

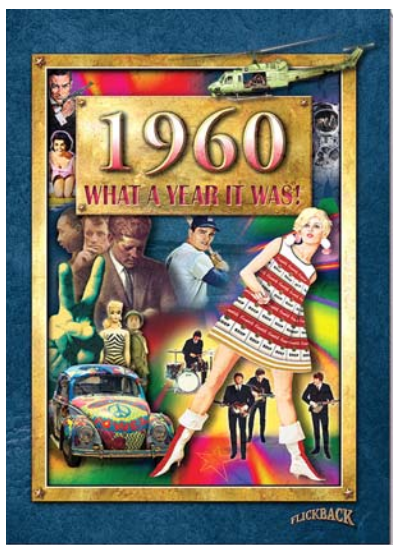


# Reflections at 50

Rick Anthes

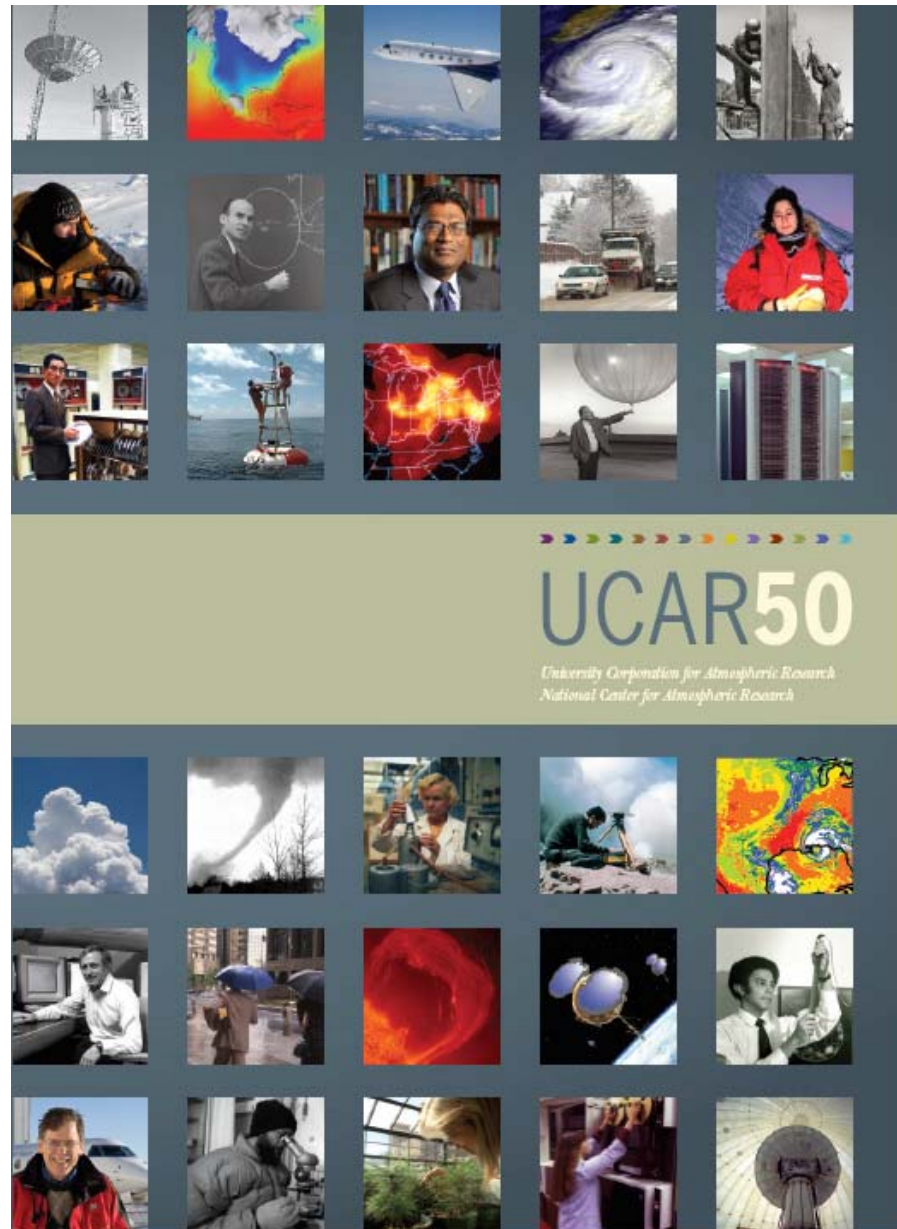
5 October 2010

UCAR Members Annual Meeting  
Boulder, Colorado



# UCAR50

- \* Just published
- \* Decade-by-decade structure as a springboard to discuss related work now and in the near future
- Laced with quotes and tributes from the community
- Draws extensively from interviews, oral histories, and historical documents
- See Bob Henson for questions or comments





Mayor Susan Osborne



# City of Boulder Proclamation 17 August 2010

UCAR/NCAR  
50<sup>th</sup> Anniversary

**WHEREAS**, in 1959, the University Corporation for Atmospheric Research (UCAR) was created to serve as a consortium of research institutions dedicated to understanding the atmosphere—the air around us—and the complex processes that make up the earth system, from the ocean floor to the sun's core, and

**WHEREAS**, in 1960, when UCAR was incorporated as a Colorado non profit and Walter Orr Roberts selected as its first president, the UCAR Board of Trustees created the National Center for Atmospheric Research (NCAR), funded by the National Science Foundation to provide research, observing and computing facilities, and a variety of services for the atmospheric and Earth sciences community, and

**WHEREAS**, since their founding, both UCAR and NCAR have been headquartered in Boulder; currently with three main campuses within the city: NCAR Mesa Laboratory and UCAR Fleischmann Building; Center Green Campus, and; Foothills Laboratory, and

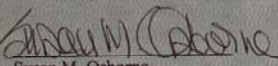
**WHEREAS**, since its founding, NCAR has grown from five full-time scientists to about 220 Ph.D. researchers and the 14 founding universities that originally made up UCAR have been joined by more than 60 other schools, including the University of Colorado, and

**WHEREAS**, UCAR and NCAR currently employ about 1,400 people in the Boulder area, many of whom are involved with education and volunteer activities, and all of whom contribute to the economy of this region, and

**WHEREAS**, NCAR scientists study weather and climate, and make other significant contributions to the body of knowledge concerning solar effects on the Earth, space weather, atmospheric chemistry and pollution, the societal impacts of severe weather and climate change, and a myriad of additional related topics, and

**WHEREAS**, NCAR scientists have received numerous awards and recognition for their work, including sharing in the 2007 Nobel Peace Prize with the U.N. Intergovernmental Panel on Climate Change (IPCC), both for having co-authored or reviewed the four assessment reports issued by the IPCC and for the NCAR-based Community Climate System Model that was cited heavily in the IPCC's 2007 report.

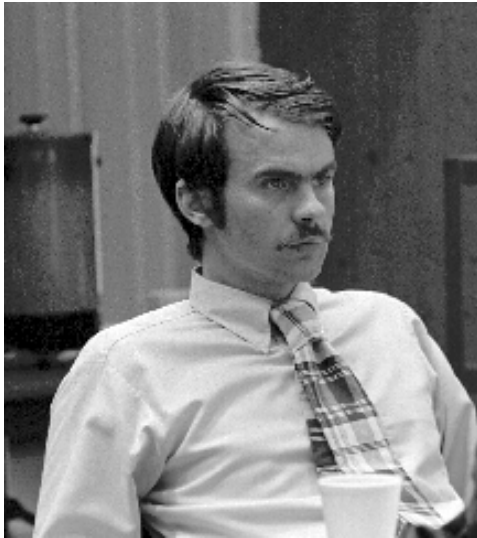
**THEREFORE**, I, Susan Osborne, Mayor of the City of Boulder, officially declare and express the collective gratitude of City Council, city staff, and the people of Boulder for the 50 years of service by UCAR and NCAR that have significantly benefited the city, the nation, and the field of atmospheric science.

  
Susan M. Osborne  
Mayor



# Brief History of my relationship with NCAR and UCAR

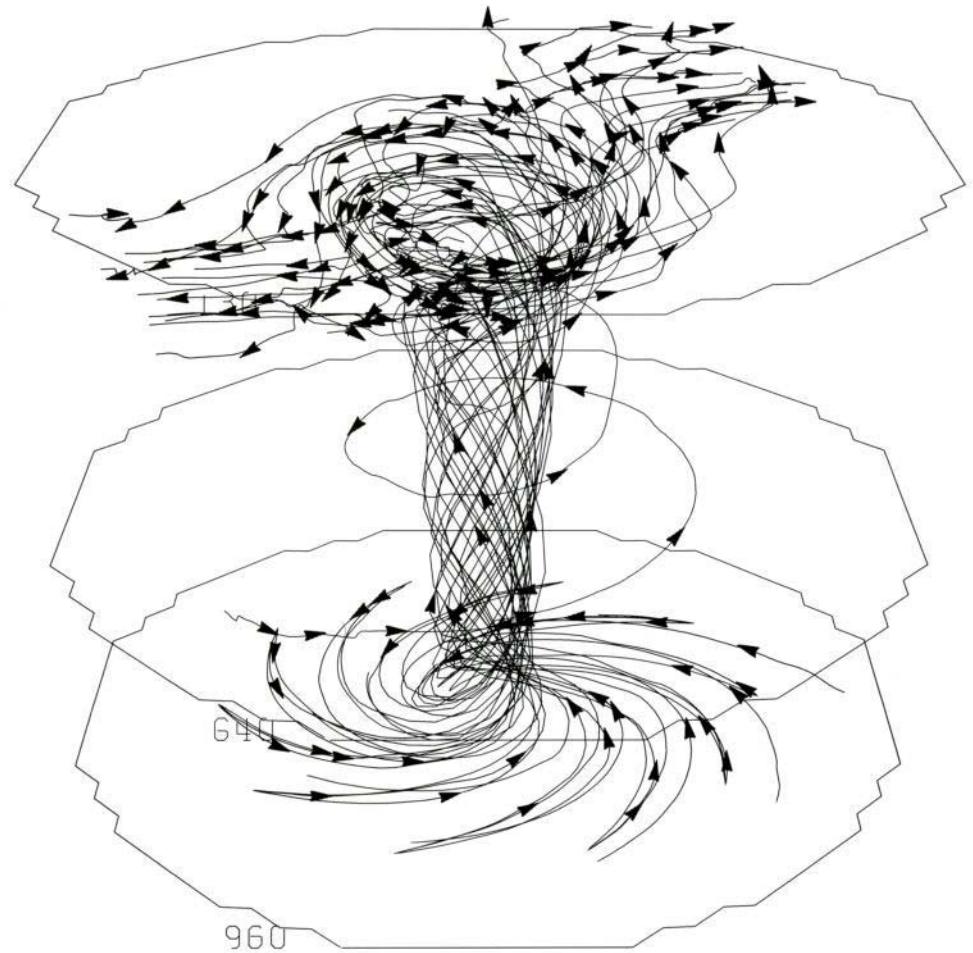
- 1970—Visited NCAR from NOAA's National Hurricane Research Laboratory in Miami to use computer for hurricane model graphics
- 1971-1981-Chaired UCAR SPEC review of NCAR (1977-780) and participated in advisory committees and workshops while at Penn State University
- Sept. 1981-August 1986-Director of Atmospheric Analysis and Prediction Division (AAP) NCAR. Bill Hess Director of NCAR then.
- Sept. 1986-Feb 1988 Director of NCAR
- March 1988-Sept. 1988 Acting President of UCAR
- Sept 1988-present-President of UCAR



Visitor and user of NCAR CDC 7600 computer  
1970



Mesa Lab Mezzanine 1970





# The earliest days....



Walt Roberts and High Altitude  
Observatory  
Climax, Colorado  
1940-1959

Walt Roberts with coronagraph  
August 15, 1940



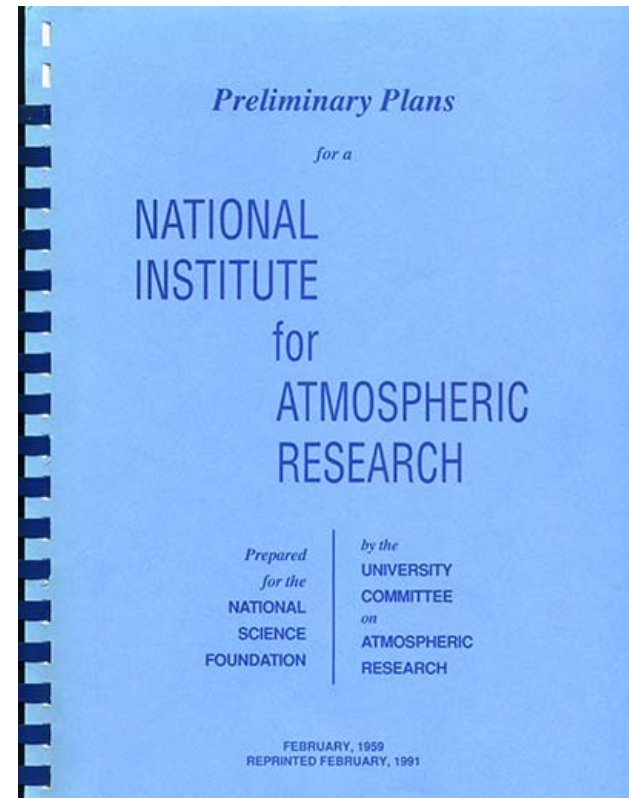
# Janet Roberts Climax Colorado 1945





1959-1970

NCAR and UCAR created in 1960



Tom Malone—instrumental in leading National Academy Committee on Meteorology which led to the “Blue Book” and creation of UCAR and NCAR. A UCAR Trustee.

<http://humanprospect-tfmautobio.blogspot.com/>

## UCAR's 75 Member Institutions (2009/1960)

University of Alabama in Huntsville	University of Houston	<b>Pennsylvania State University</b>
University of Alaska	Howard University	Princeton University
University at Albany, State U of NY	University of Illinois at Urbana-Champaign	Purdue University
<b>University of Arizona</b>	Iowa State University	University of Rhode Island
Arizona State University	University of Iowa	Rice University
Brown University	<b>The Johns Hopkins University</b>	Rutgers University
California Institute of Technology	University of Maryland	<b>Saint Louis University</b>
University of California, Berkeley	<b>Massachusetts Institute of Technology</b>	Scripps Institution of Oceanography at UCSD
University of California, Davis	McGill University	Stanford University
University of California, Irvine	<b>University of Maine (2009)</b>	<b>Texas A &amp; M University</b>
<b>University of California, Los Angeles</b>	University of Miami	University of Texas at Austin
<b>University of Chicago</b>	<b>University of Michigan-Ann Arbor</b>	Texas Tech University
Colorado State University	University of Minnesota	University of Toronto
University of Colorado at Boulder	University of Missouri	Utah State University
Columbia University	Naval Postgraduate School	University of Utah
University of Connecticut	University of Nebraska Lincoln	University of Virginia
<b>Cornell University</b>	Nevada System of Higher Education	<b>University of Washington</b>
University of Delaware	University of New Hampshire	Washington State University
University of Denver	New Mexico Institute of Mining and Technology	<b>University of Wisconsin- Madison</b>
Drexel University	<b>New York University</b>	University of Wisconsin-Milwaukee
<b>Florida State University</b>	North Carolina State University	Woods Hole Oceanographic Institution
Georgia Institute of Technology	The Ohio State University	University of Wyoming
<b>George Mason University (2009)</b>	University of Oklahoma	Yale University
Harvard University	Old Dominion University	York University
University of Hawaii	Oregon State University	

# 1<sup>st</sup> UCAR Board Meeting April 2, 1959, University of Arizona

1<sup>st</sup> UCAR BOARD MEETING  
April 2, 1959  
Univ. of Ariz. Solar Energy Lab



# Theme—Trustees and Members

# Trustees October 1988





Ferd Baer, Bob Street, Bob Fleagle  
Hamburg 1990



Dick Reed 1988



Trustees July 1995: Front row: Bob Serafin (NCAR Dir), Harriet Barker (UCAR VP), Conway Leovy, Roger Wakimoto, Dick Peltier. Back row: Lyn Hutton, Martin Jischke, Rick Anthes, Bill Chamedies, John Snow, Susan Avery, Dick Johnson, Dick Hallgren, Bill Moomaw, Don Johnson. Len Fisk, Bill Bishop, Richard Sommerville



