

A WEEK AT NCAR

**Doug Beadle, Chairman
Atmospheric Technology Committee**

NCAR's building in Boulder, CO is both easy and difficult to spot. The Mesa Lab, as it is known to those who work there, sits against the Flatirons (the beginning of the front range of the Rockies) 6100 ft above sea level. Varied daytime lighting makes the sandstone colored concrete either jump from the mesa or hide in the haze that clings to the mountainside. The drive from the city itself is up a road 1.2 miles in length winding through part of NCAR's 400 acres. Tall grasses, deer and boulders are the only obvious changes in scenery during this 600 ft climb.

The Mesa Lab is a fairly crowded facility that holds many more workers than it was originally intended to. The atmosphere seems almost informal, an aspect that hides the actual output of the facility. The lengthy walk from the parking lot takes you up two flights of stairs to a spacious lobby. Two towers house the scientists who work isolated from the main flow of traffic through the building. The second floor contains a large library that is open to the public and is itself an interesting stop. One of the two basement levels houses the Cray 1A and Cray X-MP computers. The Cray X-MP is capable of providing between 40 and 840 million computations per second, and can accomplish in one second what would take an accounting machine 40 years.

NCAR's divisions include: Administrative, Atmospheric Analysis and Prediction, Atmospheric Chemistry and Aeronomy, Atmospheric Technology (the Research Aviation Facility is a part of the ATD), Convective Storms, Scientific Computing, and an Advanced Study Program and a High Altitude Observatory. NCAR facilities are also spread among several other locations, where most of the equipment itself is located.

My first stop was the Research Aviation Facility (RAF) at the Jefferson County Airport. The RAF fleet consists of a Lockheed Electra, a Rockwell Sabliner and a Beechcraft King Air. The Electra is a large (99 ft wingspan) aircraft that barely fits NCAR's hangar facility, but like the other aircraft it is equipped with gust probes for measuring wind components in flight, and redundant sensors are used for each axis.

On this day the Lockheed Electra, which is equipped with lidar, is being readied for a test flight and part of the RAF's 40 workers swarm around the aircraft doing preflight preparations. A walk through the plane shows various equipment positions on the aircraft. Experiments are designed and built by the researcher with the air chemistry ones placed in the front portion of the aircraft to take advantage of the cleaner air.

The King Air, in addition to its gust probes, is outfitted with a laser which measures rain drop diameters. It was this laser, in the fall of 1986, that measured an 8-mm raindrop that may be the largest diameter raindrop known to date. The output from this sensor records profiles of drops that show even those splattered after they strike the sensor itself; this information is used in many aspects of cloud physics studies.

The second stop on this Tuesday was CP-2 (a dual wavelength doppler radar) site contained in a fabric inflated and pressurized dome. This dome houses a 27 ft S band (10 cm) antenna and two smaller X band (3 cm) dishes. Entry to the dome is through an airlock with a caution reminder from a nearby scientist not to open both doors at once "because a 100 mph wind will definitely knock you down."

The cross polarization output from CP-2 can be used to measure the width and height of a raindrop, a moderate surprise to those accustomed only to reflectivity output. Doppler also works in clear air; the reason it does is that insects return a signal. Since insects float with the wind, the return allows detection of

convergence zones before precipitation develops. At least one NCAR scientist has developed the ability to spot a bumblebee.

The transmitter and receiver at the site are housed in a trailer which allows the entire radar to be moved. To accomplish the move, the radar is dismantled and the dome is deflated and moved to another concrete slab. As long as CP-2 is in Boulder, a microwave link sends data to Program for Regional Observing and Forecasting Services (PROFS) in another part of town. Scientists at these sites have an obvious need to conform to workdays in trailers and fast food lunches.

Wednesday was an equally interesting experience. The CINDE project, which stands for Convection Initiation and Downburst Experiment, is located at Stapleton Airport in Denver. This site is an experience in finding out-of-the-way places. After being admitted through security gates, you find yourself close enough to the runways to wave at the passengers.

The CINDE trailer, actually two trailers joined together, serves as the coordination point for the entire project. On the day of my visit, the third day of operation, the facility is jammed with 16 scientists. Each day's operation begins with a weather briefing to determine if it is a go for the project. The gathering of data demands a large commitment of manpower and material such as radar, aircraft, surface observations, etc. The briefing is concerned with the status of radars, communications problems, photography coordination, status of aircraft as well as a detailed look at all aspects of present and forecast weather. On this particular day, forecasters are certain that convection is going to occur because temperatures are expected to climb high enough. The problem is knowing when convection will start since the timing of development is everything.

The project director gives one-half hour notice to begin the observations, which involve a complex assembling of aircraft, Loran surroundings, doppler radar and surface observations. The aircraft will remain on standby until 2200 GMT as data gathering and the wait for convection begin.

Thursday was spent with meteorologists from PROFS. The morning began with a map briefing to determine the chances for severe weather. Various products showing wind fields, temperature soundings, vorticity and vertical velocity are projected on a screen and discussed by a roomful of 40 meteorologists. A video tape of two small tornadoes from the day before is also shown.

