1313 Halley Circle . Norman, OK . 73069

NSSL's Ambassador to Jupiter

In October 1997, Loretta McKibben was named by the Jet Propulsion Lab and NASA to be Oklahoma's first "Ambassador to Jupiter" in a public educational outreach program for the Galileo spacecraft to Jupiter. Two ambassadors are chosen from applicants in each state to provide educational activities and workshops for students and teachers and host public speeches and activities to inform the general public about knowledge learned from Galileo. Two public events have been held so far with four more planned in 1998, in addition to workshops for teachers and students in Oklahoma school systems. Loretta and NSSL are sponsoring the "Weather Around the Solar System" home page on the WWW as a part of this project (*http://www.nssl.noaa.gov/srad/solarsystem*), which compares and contrasts the weather patterns and weather phenomena of planets in our solar system that have atmospheres. ◆

WDSS integration into AWIPS will bring some changes

by J. T. Johnson

The National Weather Service and NSSL have agreed to incorporate unique components of the Warning Decision Support System (WDSS) into the Automated Weather Information Processing System (AWIPS).

One component to be integrated will be the severe weather table, used by forecasters to support their decision making. The table information in the prototype WDSS consists of severe weather prediction and detection algorithm information from a single radar that is sorted and color-coded by severity. During the integration into AWIPS, the tabular information will be transformed into a County Warning Area, or CWA-centric rather than a radar-centric set of information. The reason for this change is that most NWS Forecast Offices have an area of responsibility for issuing warnings- their CWA- that is covered by more than one radar. Therefore, the warning guidance information should include information from all relevant WSR-88D's, not just the primary one. The new CWA-centric information will take into account such things as the range a storm is from a radar, the viewing angle the radars have of the storm, and the scanning strategy the radars are in. Given this new set of information, the forecaster will be able to determine quickly the most significant storms, knowing that the WDSS components have examined them from all possible data sources. Then, a forecaster wishing to have more information, can examine data and algorithm products using data and products from all individual radars that scan the storm. We term this approach to information presentation as *selective disclosure*.

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In addition to the new CWA-centric warning guidance information, the WDSS integration into AWIPS will include trend displays of new variables not currently available in the operational WSR-88D displays. Over the past several years, NSSL has demonstrated the utility of using time series of variables or trends of certain phenomenon-specific parameters for making warnings. Some of these trends have been incorporated into the WSR-88D system. However, it is possible to display many more useful parameters as trends. These additional trends will be added during the WDSS integration into AWIPS.

Initial integration activities are expected to begin in early 1998 and be completed by the end of 1998, resulting in a limited WDSS functionality as part of AWIPS Build 6.0 (Build 3.0 was released to the field in August, 1997). Build 6.0 is expected to be released to the field in mid-1999. Plans are to continue to add more WDSS functionality to AWIPS beyond Build 6. ◆