# Trustees February 2003



## Trustees February 2003



# Trustees February 2003



# NSF, Trustees, President's Council 2004



# Trustees President's Council February 2006



# Trustees May 2010 Washington DC



# Center Green Dedication 8 October 2002



# Center Green Dedication 8 October 2002

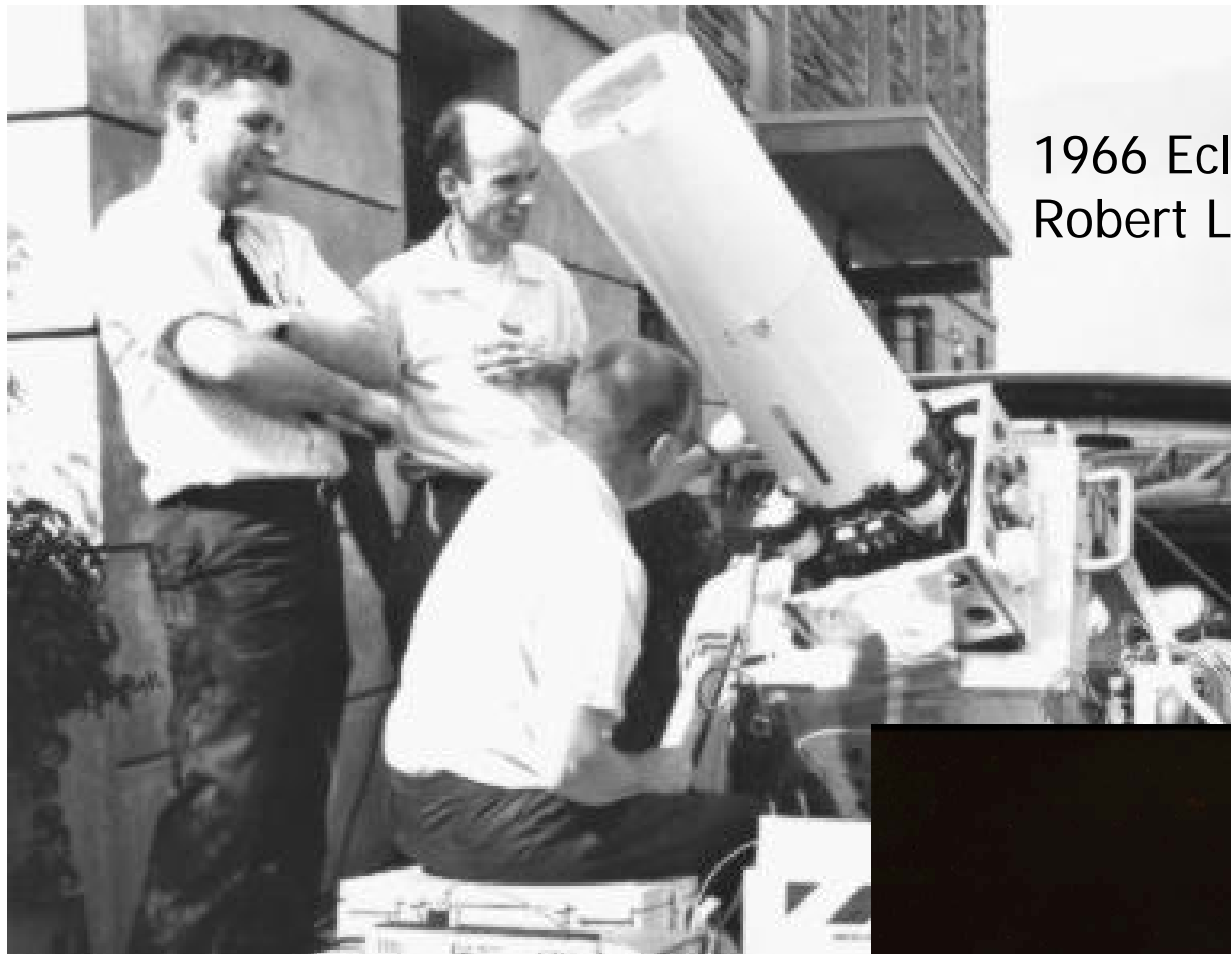




## UCAR Member Reps Oct 2006

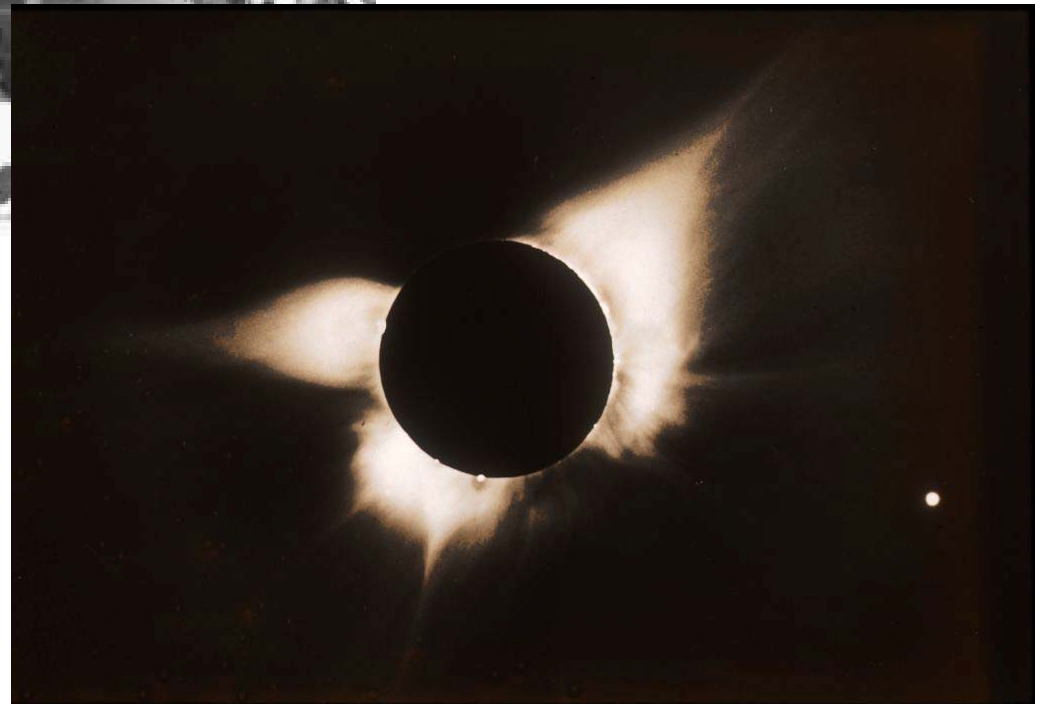


Back to the 60s

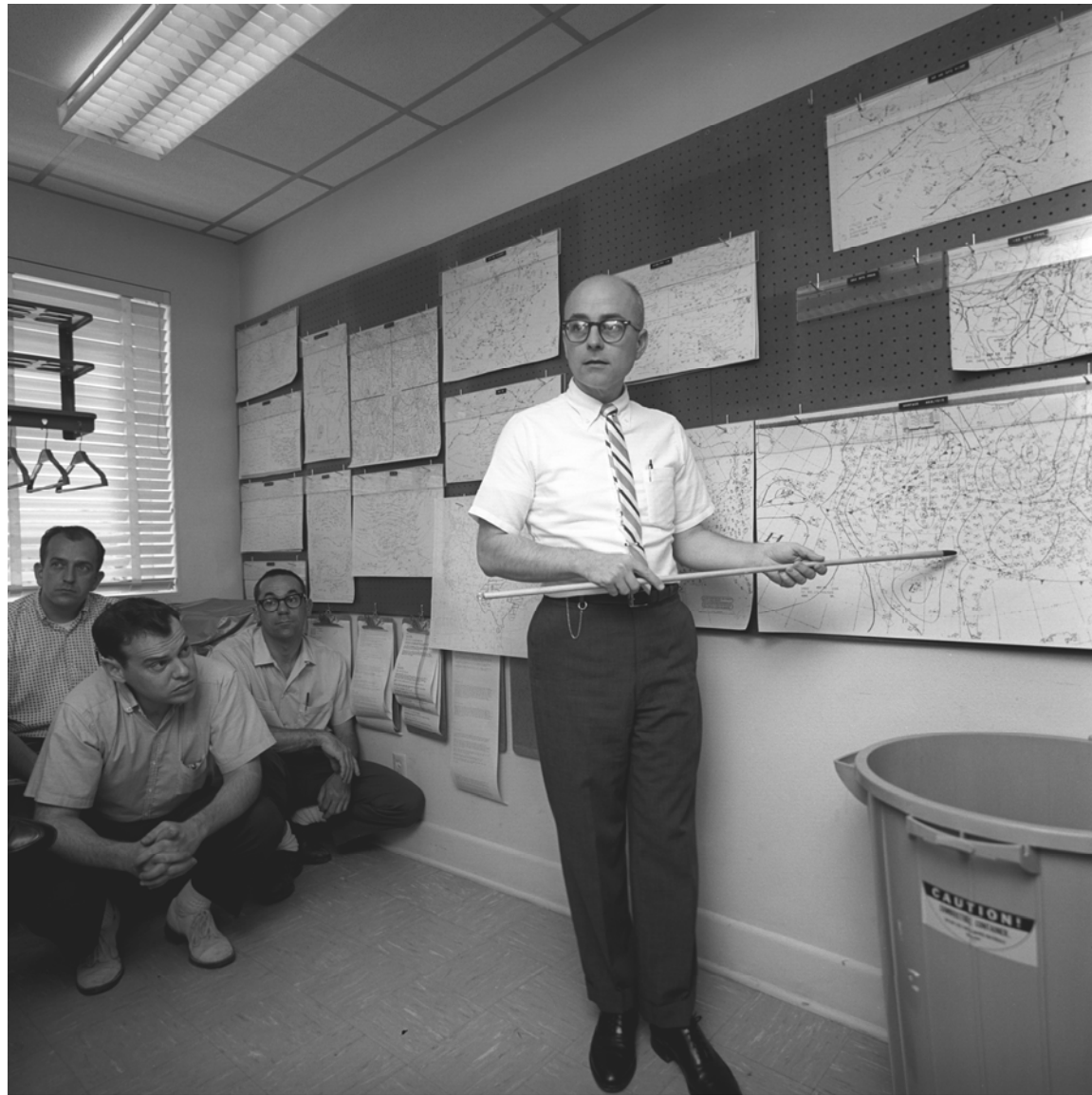


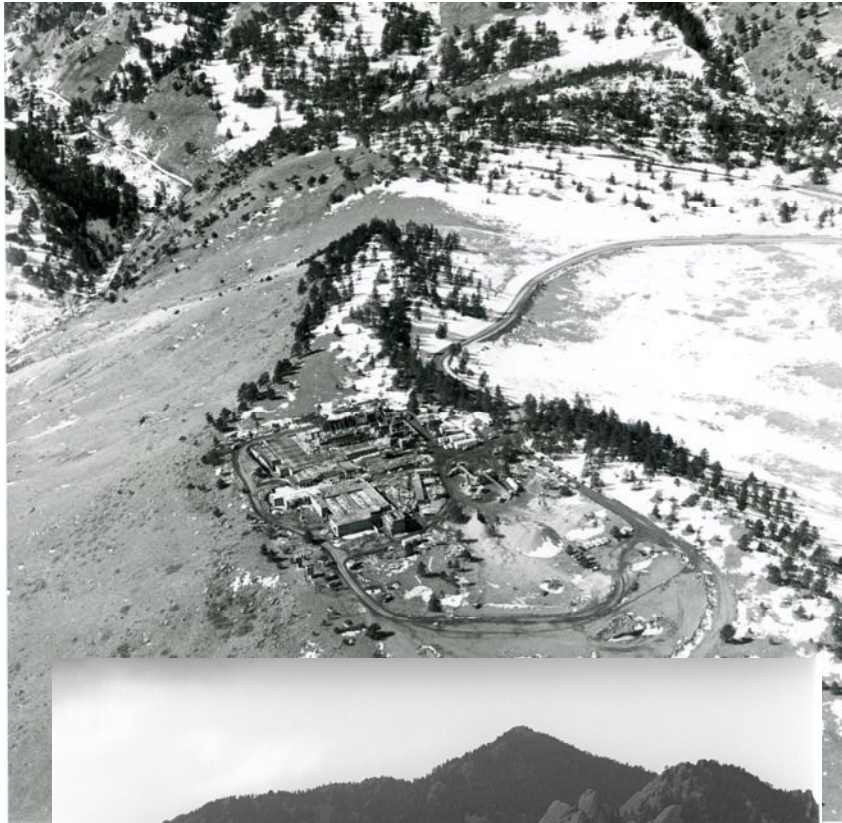
1966 Eclipse Jack Eddy, John Firor,  
Robert Lee

1966 Eclipse  
Bolivia

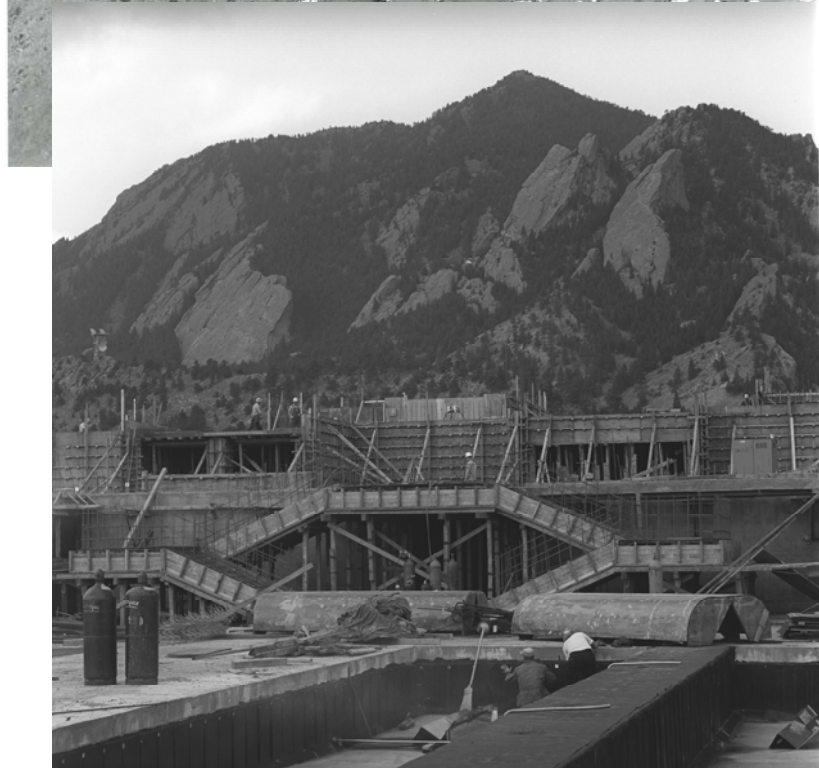


# 1965 Weather Briefing





## Construction of Mesa Lab 1965



# Fleischmann Building Groundbreaking Sept 1968



John Firor, Bernard Haurwitz, Walt Roberts

Theme—Construction to support  
science

# Campuses that allow growth, flexibility

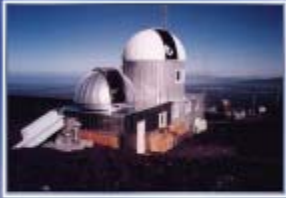


**Mesa Lab**  
**~80,000 visitors annually**

**Center Green**

**Foothills Lab**





# Mauna Loa Solar Observatory

Welcome to the website of MLSO, which operates instruments designed to provide observations needed to understand the Sun's continuous release of plasma and energy into interplanetary space



1970-1980

## Leningrad 1972



Front row: K. Miyakoda, Viktor Antonovich Bugaev, M. Budyko, J. Smagorinsky, Bert Bolin, A. Obukov, A. Robert, ?. Others on left side, Tomio Asai, R. Jastrow, S. Manabe, Lev Gandin, Paul Crutzen, Yoshi Ogura. On right side: Doug Lilly (with beard), Francis Bretherton, Hans Panofsky, Akira Kasahara

JEFFCO Hangar 1971



# Theme-Research Aircraft

# 1970s to 1990s NCAR Sailplane



Ca 1972



NCAR's de Havilland Buffalo N326D.



NCAR's Queen Air A80 N304D.





NCAR's North American Rockwell Sabreliner N307D.

# Sabreliner



# NCAR Electra in Kuwait 1991



# King Air 1984



# 1984 Fleet



Electra

Queen Air

Sabreliner

King Air

NCAR WB-57  
21 October 1994



# C-130



Arica, Chile October 2008

# HIAPER

2008





# HIAPER



Terrain-Induced Rotor Experiment

(T-REX)

2008

Back to the 1970s

# CRAY 1-A 1975-1986

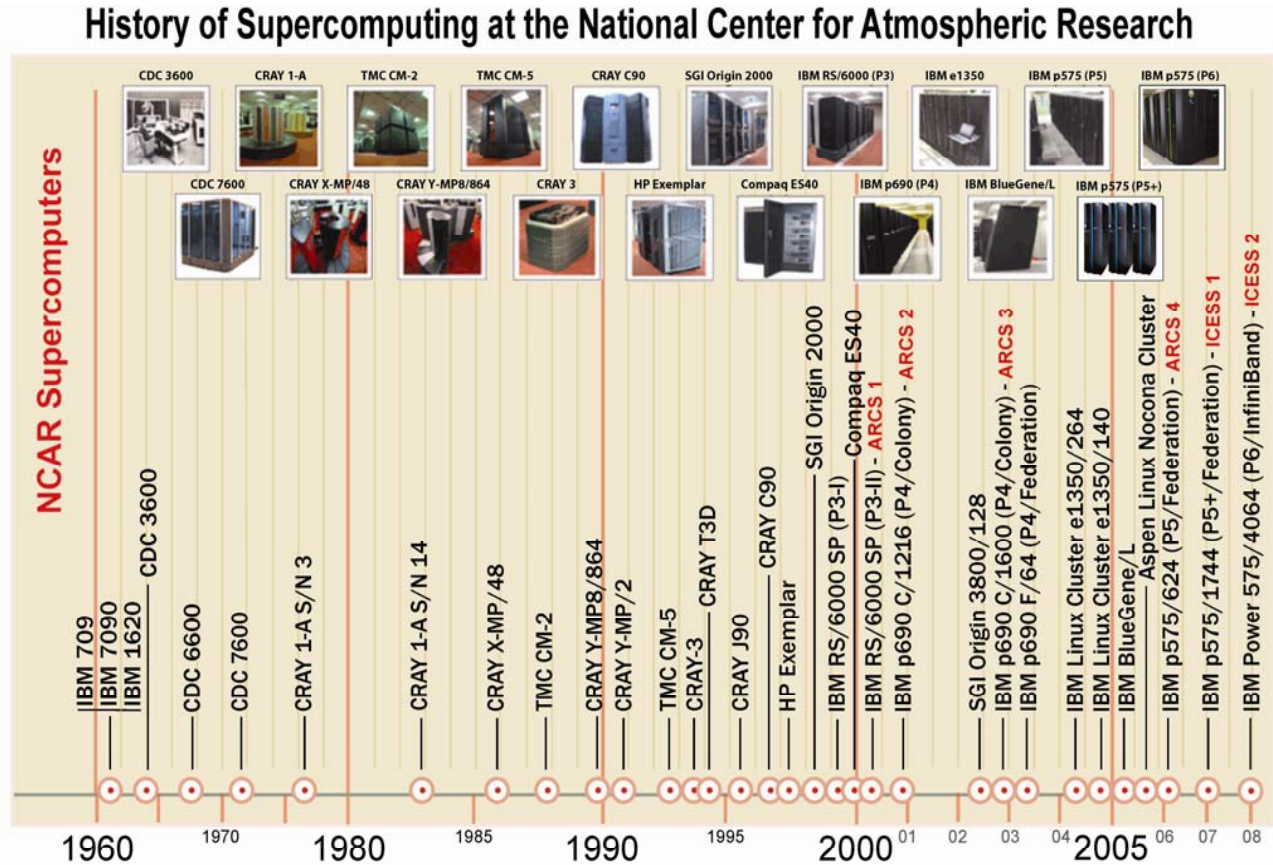


1978

# Theme: Supercomputing



Card punch operator  
In late 1960s



# CDC 6600 1963-1974

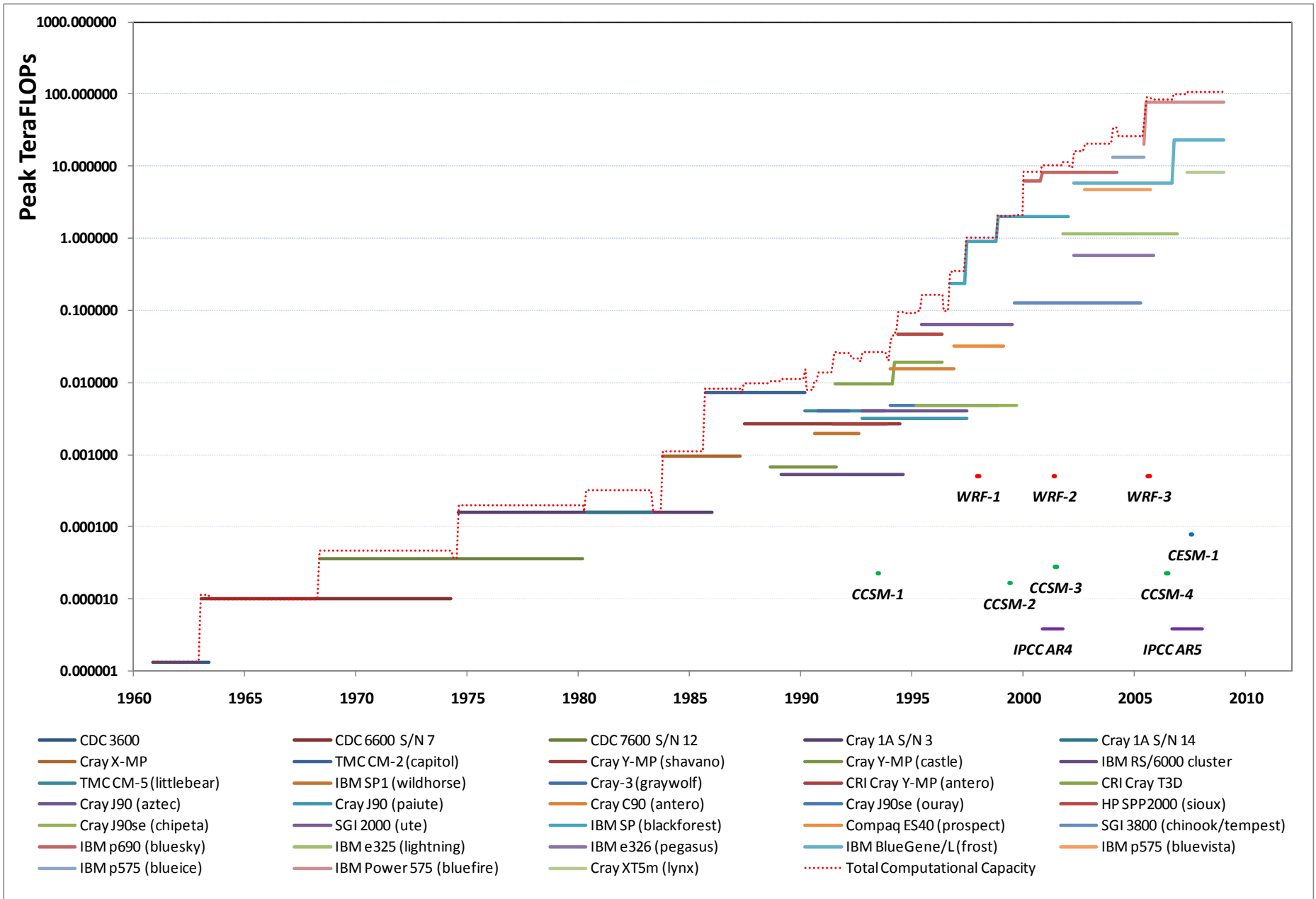


IBM Power 575 Hydro-Cluster  
(Bluefire) 2008-2010

**10 Million times faster than 6600**



# History of NCAR Computers





Warren Washington, Maurice Blackmon, Eric Barron, Byron Boville  
and Bob Chervin 1983