To further my enthusiasm for the day, forecasters determine by 1700 GMT that this is a chase day and I am assigned to Chase One, bringing this particular crew to three. At 1800 GMT we load the vehicle and head south with a restriction of 115 km distance from Boulder. We do have an option, depending on storms, to extend the pursuit to 150 km, but this is outside of radar coverage. Our departure is accompanied by numerous flat cumulus, a pretty depressing start. At 1825 GMT we spot a towering Cu to the south. Hot dog, hard convection! We radio our news to the control center. Chase Two has also departed Boulder and they spot the same tower.

At 1850 GMT lightning and a radar return of 40 dbz show up 45 miles SSW of our position. Our thunderstorm is continuing to grow. The comment from the control center at 1900 GMT indicates that activity may build further south, a new cell is spotted on the doppler.

At 1910 GMT the two way radio crackles with the news that there is a 90% chance of 40 dbz in the area where we are headed. The chase team has grown to four vehicles. By 1930 GMT we

reach Castle Rock, an appropriately named town near a huge rock formation that looks like a castle. Good convection is continuing north along the foothills. Our chase vehicle appears to be headed into the prime area. How lucky can you get!

At 1945 GMT we reach Larkspur, CO, a small town at the edge of radar coverage. We find a parking lot near a garage, circle the gas pumps and find a scenic view of the mountains topped off with a trash dumpster in the foreground. This spot was to become our home for the next one and a half hours as we sat and watched towers come over the mountains, pulsing to 60 dbz and falling back again. The number of turkey towers continued to grow, but there is too much glaciation on the tops, occurring too early in their life cycle. We are unable to get enough heating to burn the cap off. In the meantime, our government car is beginning to attract attention and we begin to speculate that the locals believe we may be from the FBI. Our radio transmissions to the control center only fuel their suspicions. After a Pepsi and more waiting, the control center decides at 2120 GMT that the chase is a bust and we head back to Boulder. This is normal, as storm chasers know, another day would be different.

The last day was highlighted by a morning at PROFS (Program for Regional Observing and Forecasting Services). The com-

puter programs that make up this system allow forecasters to do an amazing number of things. A mouse permits selection from a screen of a wide variety of data and information. Data can be displayed on a local, regional, national, North American or hemispheric scale. Smaller scales such as local and regional have a greater selection of data available.

The system is a forecaster's dream as almost any type of data can be overlayed over another, plus the ability to select a looping feature for nearly all of the products. An interactive skew-T shows a temperature profile for a later time during the day. Even forecast texts are available on the system. Forecasters will find this system highly advantageous once they have the opportunity to use it operationally. PROFS is indeed a very impressive system!

NOTES

Doug Beadle, Chairman, Atmospheric Technology Committee, visited the National Center for Atmospheric Research (NCAR) from June 23-26, 1987 so that he could report on NCAR activities to NWA members. The NWA thanks NCAR for the fine reception and courtesies it extended to Mr. Beadle.

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SATELLITE INFORMATION SERVICES CORPORATION

Satellite Information Services Corporation (SISCORP) offers a technologically superior data broadcasting service utilizing a satellite communications network for distribution of information to subscribers in the private and government sector. The corporation is the leader in the dissemination of weather related data.

SISCORP's WeatherStream 2000 is a unique data broadcasting service which represents a major advancement in the dissemination of weather information. Using SISCORP's proprietary data selection process, customer-selected portions of the government's worldwide weather database are continuously broadcast via the Galaxy III Communications Satellite. The customer utilizes a state-of-the-art, two-foot diameter micro earth station with the proprietary SISBox (information selector device) for data reception. Other SISCORP products include the SIS-Writer 2000-D, a low cost, plain paper printer for DIFAX charts and the WXBase software package which allows for data capture storage and retrieval. WXBase modular add-ons include DIFAX display, Accu-Weather Color Graphics display and WXBrief Aviation Weather Services. SISCORP is the first organization to distribute all government-furnished weather data products using a low cost, highly reliable satellite receiving station.

SISCORP's senior staff members average nearly 25 years of experience in the management of information and communications systems. SISCORP is headquartered at 1100 Wayne Avenue, Suite 1209, Silver Spring, MD 20910 and can be reached at either 1-800-345-7472 or (301) 588-9000.

RUTGERS UNIVERSITY AND COOK COLLEGE

Rutgers, The State University of New Jersey, was founded in 1766. The University has over 47,000 students on three campuses; the largest campus is located in New Brunswick. The instructional and research functions of the University are carried out in twelve undergraduate colleges, eleven graduate schools, and in one college that offers both undergraduate and graduate degrees.

The Department of Meteorology and Physical Oceanography is located in New Brunswick on the Cook College campus, and offers both the B.S. and M.S. degrees. Cook College is a professional school concerned with the life sciences, agriculture, and environmental sciences and is the land-grant college of Rutgers, The State University of New Jersey. The college has its own faculty and facilities, and 70 percent of its approximately 3,000 undergraduates live on campus. The student body is evenly divided between men and women. Cook College applies the land-grant concept of integrated teaching, research, and community outreach to its broad range of interdisciplinary, problem-oriented programs for the benefit of the state and the nation.