## Delivery of CRAY XMP



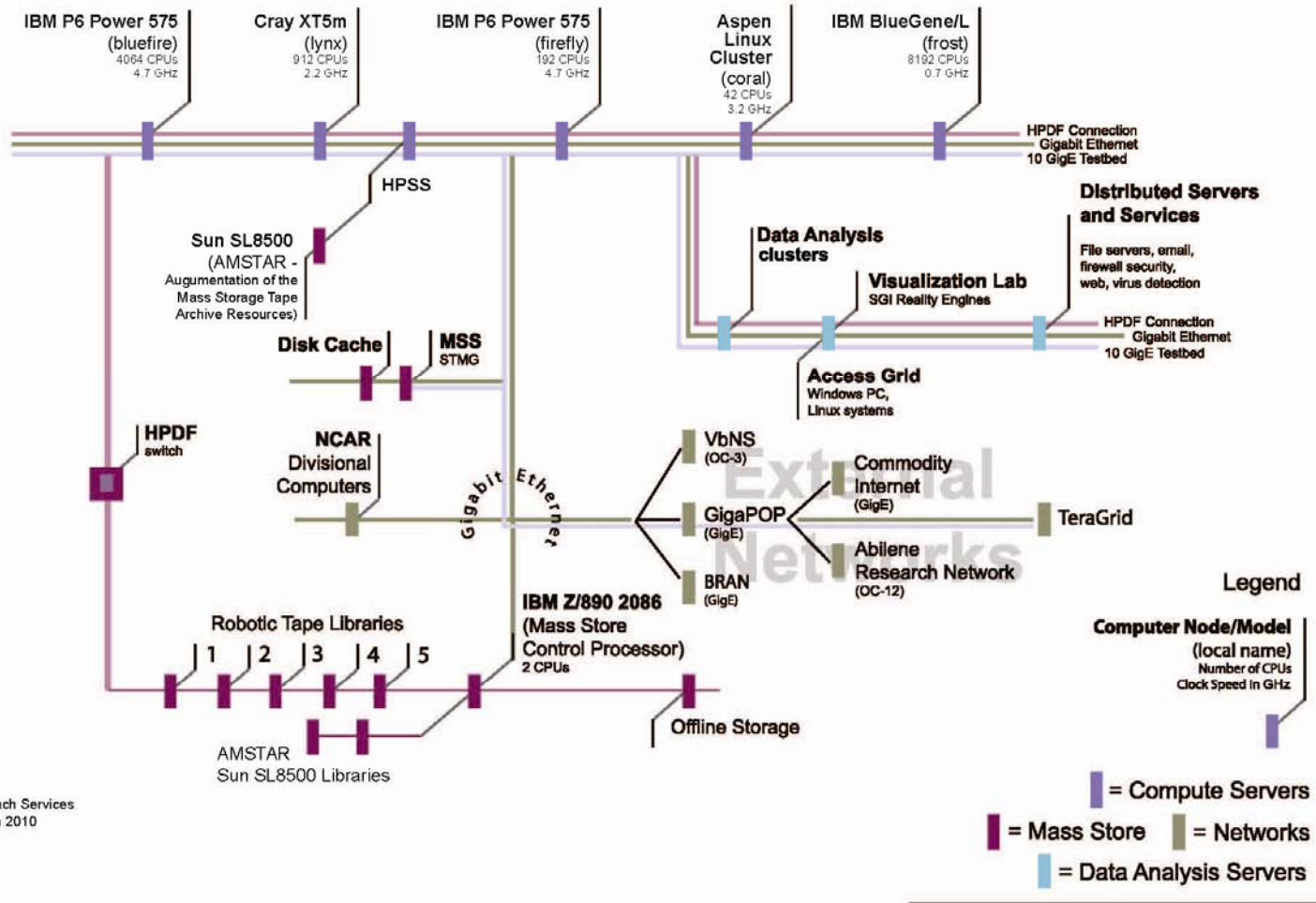
October 1986





# March 2010 NCAR computing system

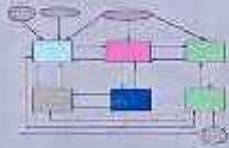
## Computing Resources, Networking Infrastructure, and Mass Storage System NCAR Computational and Information Systems Laboratory



# Model Evaluation Consortium for Climate Assessment (MECCA) 1988-1995

**MECCA**

Phase I Research Results and Future Directions



## MECCA Goals

- To quantify the probable range of future climate change
- To provide policymakers with information for coordinating decisions with scientific developments
- To identify key topics needing research to improve climate forecasts

# Model Evaluation Consortium for Climate Assessment (MECCA)

## Sponsors

Electric Power Research Institute (EPRI)

University Corporation for Atmospheric  
Research (UCAR)

Central Research Institute of Electric  
Power Industry (CRIEPI) (Japan)

Electricite de France (EDF)

Agency for New Technologies, Energies  
and Environment (ENEA) (Italy)

Research and Development, Testing and  
Certification and Consulting Services for  
the Electric Power Industry (KEMA)  
(Netherlands)

## "In-Kind" Support

Provided by NCAR from its NSF support

# MECCA Computer

## CRAY Y-MP2D/216 (castle)

1991–1993

First computer in N. America  
Dedicated solely to climate  
simulations

CSMP  
9/15/90

### CRAY XMP/48 INITIATIVE

#### \*CONFIGURATION

- FOUR PROCESSORS
- EIGHT MILLION WORDS OF CENTRAL MEMORY
- 256-MILLION-WORD SOLID STATE DISK
- 20 GIGABYTES OF HIGH-SPEED DISK DIRECTLY CONNECTED TO XMP

#### \*EPRI ROLE

- PROVIDE INCREMENTAL START-UP AND ANNUAL OPERATING COSTS (Approximately \$13M over 3 years)
- PLAY LEAD ROLE IN DEFINITION AND SELECTION OF CLIMATE RESEARCH PROJECTS THAT USE FACILITY
- PARTICIPATE IN INTERPRETATION OF RESULTS
- EPRI TENTATIVE COMMITMENT IS FOR \$4.5M of \$13M; EPRI and UCAR ARE COLLABORATING ON DEVELOPING AN INDUSTRY/AGENCY COALITION TO FUND THE REMAINING \$8.5M

#### \*NCAR ROLE

- OPERATE AND MAINTAIN DEDICATED FACILITY
- PROVIDE CONSULTING, DATA, SOFTWARE, AND VISUALIZATION SUPPORT
- PROVIDE ACCESS TO ONE OF THE LARGEST CLIMATE DATA ARCHIVES IN THE WORLD (350 data sets totalling two terabytes)
- VALUE OF NCAR SERVICES APPROXIMATELY \$8.3M

# Example science project supported by MECCA

**MECCA**

Phase I Research Results and Future Directions

Atmospheric  
Dynamics  
(Including clouds)

## Regional Climate Modeling

Giorgi/Visconti/Marinucci/Decanio

- Model was run for different scenarios over the United States
- Nested regional model more closely represents influences on climate exerted by topographic features
- Regional model showed improved simulation of temperature and precipitation

# Example science project supported by MECCA

**MECCA**

Phase I Research Results and Future Directions

Atmospheric  
Dynamics  
(including clouds)

## Climate Sensitivity Experiments

Washington/Meehl

- Developed new set of coupled atmosphere, sea-ice and ocean models
- Models simulated observed parameter values better than previous models
- Showed simulated cirrus cloud albedo creates a negative climate feedback - Result: Cooler Planet

Fujitsu visit Sept 1991  
So much for free trade.....



# NCAR Wyoming Supercomputing Center









Bill Gern and Rick Anthes



Cliff Jacobs and Bob Serafin

1 October 2010



<http://oxblue.com/pro/open/saunderci/ucar>

# Summer 2012



©2009 g3D, Inc. www.g3d.net

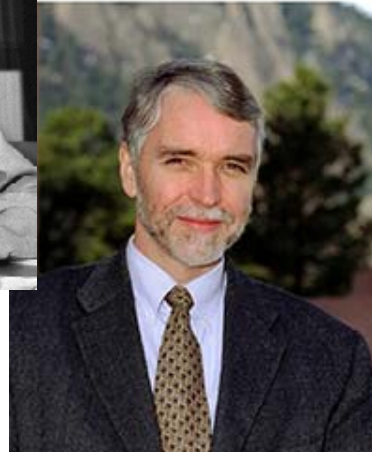
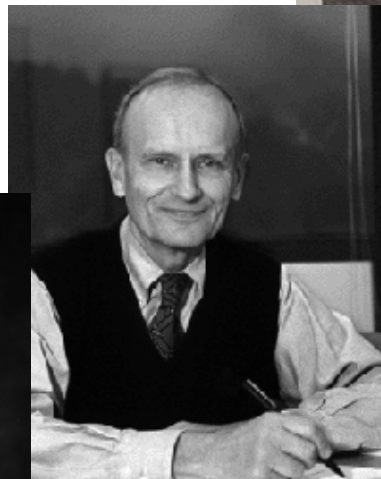
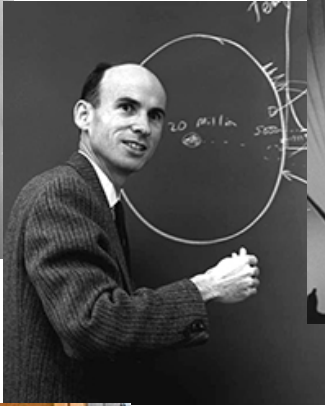
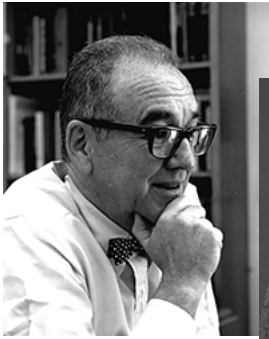
*Image courtesy of g3D, Inc.*

Back to the 1970s

John Firor, Francis Bretherton, Walt Roberts ca. 1976



# Theme—People and Leadership



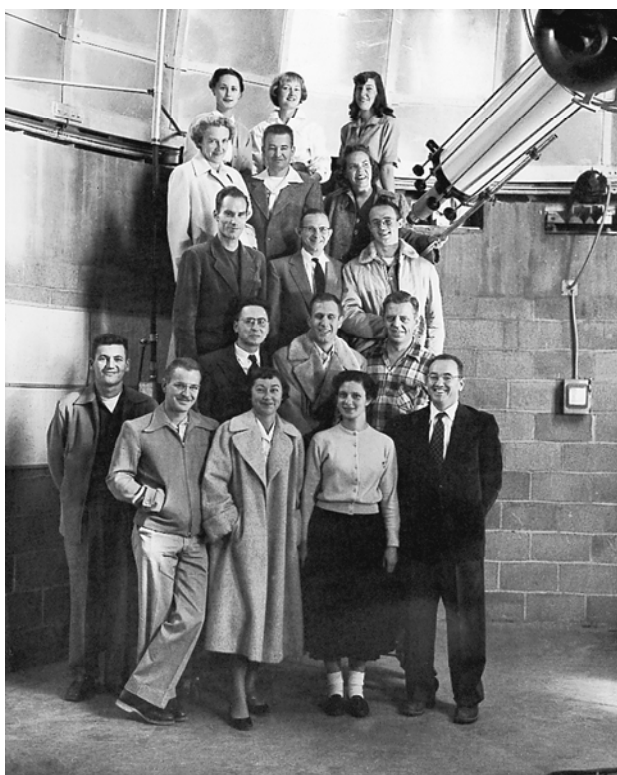


Akira Kasahara 1970

Dave Bargen and Bob Serafin  
ca. 1977



HAO staff  
1940-50s



HAO Directors MacQueen, Roberts, Gilman, Firor







Bill Rawson and Harriet



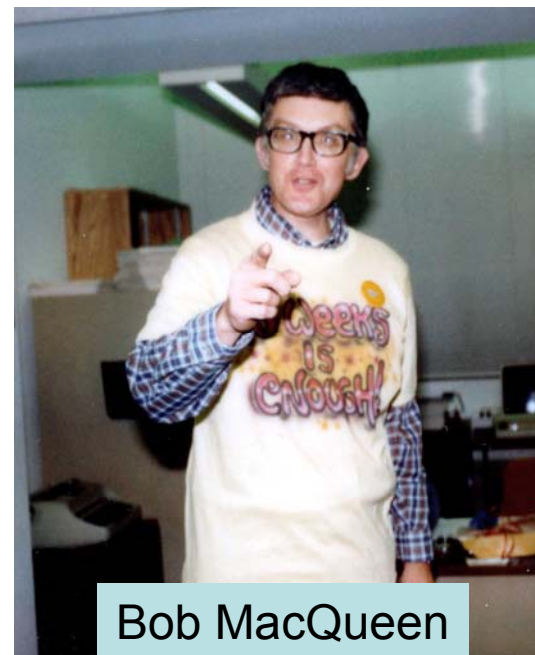
Steve Schneider and Jim Baker



Ralph Cicerone



Doug Lilly



Bob MacQueen



Bill Hess, Margaret Drake and Walter Macintyre

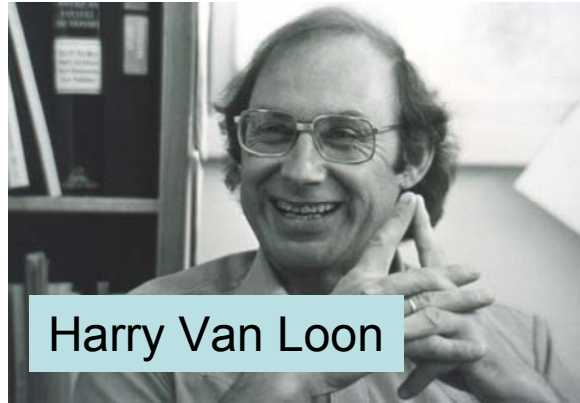


Fred Carr and Chester Newton  
Oklahoma ca. 1978



Brant Foote

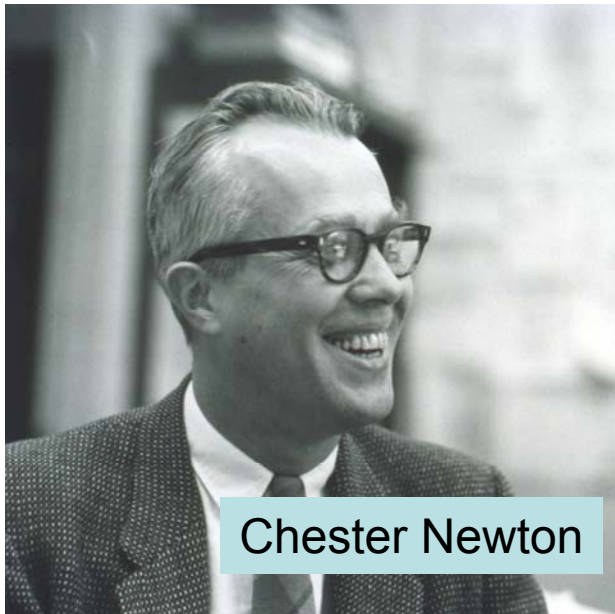
Greg Holland



Harry Van Loon



Dave Baumhefner



Chester Newton



Harriet Barker and Mike Moran



Paul Julian, Rol Madden, Dennis Shea, Chester Newton, Harry Van Loon

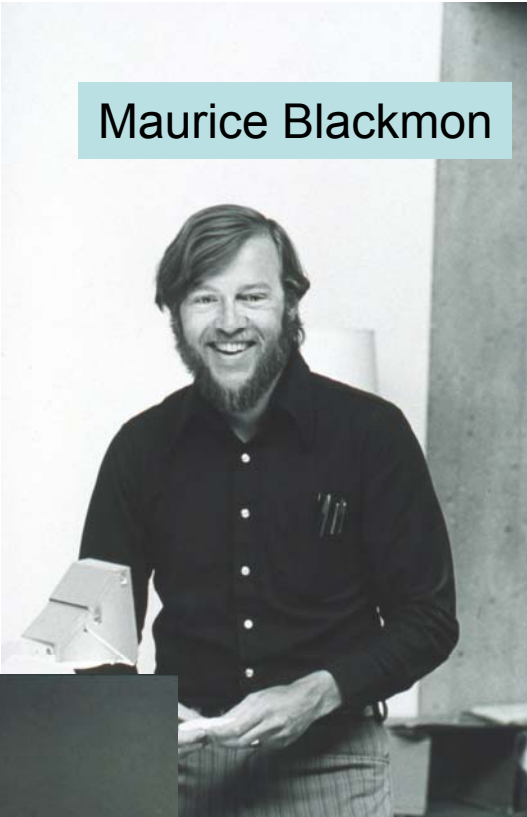
## Chester Newton's AAP Group 2008

Jim Fankhauser, Rol Madden, Mel Shapiro, Dennis Shea, Harry Van Loon  
Chester and Harriet Newton





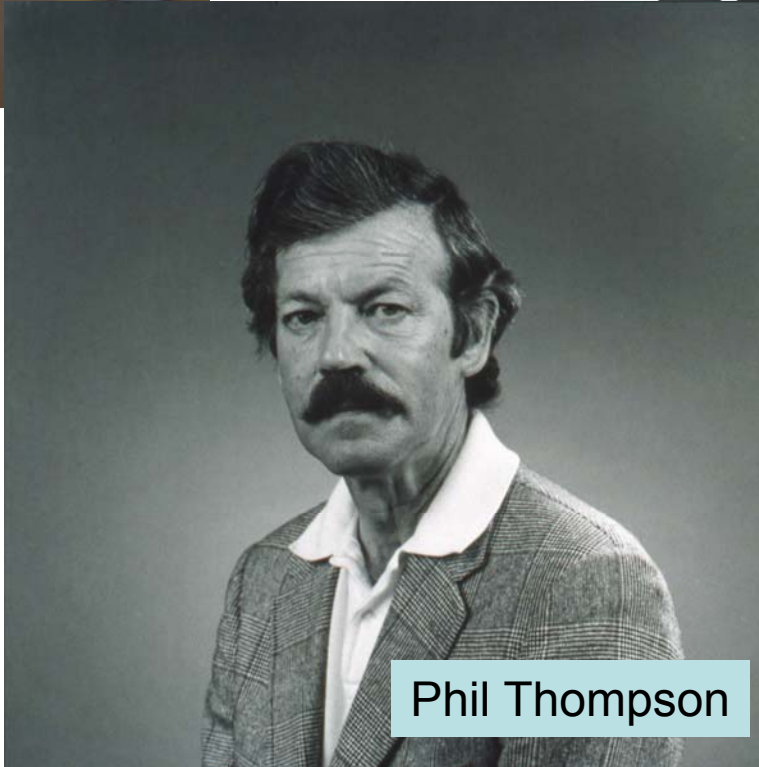
What's this?



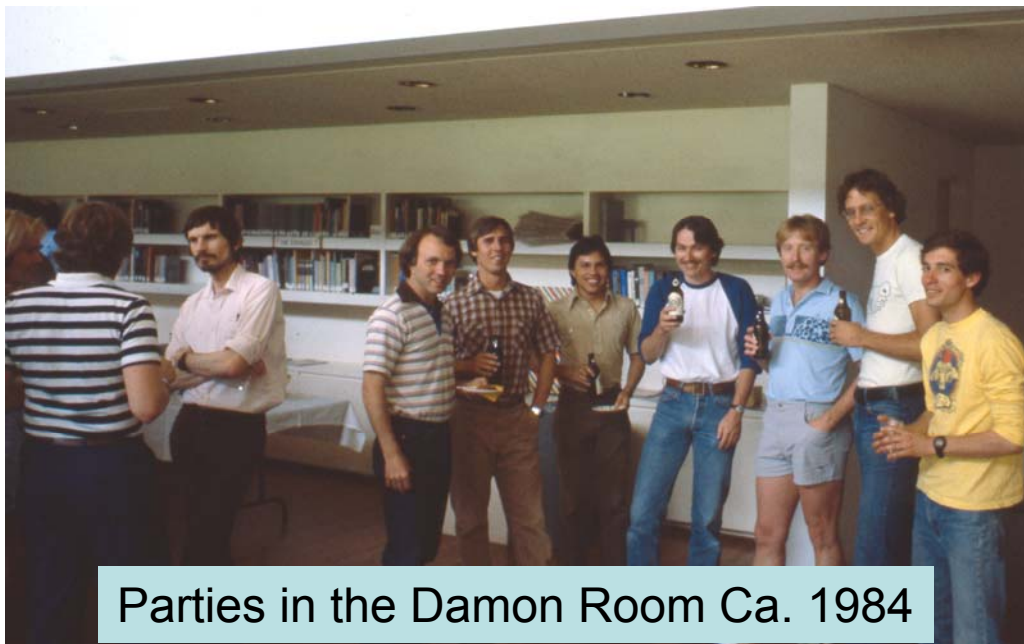
Maurice Blackmon



Will Kellogg



Phil Thompson



Parties in the Damon Room Ca. 1984



Steve Schneider



Panofsky, Leith, London, Anthes  
Sept 1982



Bob Chervin



Roger Daley, Dave Williamson, Joe Tribbia, Bill Hess





Ed Zipser, Ed Wolff, Stan Ruttenberg, Harriet Crowe ca 1985



Chester Newton and Jim Coakley



Gloria Williamson and Akira Kasahara

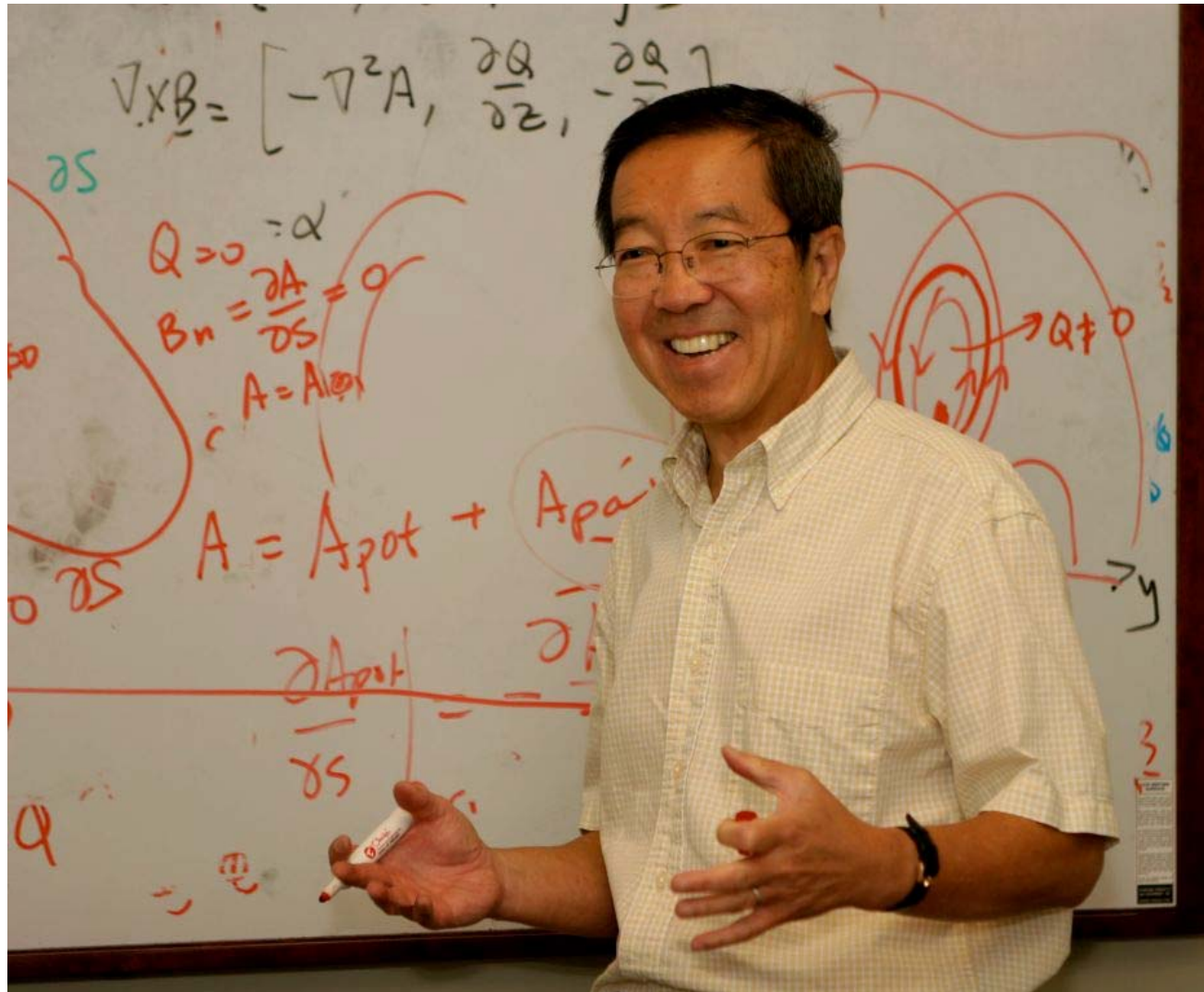


John Firor, Peter Rhines, Chuck Leith 1983



1983 Maurice Blackmon, Dave Williamson, Rick Wolski

# BC Low



Rick and Warren AMS 1994 Nashville





# President's Council Retreat June 2009



Jack Fellows

Maura Hagan

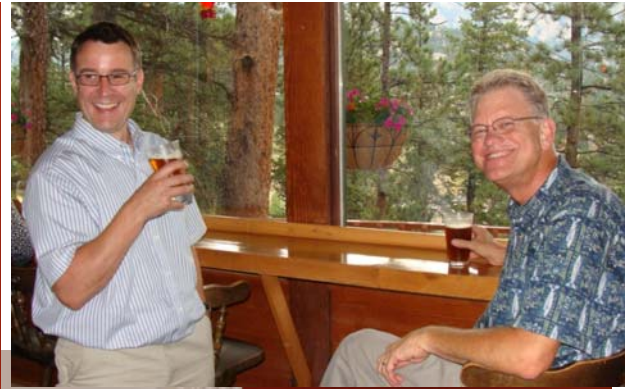
Rick Anthes

Katy Schmoll

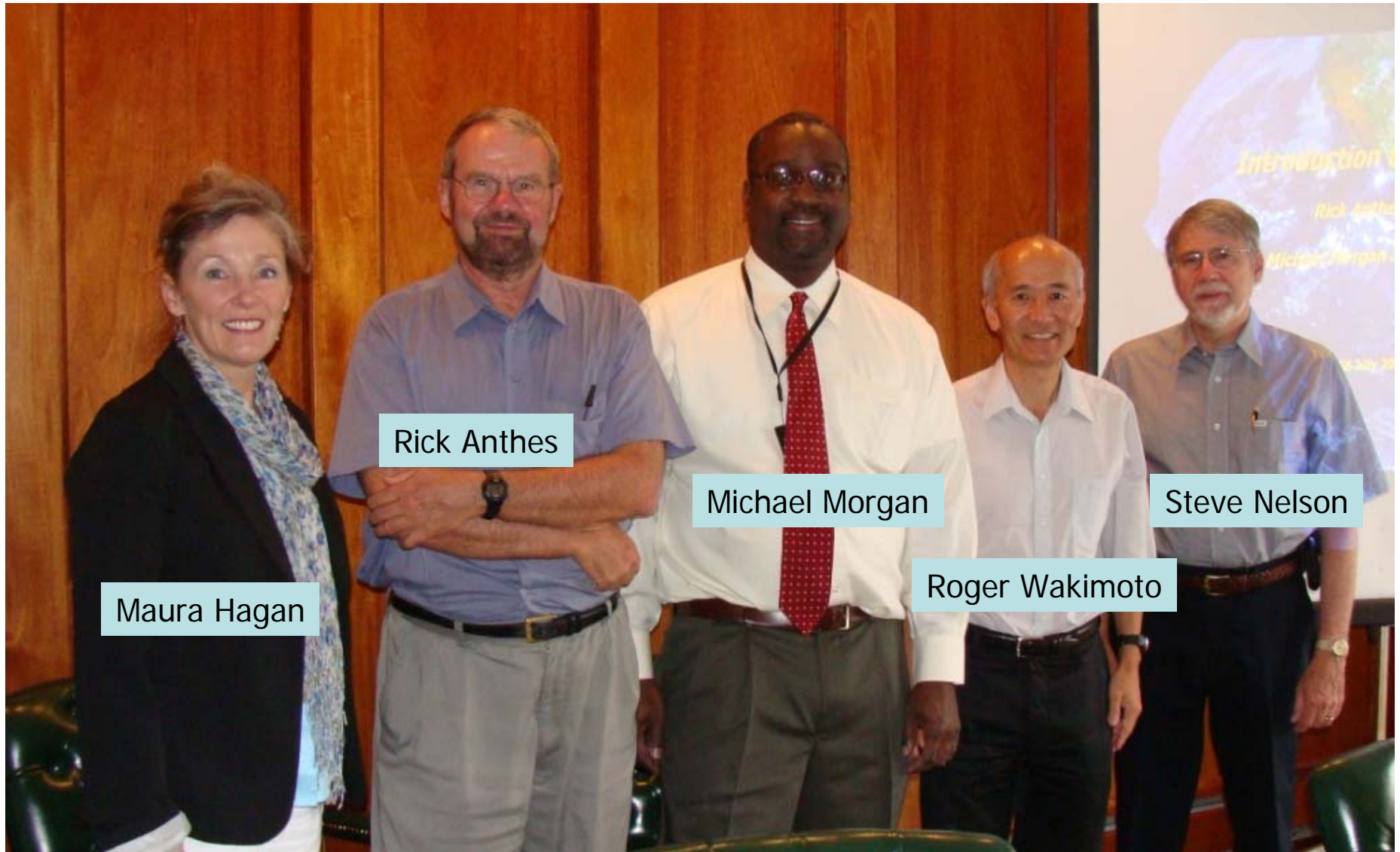
Eric Barron

# NCAR Executive Committee Estes Park, July 2010





The NSF partnership is critical to success



Maura Hagan

Rick Anthes

Michael Morgan

Roger Wakimoto

Steve Nelson

# President's Advisory Committee on University Relations (PACUR)



Oregon State University March 2010

# UCAR Management Committee March 2010



# UCAR Staff at 50<sup>th</sup> Anniversary



<http://www.50th.ucar.edu>

# Theme-Culture and Humor



# Is Camelot Fading? Doug Lilly 1971



"There is a great deal of tension, disappointment and uncertainty among the NCAR staff....due to the decreased status and support given science in the past couple of years."

"Problems include

- Employment insecurity

- Unwillingness of management to weed out or strengthen weak programs

- Pressure to become more relevant and undertake large and fuzzily-defined programs

- Competition with each other and new activities

- Continued pressure for new initiatives

- Poor communication from management to staff

- Changes in senior scientific staff tenure policies

- Decisions forced on us by NSF, UCAR or some other outside force



# Jack Eddy's Skizzenbuch

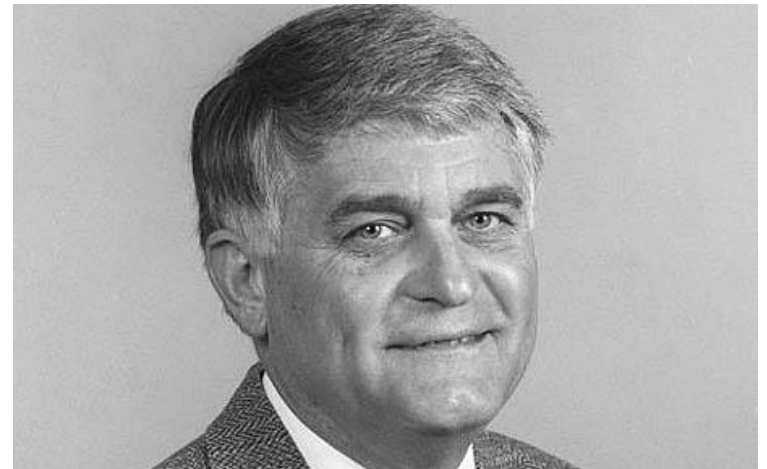
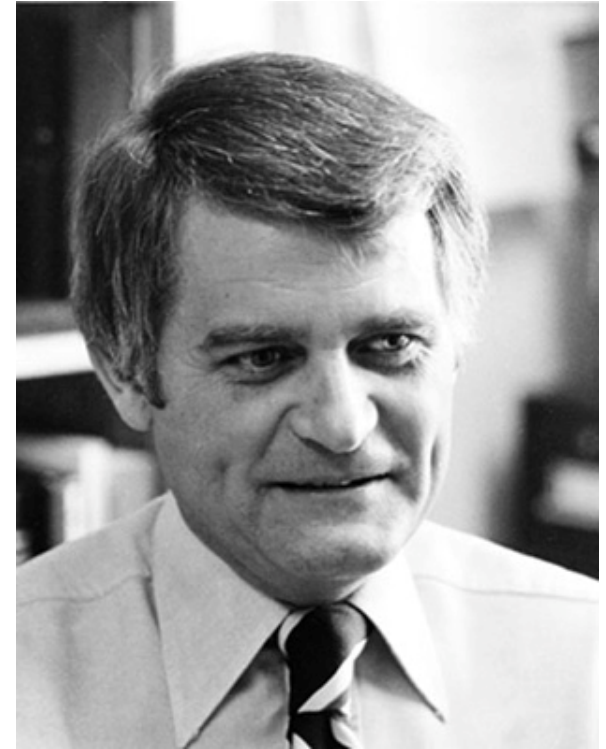
NCAR  
SKETCHBOOK  
SKIZZENBUCH



Ca. 1974

*Jack Eddy*

Jack Eddy (1931-2009)



# The Mesa Lab as a place to work and play



THE NCAR MESA IS ALWAYS FREELY  
AVAILABLE FOR RECREATIONAL ACTIVITY



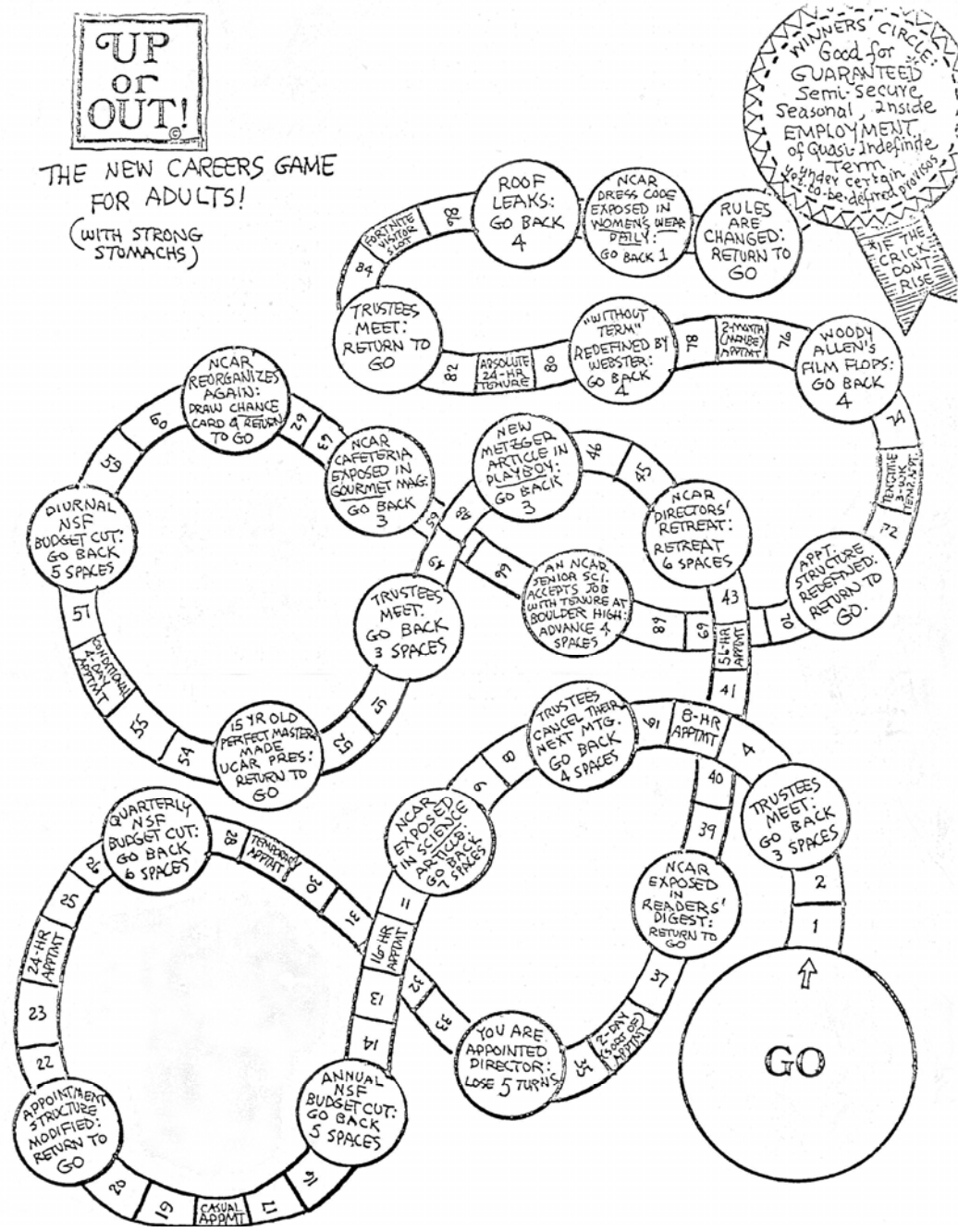
THE ECOLOGY OF THE MESA SITE  
HAS BEEN CAREFULLY MAINTAINED

# Promotion and Tenure



THE NEW CAREERS GAME FOR ADULTS!

(WITH STRONG STOMACHS)

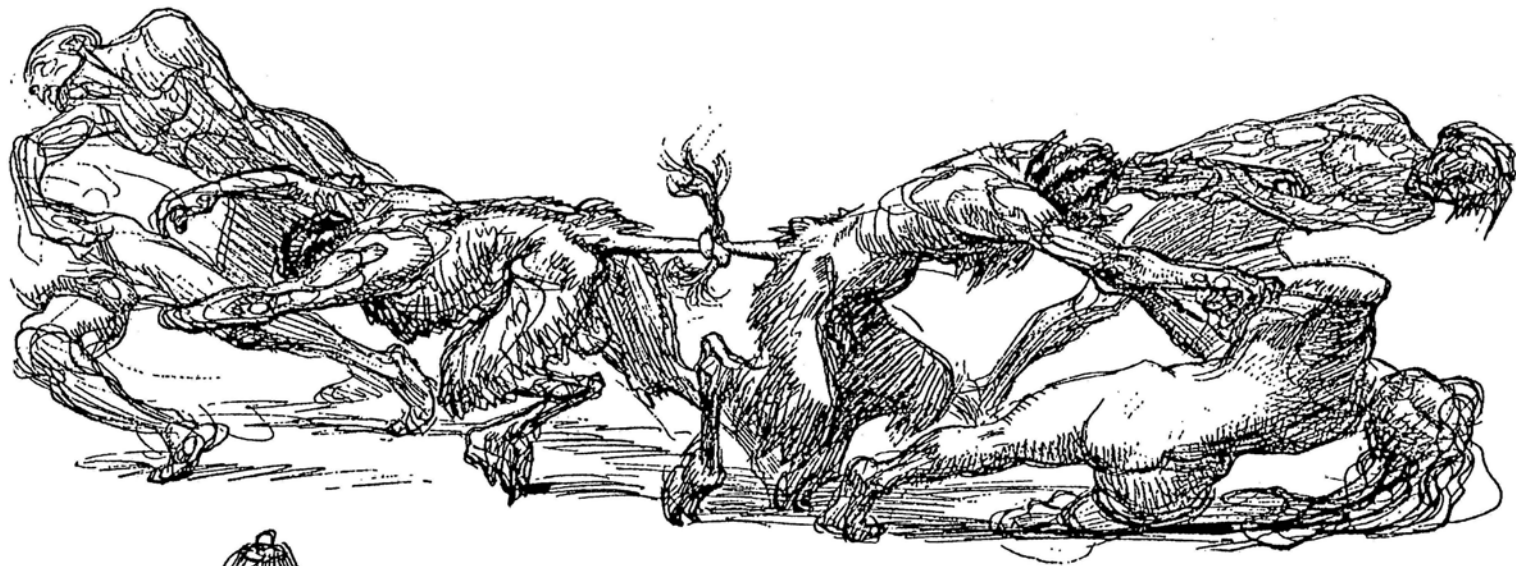


# Annual Budget Review



BUDGET PRESENTATION IS MADE  
TO NSF EACH SPRING

# Management Meetings



DIRECTORS' COMMITTEE MEET

# Importance of the Advanced Studies Program

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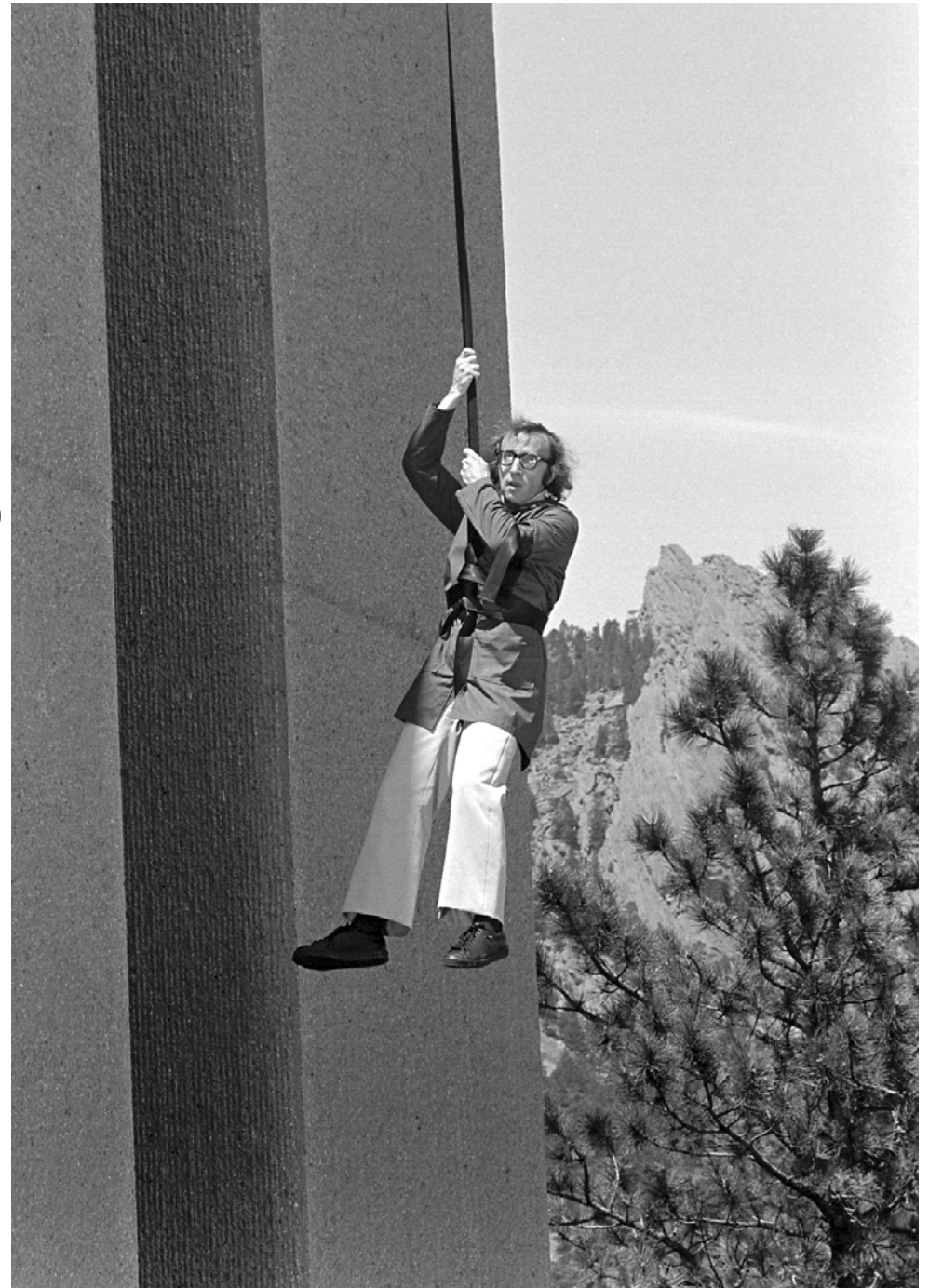


ALTHOUGH SMALL IN NUMBERS ASP  
FURNISHES NCAR WITH GUIDANCE FOR  
THE FUTURE

Woody Allen  
Sleeper (1973)

and

The JEC (Joint Evaluation Committee)





# Theme-Visitors



A. Arakawa, J. Hovermale, Jack Geisler, Ed Lorenz in Damon Room 1978.

Ed Lorenz



Hans Panofsky and Harriet Newton



Julius Chang and Kikuro Miyakoda  
Ca. 1982



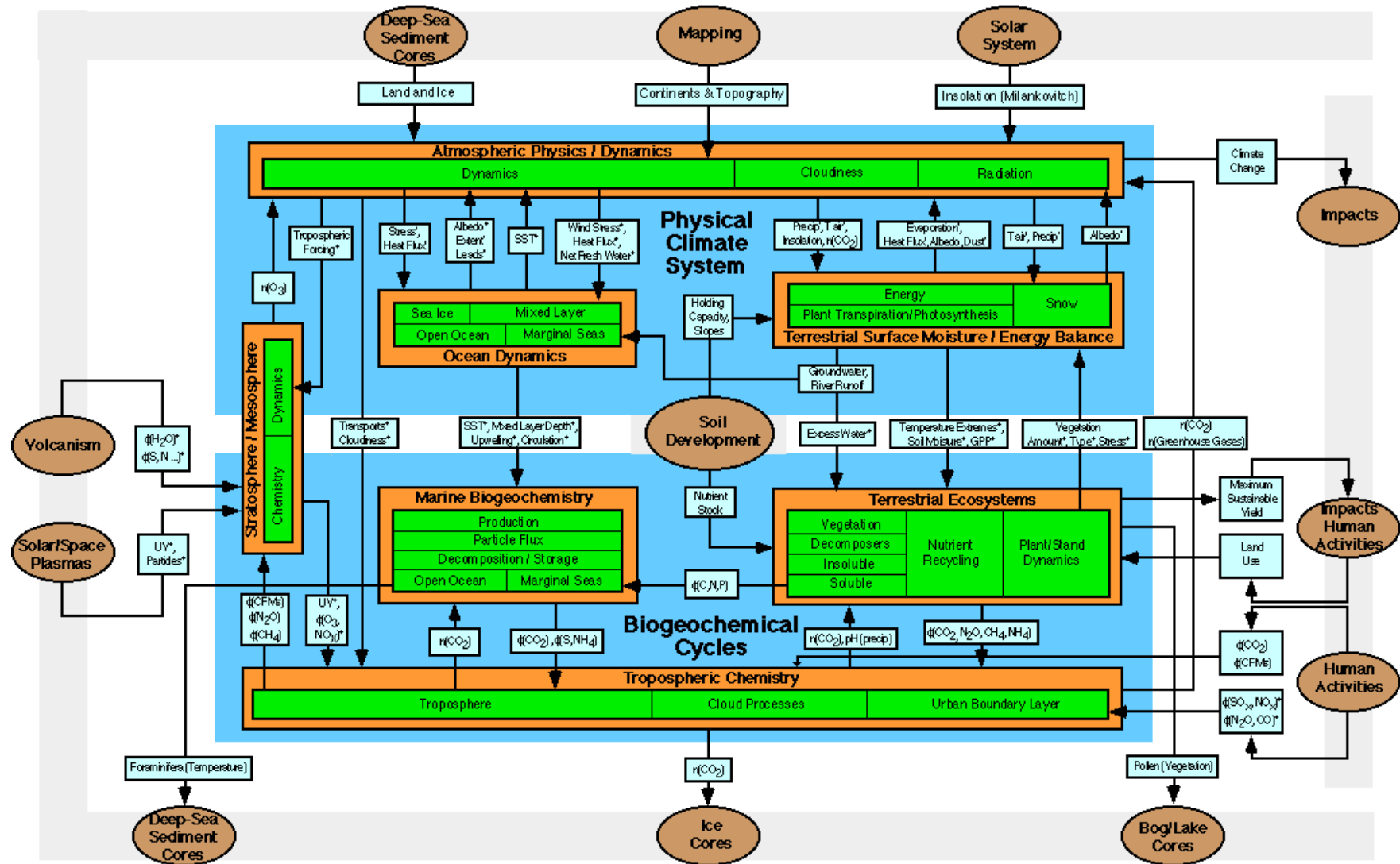
# Akira Kasahara and George Platzman 1983



1980-1989

# Emergence of Earth System Science

CONCEPTUAL MODEL of Earth System process operating on timescales of decades to centuries



$\phi$  = on timescale of hours to days \* = on timescale of months to seasons  $\phi$  = flux n = concentration

Bretherton wiring diagram

# Creativity with Moyers 1982

John Firor  
Will Kellogg  
Walt Roberts  
1:54



John Firor, Will Kellogg, Walt Roberts 1982 Bill Moyers show



## Chuck Leith and the “slow manifold”



May 1983

August 1983

ADMP-83-2

## Regional Acid Deposition: Design and Management Plan for a Comprehensive Modeling System

The NCAR Acid Deposition Modeling Project

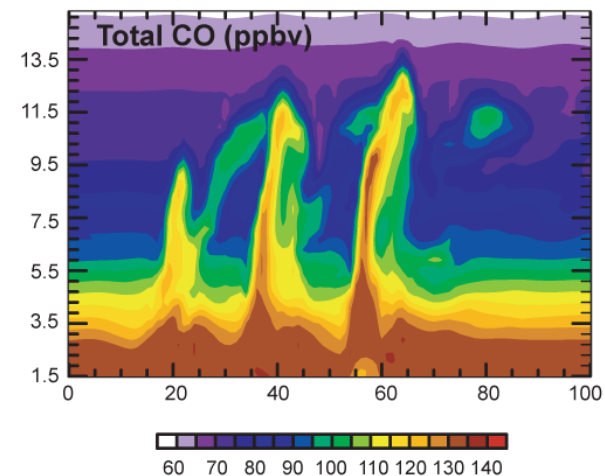
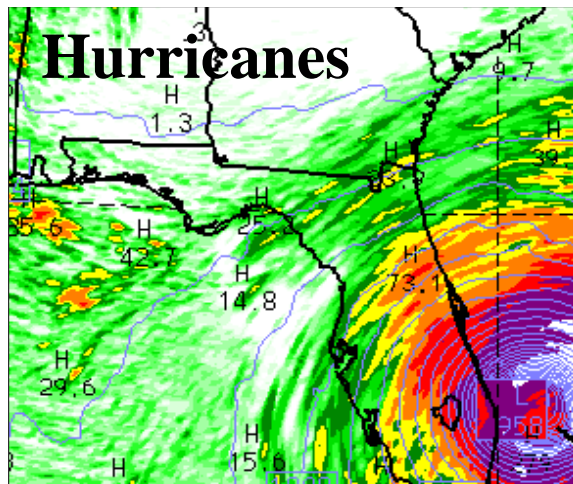


### The NCAR Acid Deposition Modeling Project

Supported MM5 and led to  
WRF and WRF-CHEM

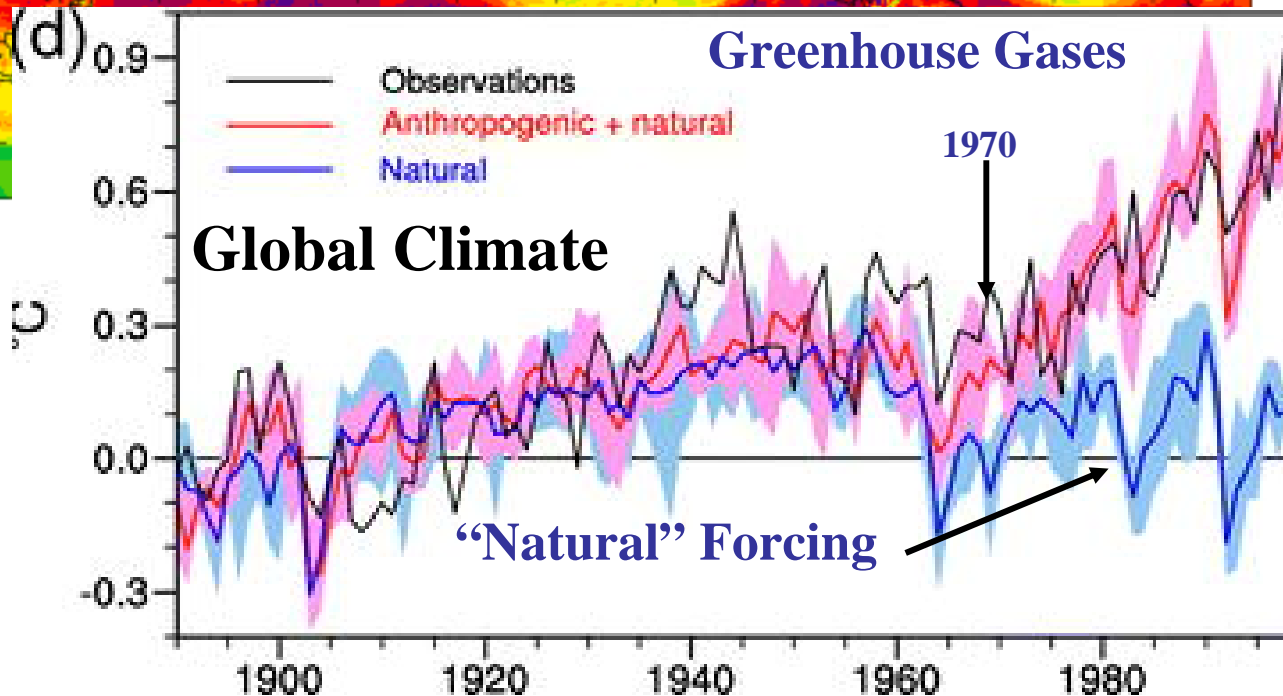
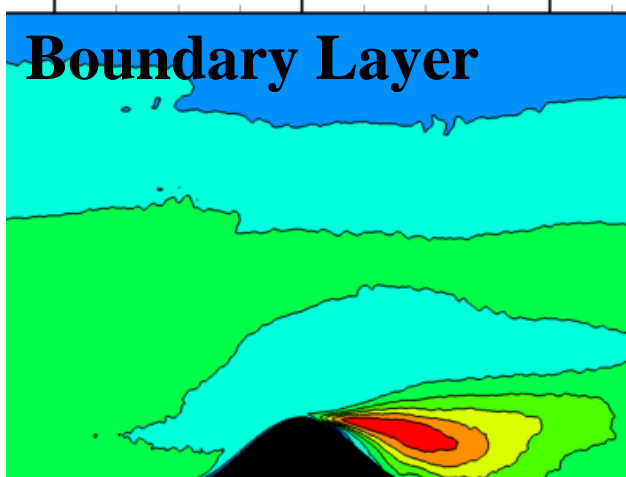
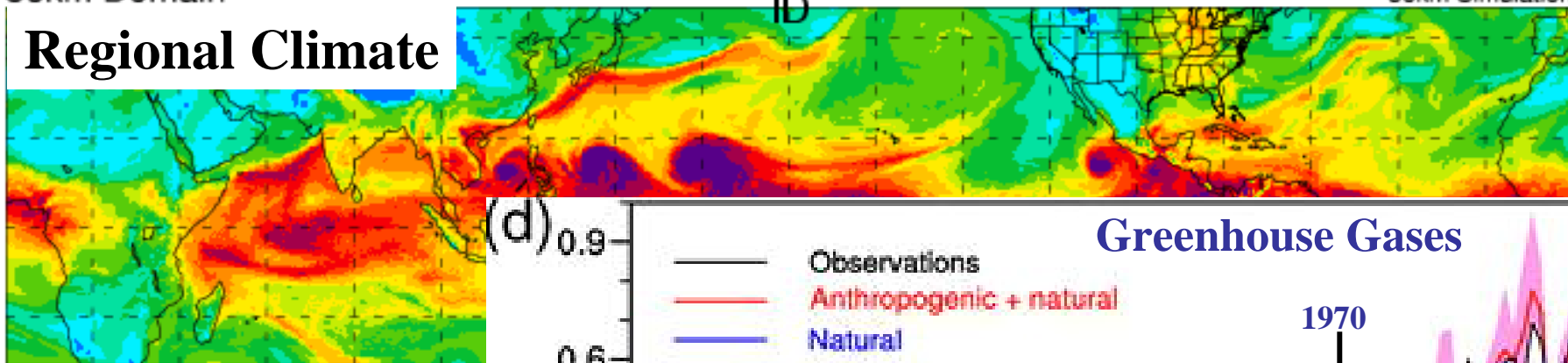
John Wyngaard (AAP), Project Coordinator  
Richard Anthes (AAP), Subgroup Leader, Meteorological Processes  
Jack Calvert (ACAD), Subgroup Leader, Chemical Processes  
Julius Chang (Lawrence Livermore National Laboratory),  
Subgroup Leader, Model Development and Integration  
Robert Chatfield (ASP)  
Ralph Cicerone (ACAD)  
Tony Delany (ACAD)  
Daloris Flaming (AAP)  
Phil Haagenson (ACAD)  
Brian Heikes (ACAD)  
Hsiao-ming Hsu (ASP)  
Shaw Liu (NOAA/ERL Aeronomy Laboratory)  
Paulette Middleton (ASP)  
Bill Stockwell (ASP)  
Anne Thompson (ASP/ACAD)  
Stacy Walters (ACAD)

# THEME: Community Models

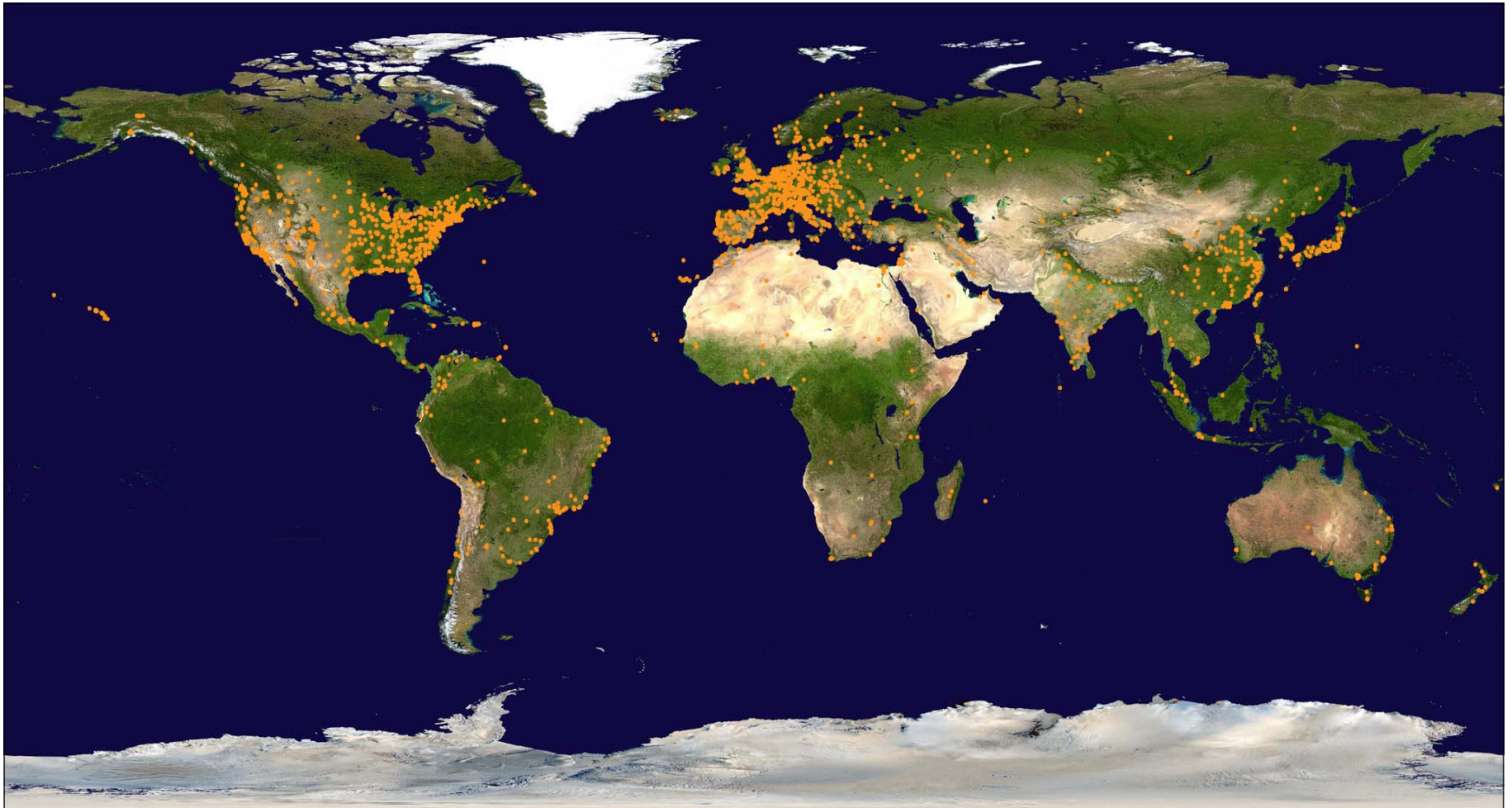


36km Domain

## Regional Climate

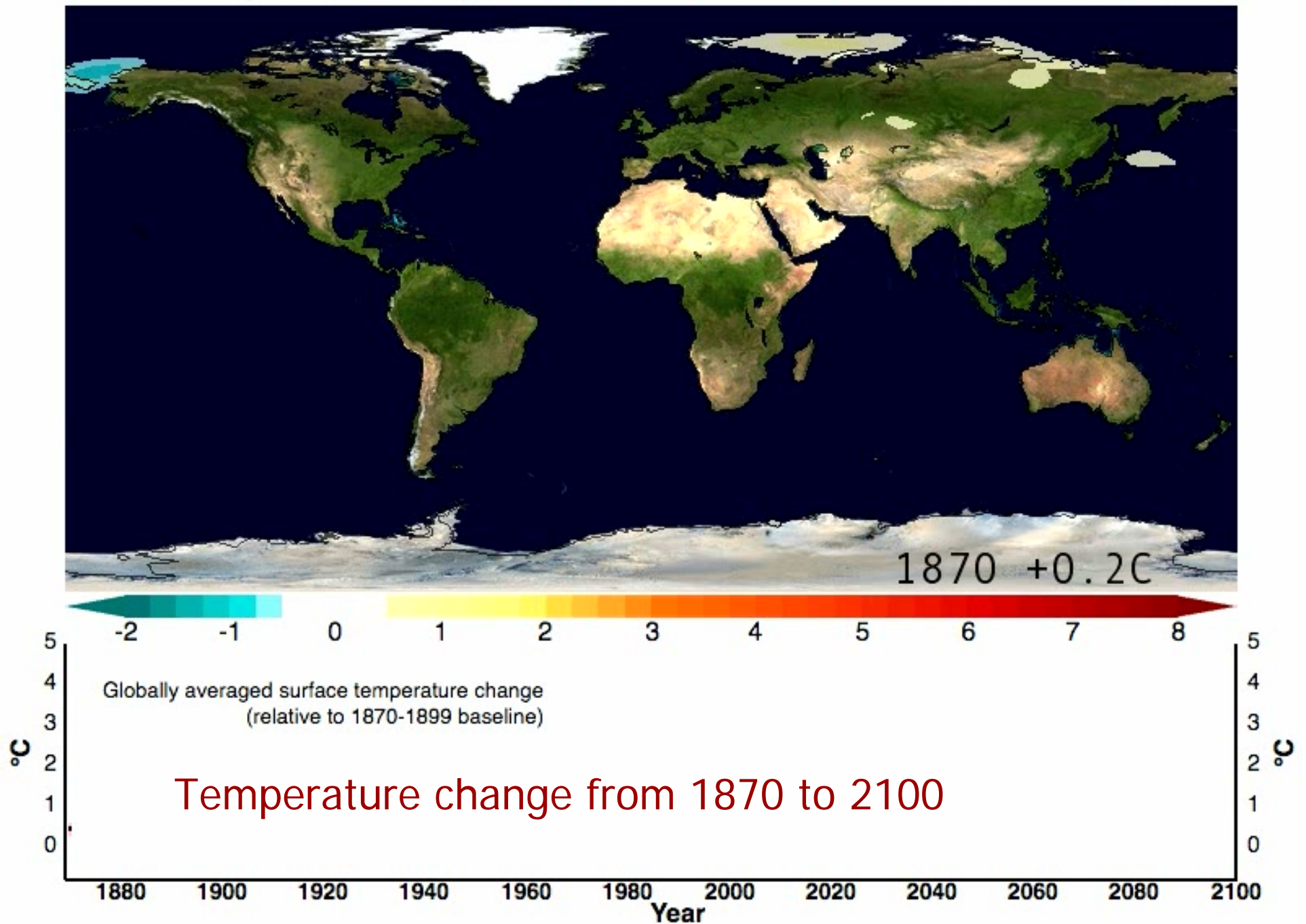


# Community Climate and Earth System Models-A community resource



Over 3,000 sites from 130+ countries

Surface temperature change relative to 1870-1899 baseline CCSM3 IPCC AR4



## CCM Advisory Committee 1982



Bob Dickenson, Mike Wallace, Rick Wolski, Dave Baumhefner, John Hovermale, Bert Sempter, John Kutzbach, Dave Williamson, Jack Geisler, Ferd Baer, Byron Boville, V. Ramanathan, Warren Washington, Maurice Blackmon, Akira Kasahara

# CSMP Summer School Madison Wisconsin 1989







CSM Adv Board Mtg 22-30 Apr 1999 at NSF. L-R: Bob Serafin, Al Kellie, Maurice Blackmon, Steve Running, Bert Semtner, Dick Berk, Bob Malone, Ari Patrinos (partially hided), Isaac Held, Ed Sarachik, Steve Zebiak, Jay Fein, Kevin Trenberth, Francis Bretherton, Michael Ghil, Rick Anthes

# MM5

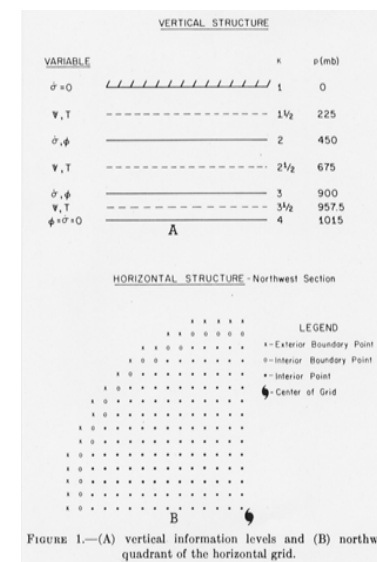
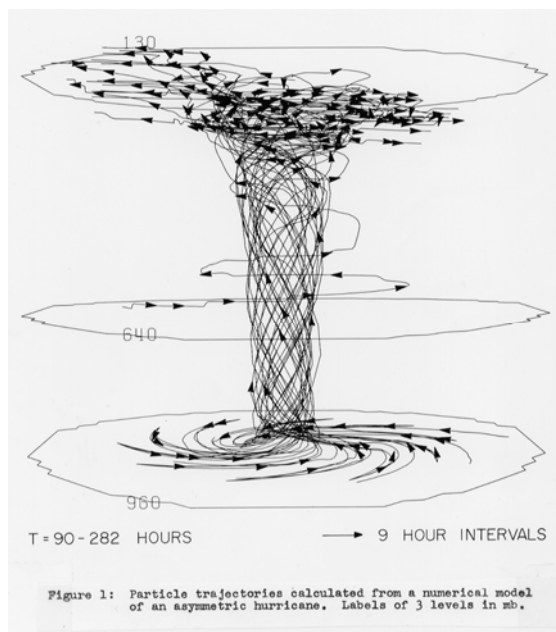
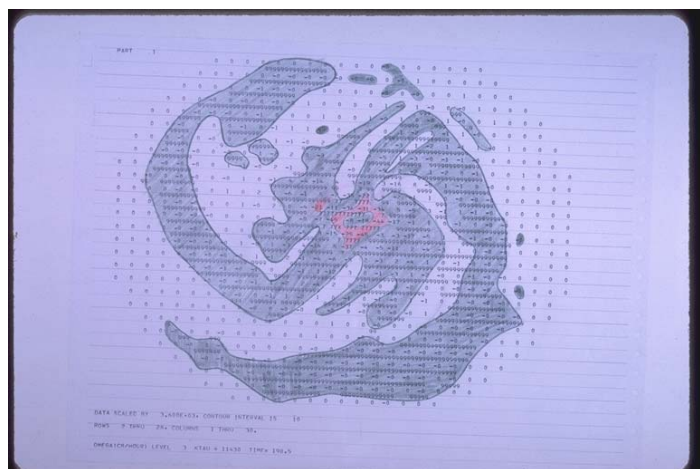
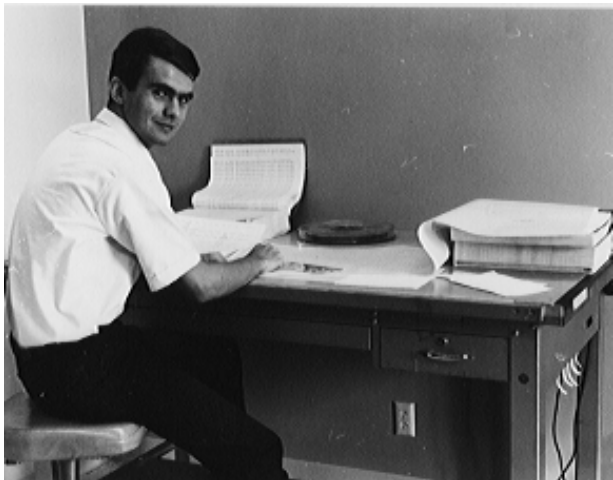
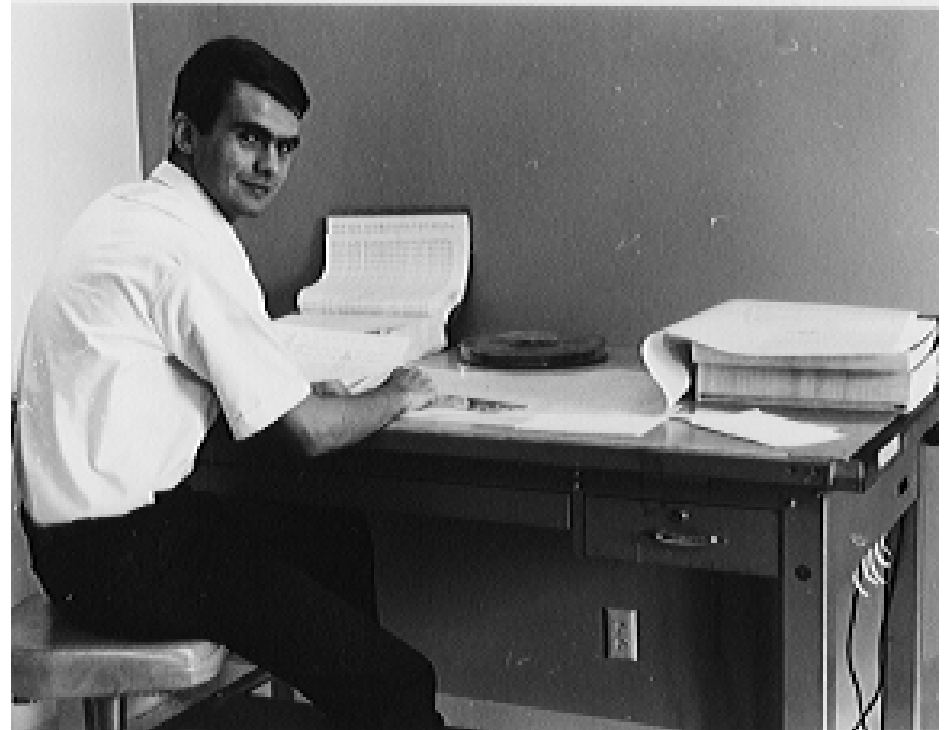


FIGURE 1.—(A) vertical information levels and (B) northwest quadrant of the horizontal grid.

# MM5

MM5 is the fifth generation version of the Penn State-NCAR mesoscale model. It is probably the most widely used mesoscale model in the world. It began with the development of a 3-D hurricane model in the late 1960s at NOAA's National Hurricane Research Laboratory in Miami, Florida.



# War Story #4--Trips to NCAR

**“In the really early days we could not connect remotely to NCAR SCD from PSU and had to cram our model running into visits to NCAR. Because the model runs were computationally demanding, we could only get quick turn-around at night, and thus had to sleep during the days and work the night shift when there was time on the machines. During the day we would tie blankets up over the windows at the Sleazy J Motel on 28th so that we could (try to) sleep.”**

**Tom Warner, 14 June 1999**

# Computers and MM in 1976

CDC 7600 5X faster than 6600

Storage 140K

3-D dry MM

$6 \times 40 \times 40 = 9600$  grid points

$DX = 20\text{km}$

12-h run took 30 min on 7600

# MM5 Developers in 1999



Nelson Seaman, Dave Stauffer, Tom Warner, Rick Anthes, George Grell, Jimmy Dudhia, Bill Kuo. June 1999

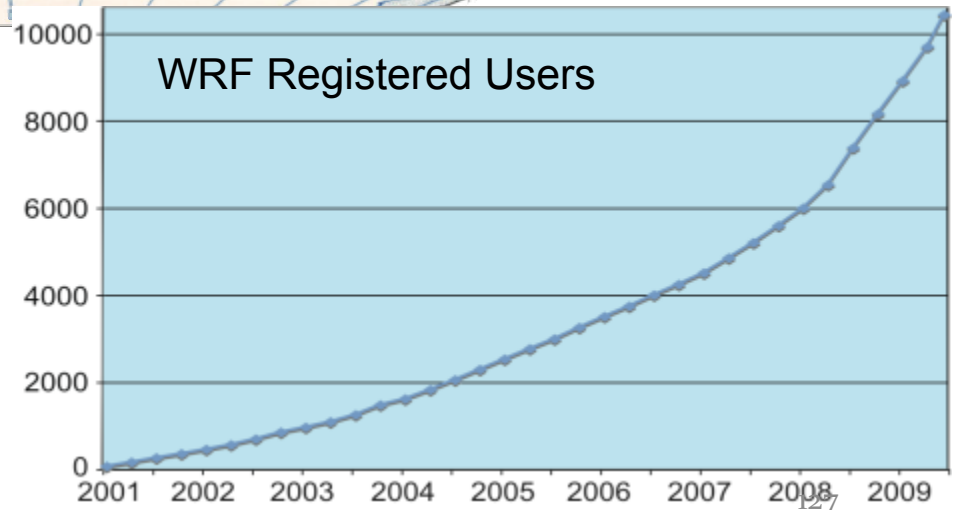
# Weather Research and Forecasting Model

A Major International Facility

Probabilistic  
&  
Explicit  
Prediction



The leading atmospheric modeling System in the world, used in:  
135 Countries  
>50 Operational Forecast Centers  
>14,000 registered users

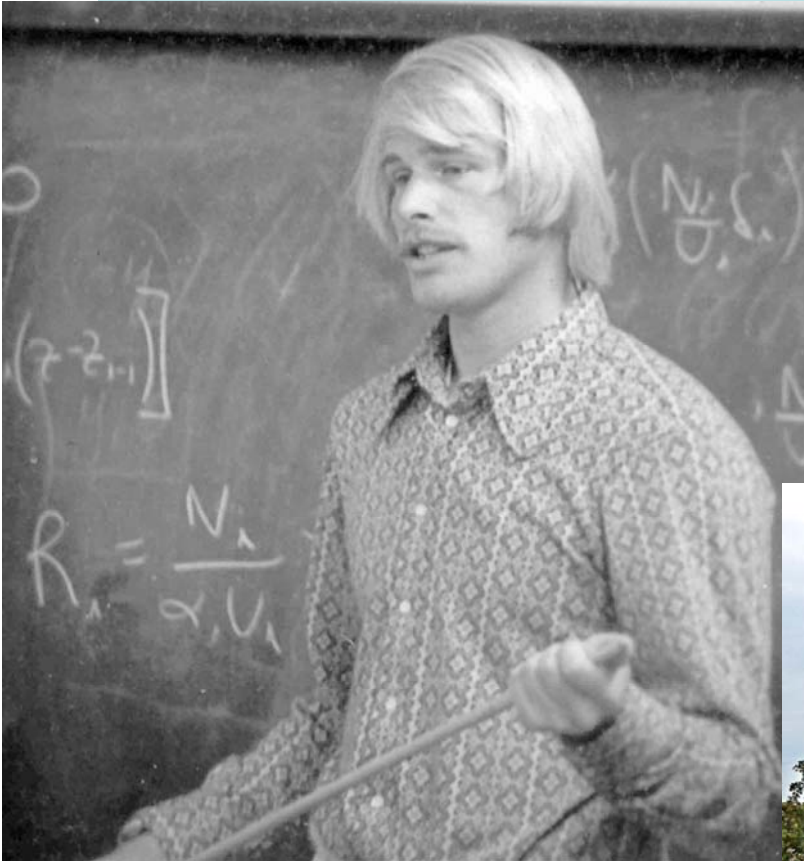


>5000 active subscribers to [wrf-news@ucar.edu](mailto:wrf-news@ucar.edu)

# Joe Klemp

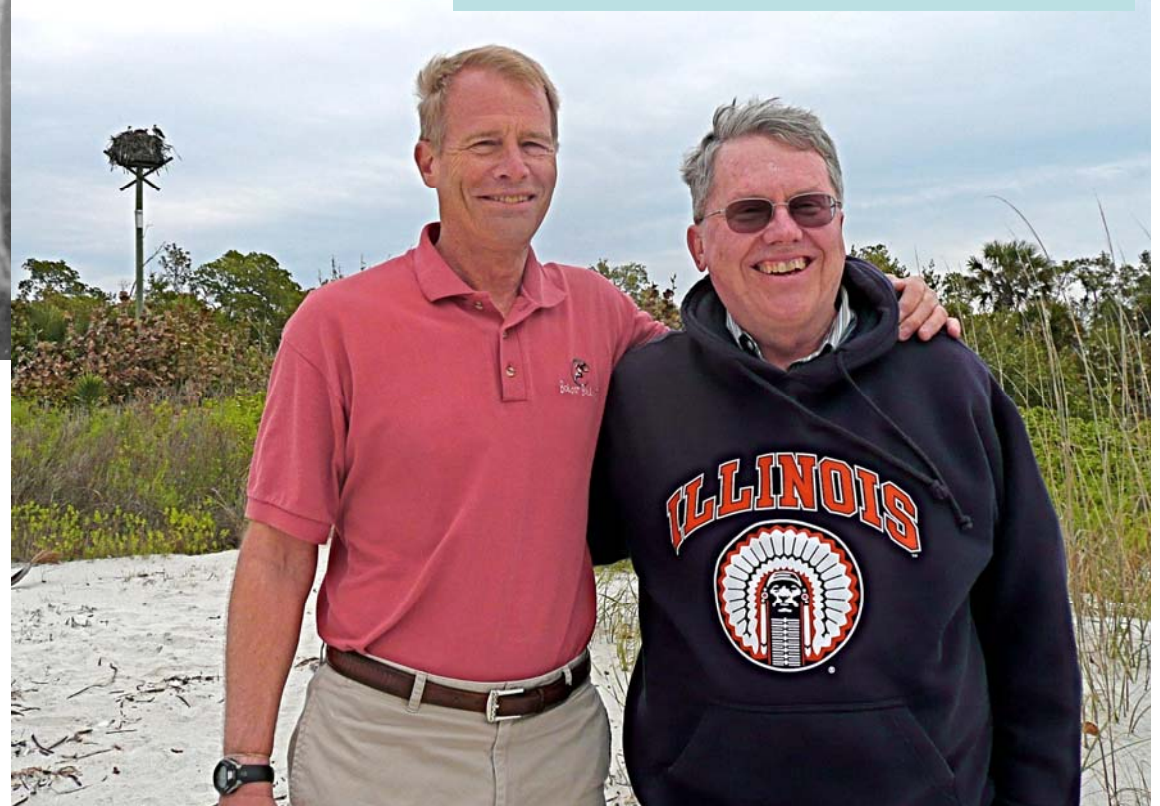
Winner of AMS Rossby Award 2011!

Also winner of Franklin Brooks Award 2011!



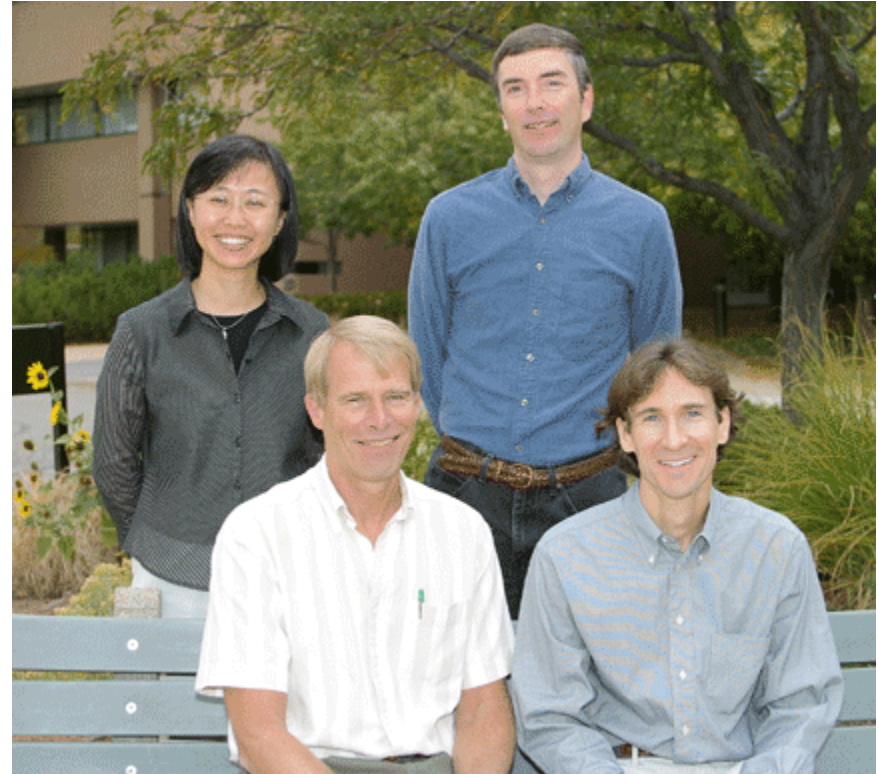
Early '70s in Fleischmann Building

Klemp and Wilhelmson (2010)



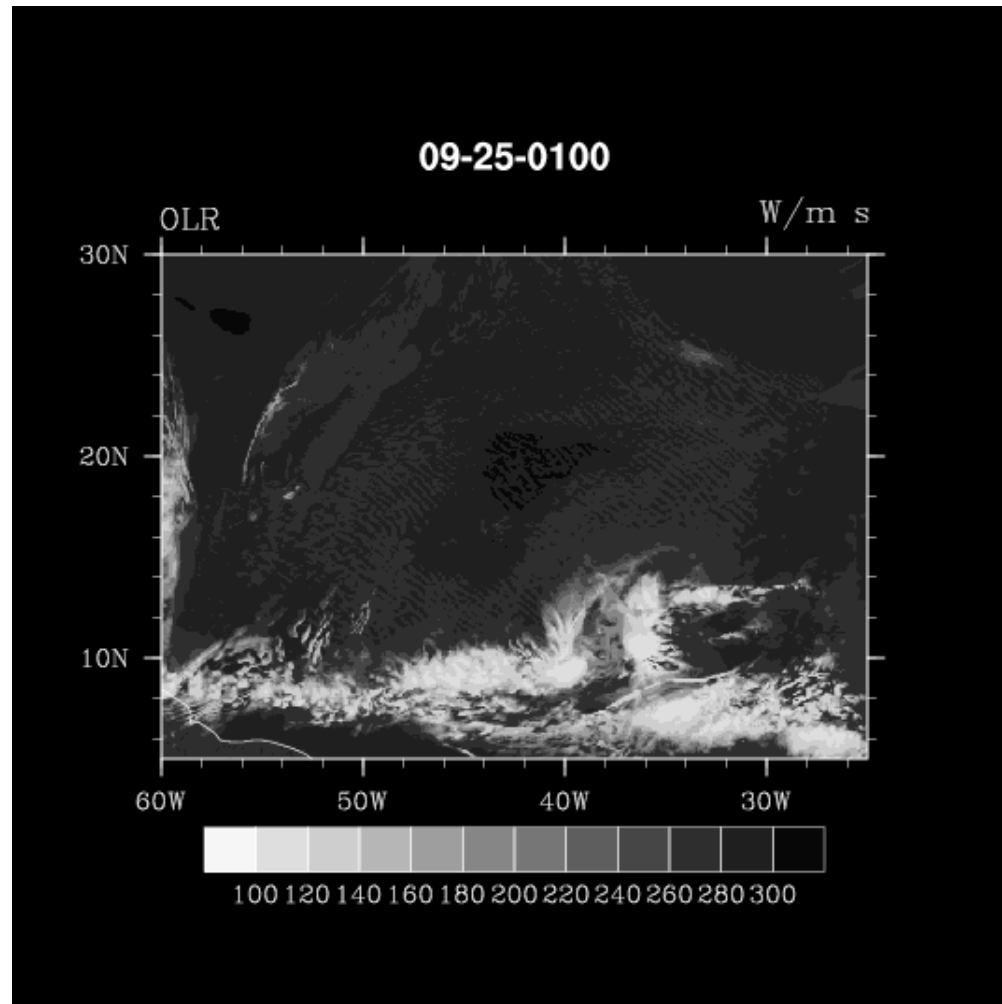


# Joe Klemp



With John Firor accepting NCAR Outstanding Publication Award 1979

# Simulation of Hurricane Genesis with NRCM at 4 km resolution

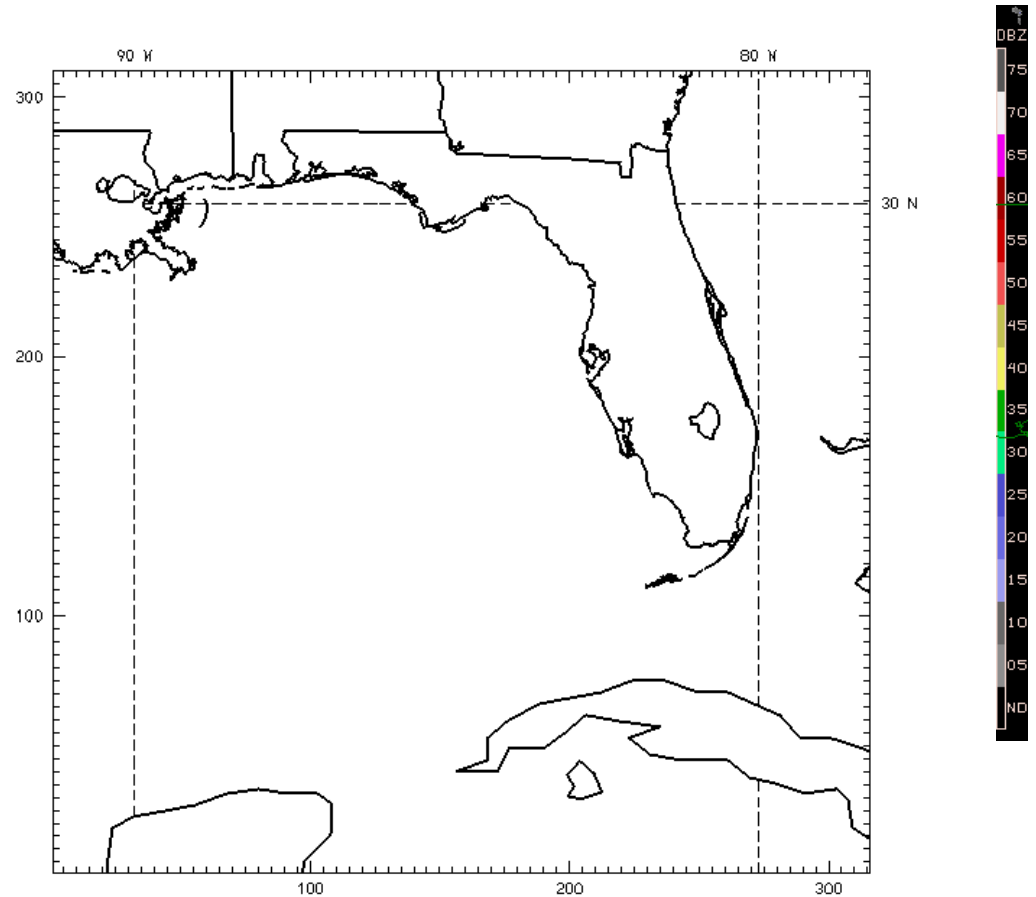
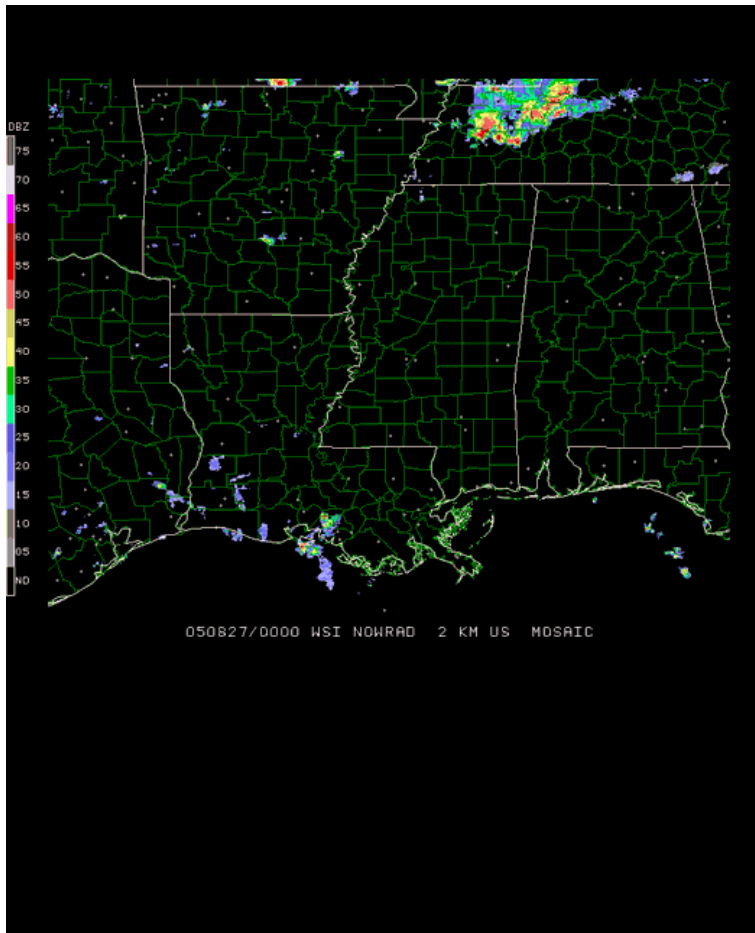


(Asuka Suzuki)

# Hurricane Katrina 2005

WRF initialized 00 UTC 27 Aug

Radar



72 h forecast

# Theme-China and Taiwan



## Peking University May 1982



Qin-Cun Zeng (in black suit, 3d from left), I. Orlanski, J. Hovermale, D. Lilly, R. Anthes, J. Wyngaard, E. Reiter (head of US Delegation), R. Smith B. Albrecht, L. Gates

CMA Director Zou Jing-men  
challenging Rick to a Mao-Tai  
Toast.  
May 25, 1982



Director Zhou + toast  
Beijing 5/25/82

Taiwan April 1983



C.-Y. Tsay (NTU) and Jackson Chang (CWB)

# Hua-Lian Radar Site Taiwan 1983



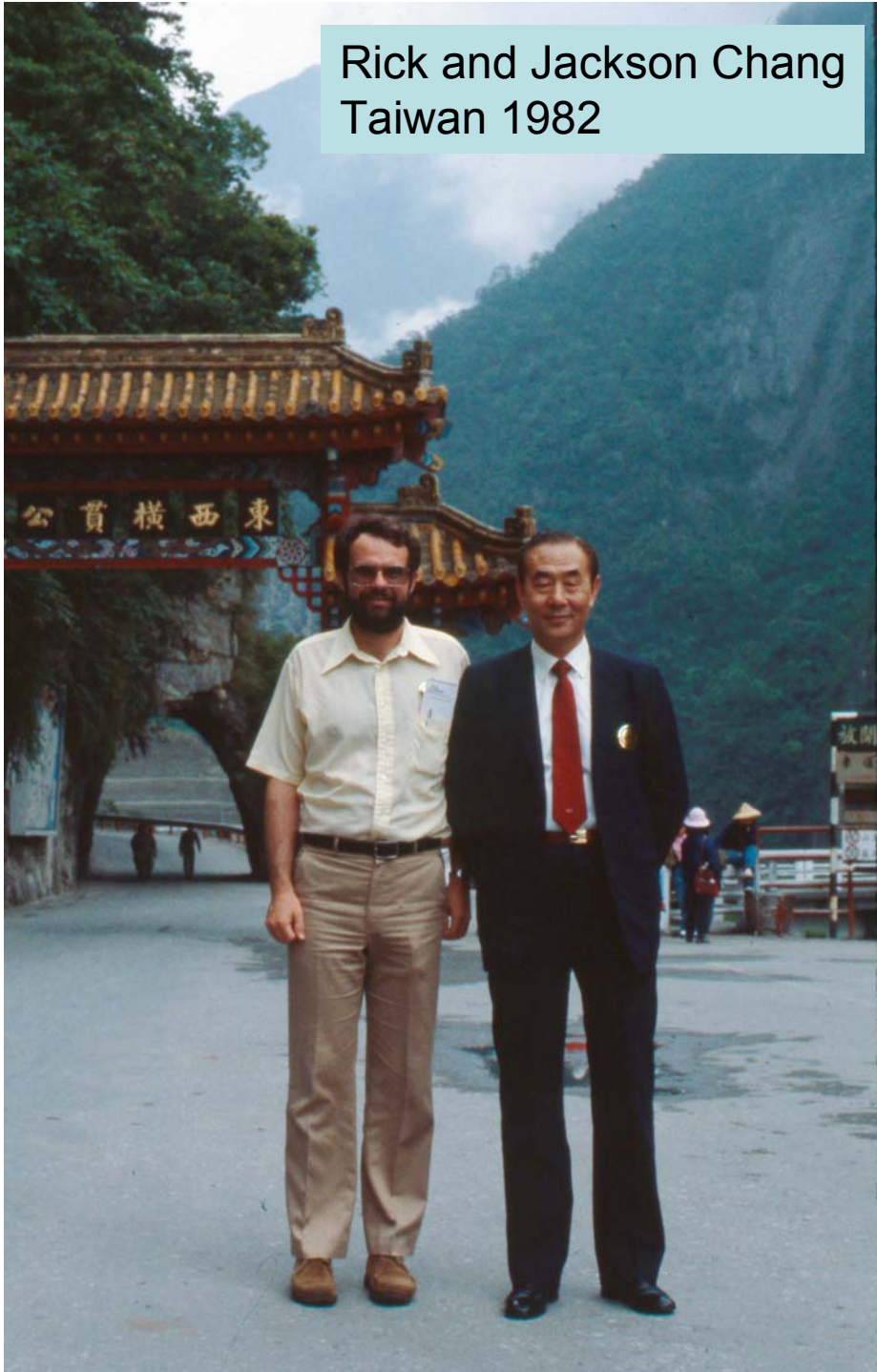
Wei-Xin Shen, Tsann-Wang Yu, Ching-Yen Tsay, Jackson Chang, Chi-Hui Lin, Lai-Cheng Jian, Shi-Guang Zhu





Bill Kuo and C.-Y. Tsay 1983 Taiwan

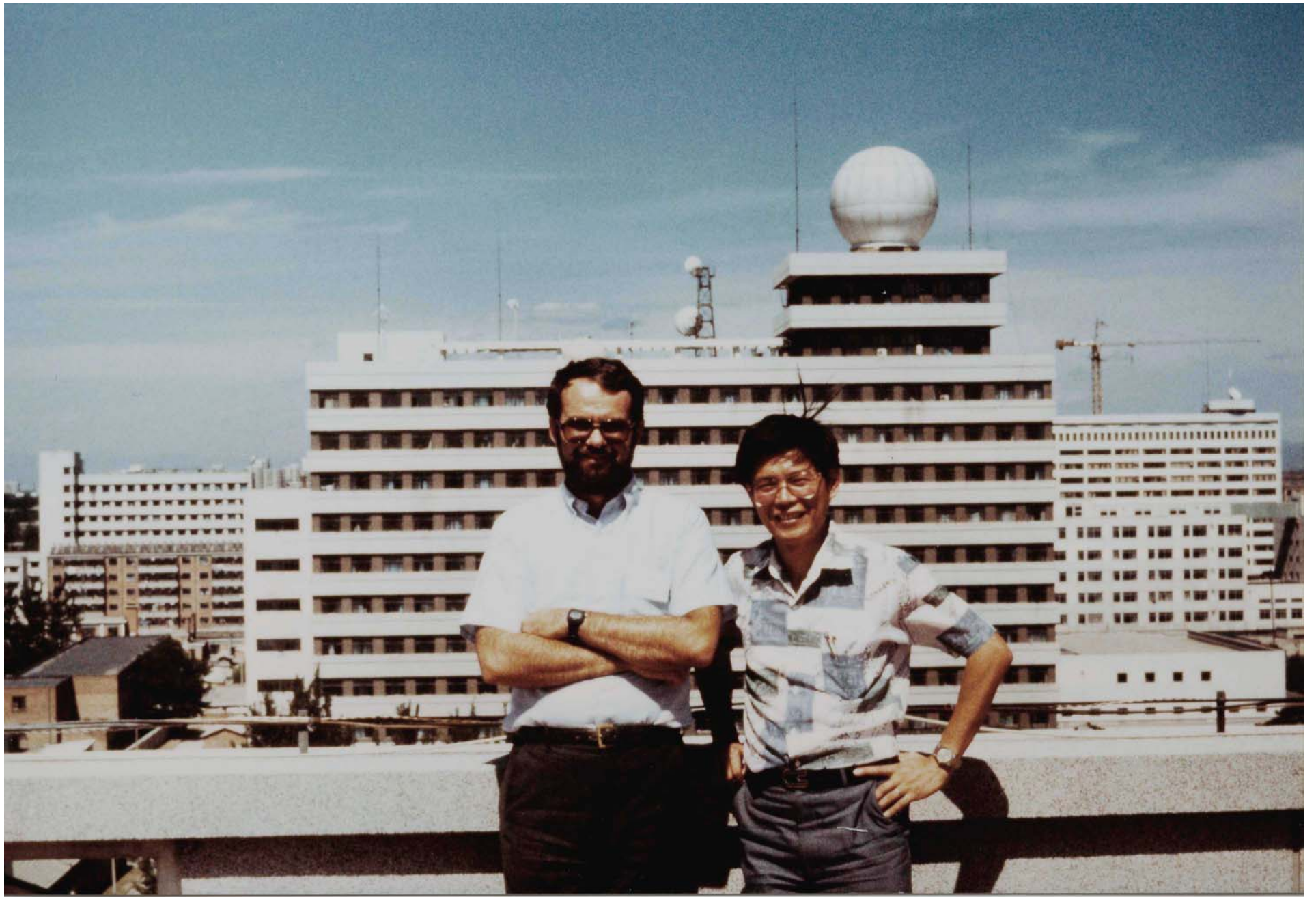
Rick and Jackson Chang  
Taiwan 1982

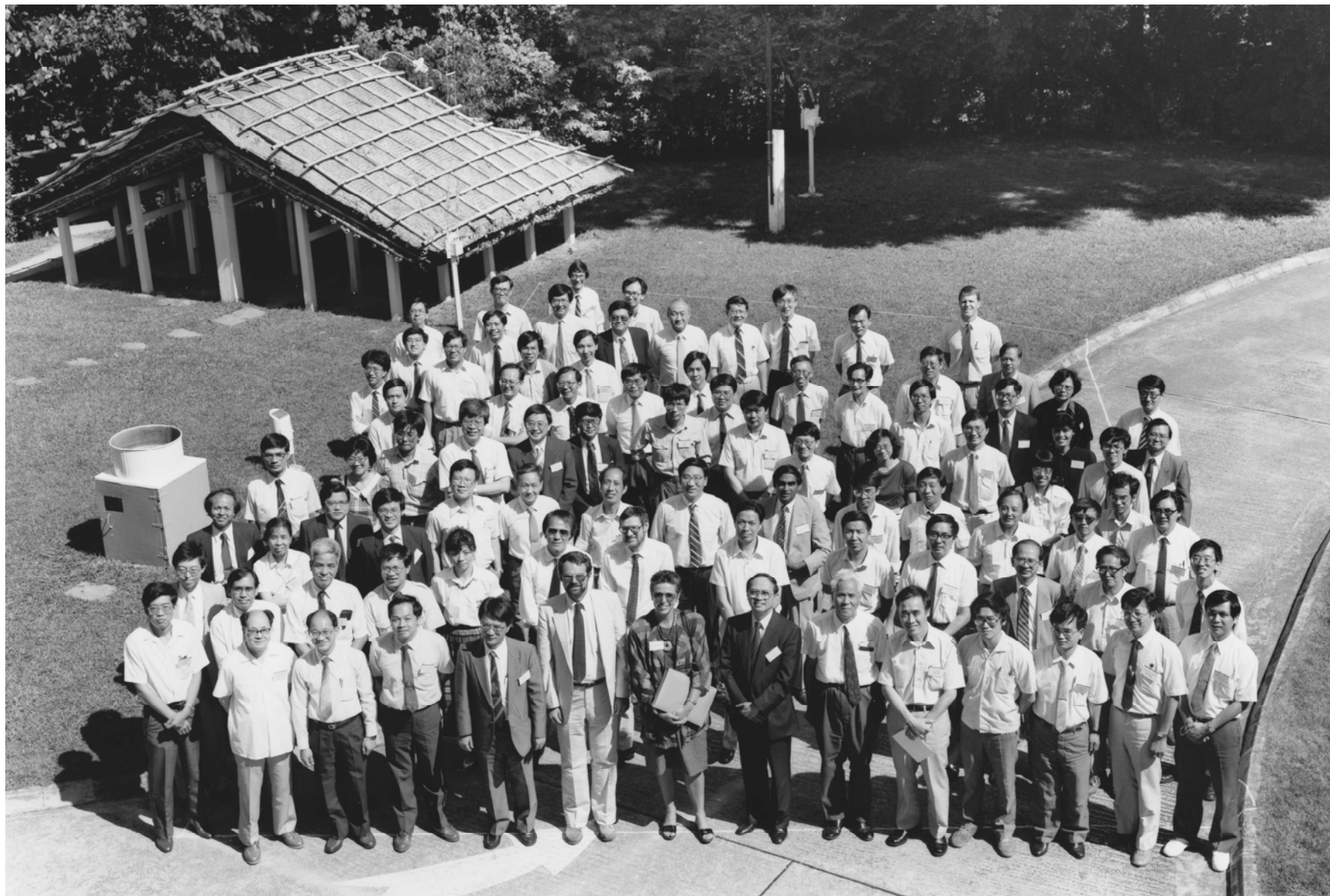


Rick and Bill Gray  
Taiwan ca. 1983



Rick and Bill Kuo Beijing 1988





**INTERNATIONAL CONFERENCE ON  
EAST ASIA AND WESTERN PACIFIC  
METEOROLOGY AND CLIMATE**

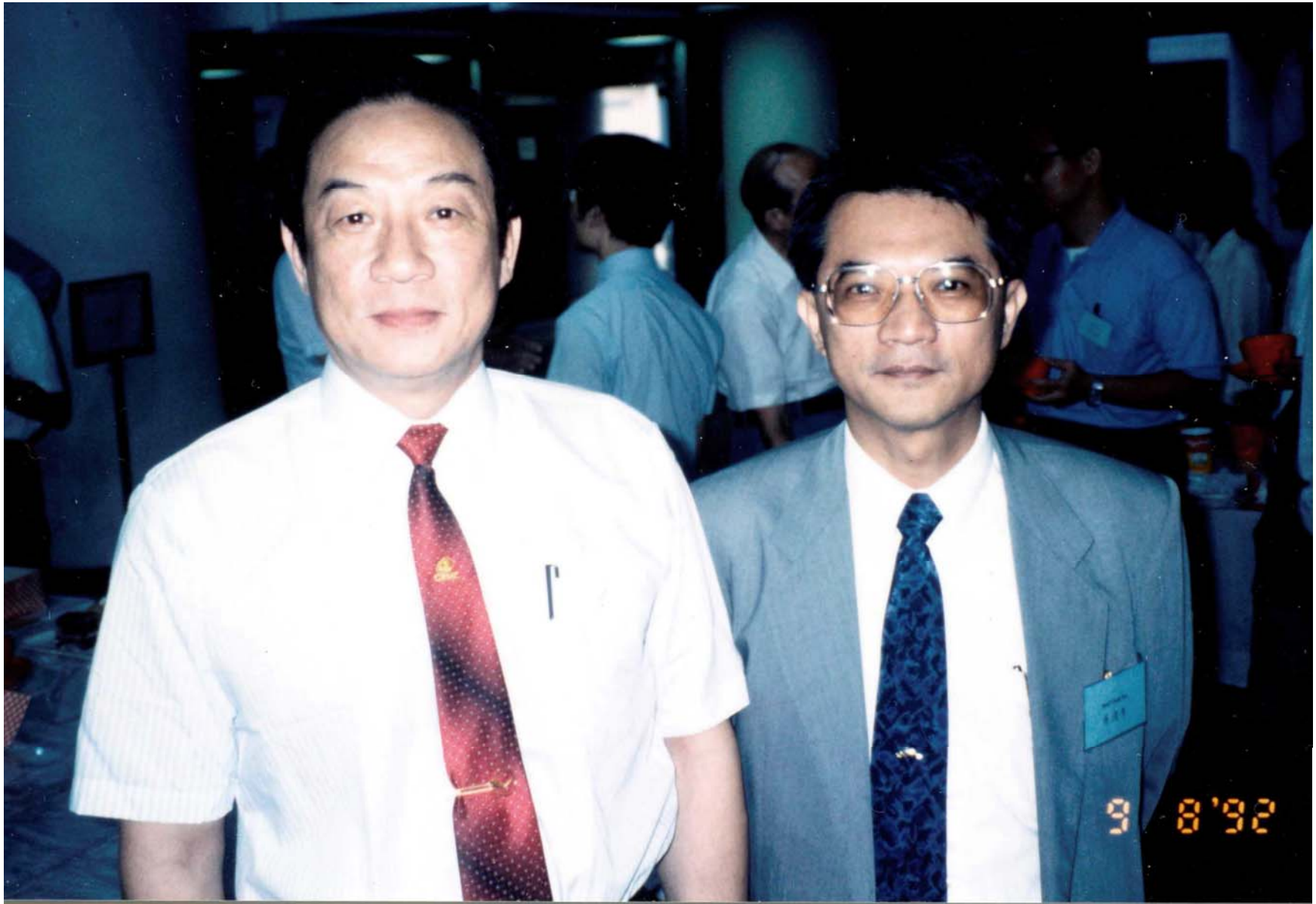
6-8 July 1989

Hong Kong

東亞及西太平洋  
氣象與氣候國際會議

一九八九年七月六日至八日

香港



Zou Jing-meng and CY Tsay September 1992

Hong Yan



1987



Hong Yan, Rick, Rich Rotunno, Bill Kuo

Back to the 80s

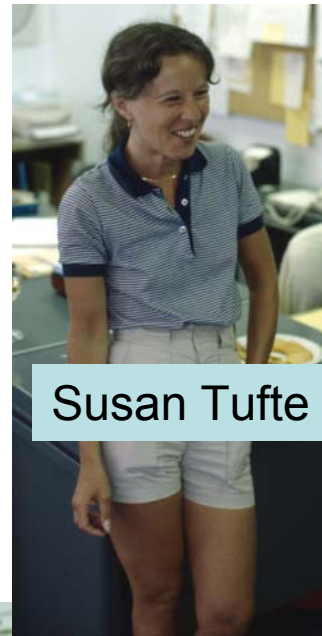
# The Director's Office was a fun place to be



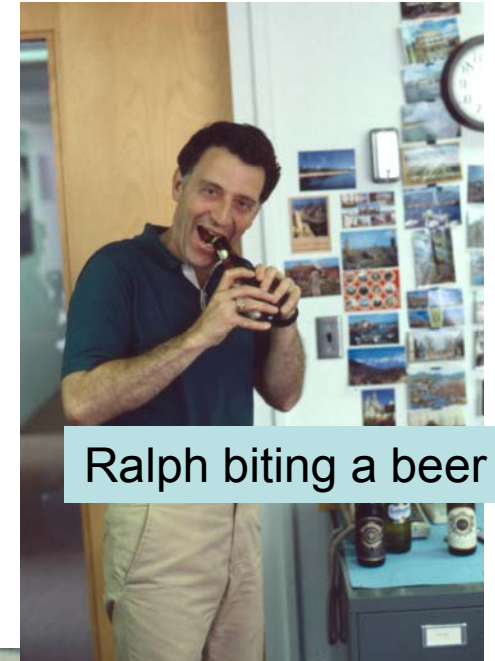
El Lobo

Julian

Ralph



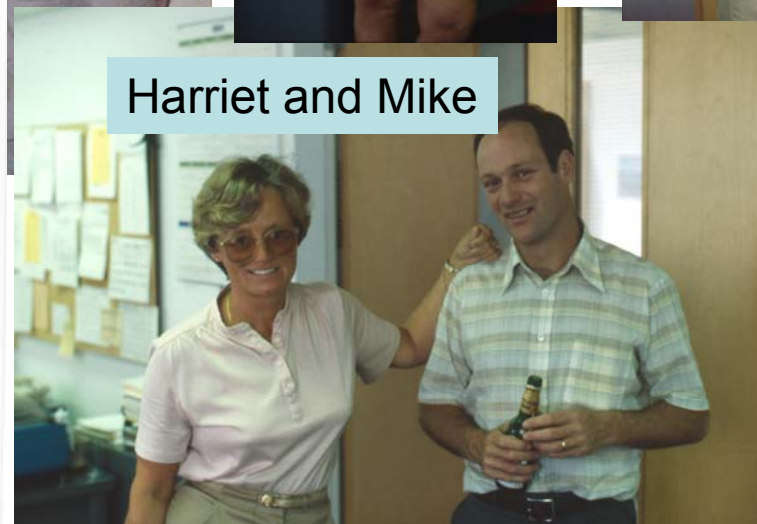
Susan Tufte



Ralph biting a beer



Karyn



Harriet and Mike

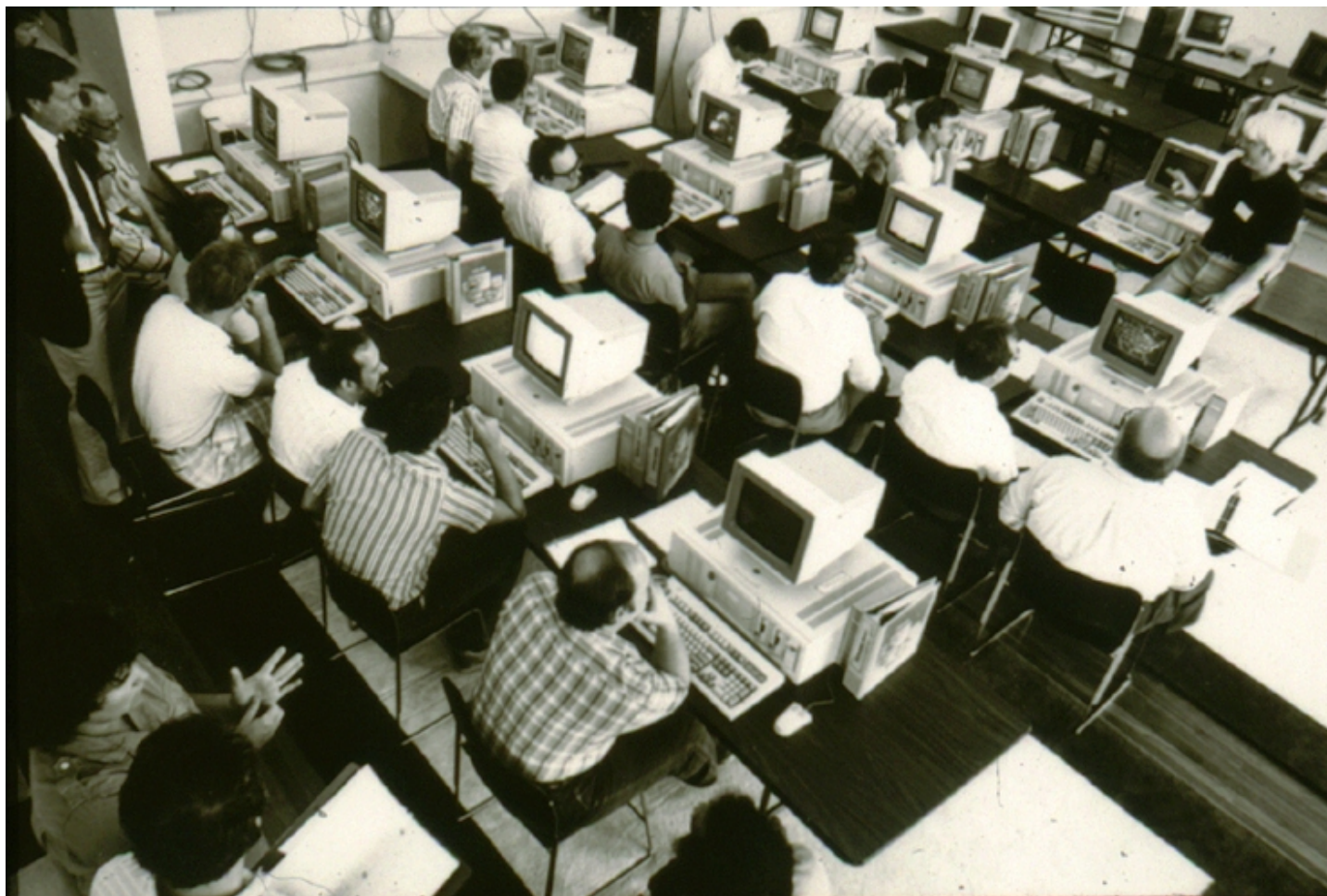


## Bob MacQueen and Friends Winter 1981-82



Charlene Bandurian, Harriet Crowe, Julian Shedlovsky, Ed Wolff, ???, and Bob MacQueen

# NCAR-Unidata Synoptic Meteorology Classroom 1988



# Theme---Information Technology and Education

# Unidata Booth AMS January 1988



# Unidata Staff October 1990



Tim Spangler U. Northern Illinois-first Unidata Grant ca. 1987



2010

CG-2

The Spangler Building

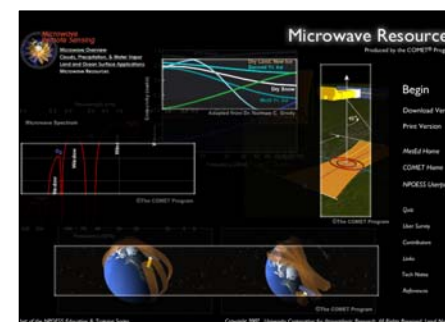
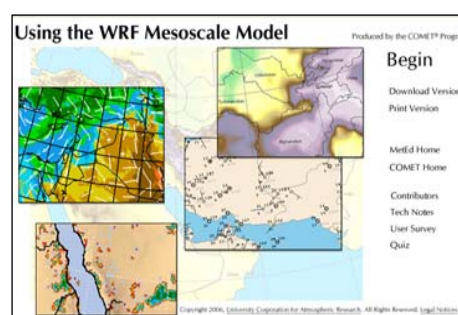
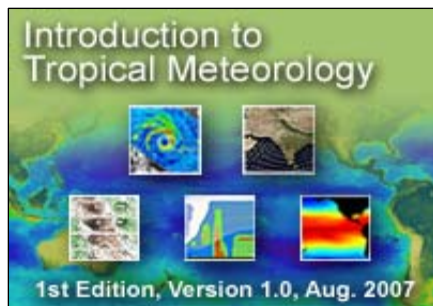
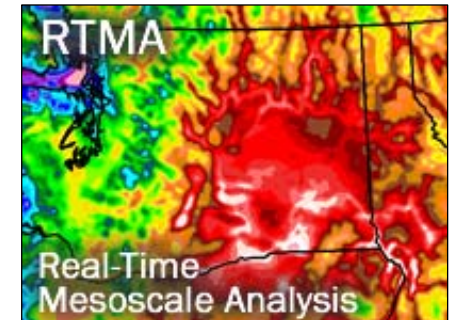
THIS BUILDING IS  
CARD ACCESS ONLY  
ALL VISITORS SHOULD GO TO  
3000 CENTERGREEN DRIVE  
FOR ASSISTANCE  
→

Wisconsin

Location of the Spangler Building

06.25.2010 15:30

# COMET: training operational forecasters via classroom, webcasts, and distance learning





# 1987-Joint Climate Projects/Planning Office formed



Chinese oceanographic research vessel Xiangyanghong #14 – participating in the 8 research cruises before TOGA-COARE as part of the US PRC TOGA Program - they were calling at Sydney harbor for installation of a Doppler radar onboard to participate in the AMEX-EMEX field campaign

## JCP/PO Staff Oct 1990



Jon Rush, Stan Ruttenberg, Karyn Sawyer, Gene Martin, Robert Carpenter

UCAR Project Office  
October 1990

Meg Austin  
Susan Baltuch  
Michelle Simpson  
Bill Curtis



1990-2010

# Signing of Eldora Agreement with French in Paris January 1990



# Electra and Eldora



1991 Academic Affiliates Program started

# Academic Affiliates Program Report

15<sup>th</sup> Anniversary: 1991-2006



Theme—inclusiveness and  
diversity



Academic Affiliates ca. 2003  
Mesa Lab Cafeteria October meeting



# SOARS—1995-2010

SOARS Protégés 1998



# Tom Windham and SOARS Presidential Award 2001



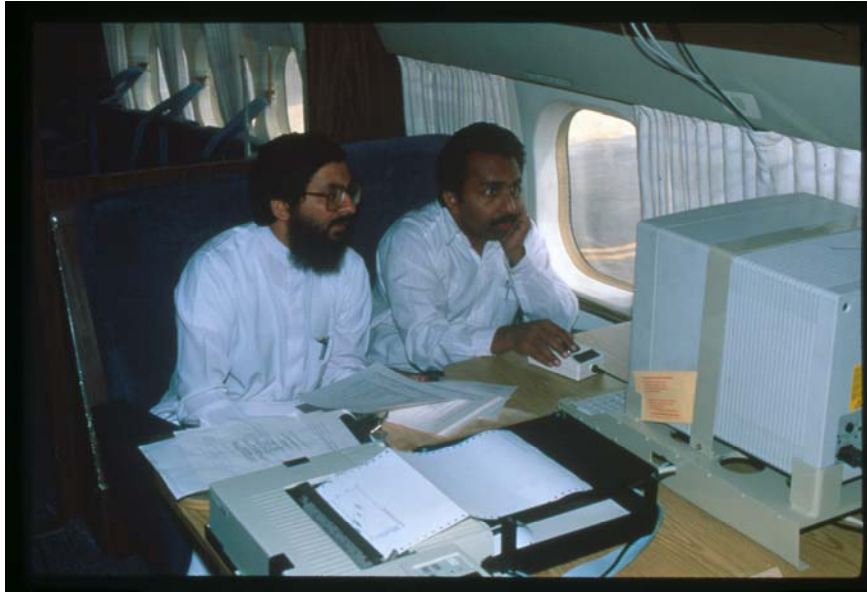
# SOARS "Graduation" 2010



# Kuwait Oil Fires 1991



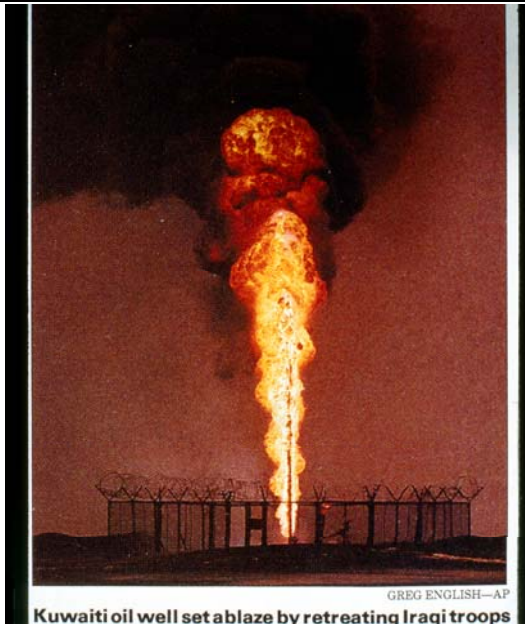
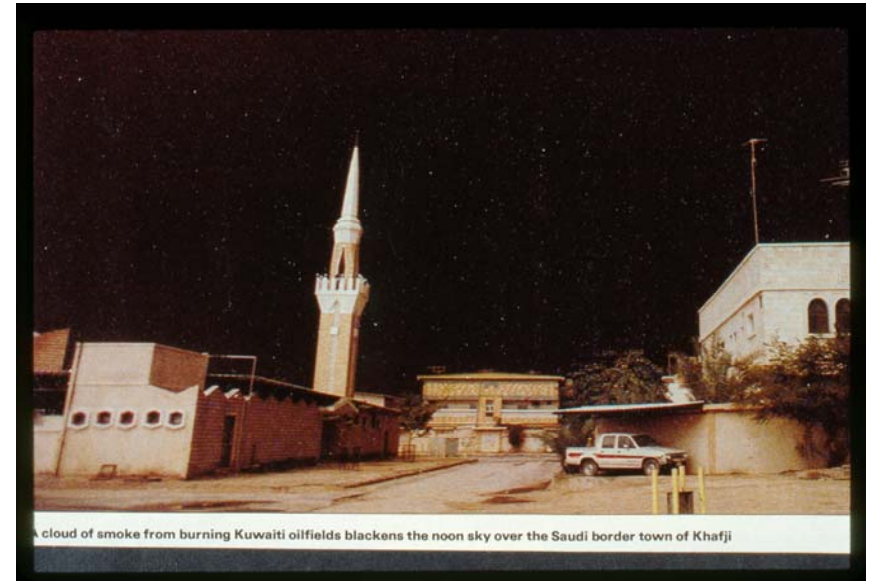
# Kuwait Oil Fires 1991



“Nuclear Autumn”



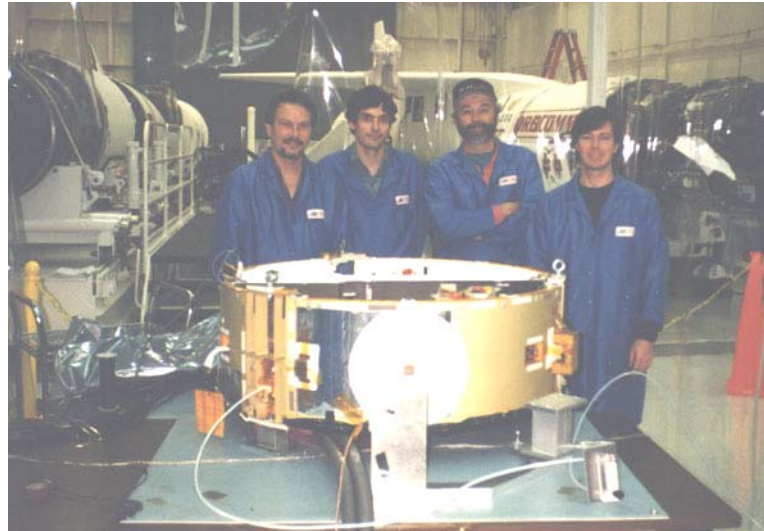
# Kuwait Oil Fires 1991





# GPS/MET Proof of Concept Mission

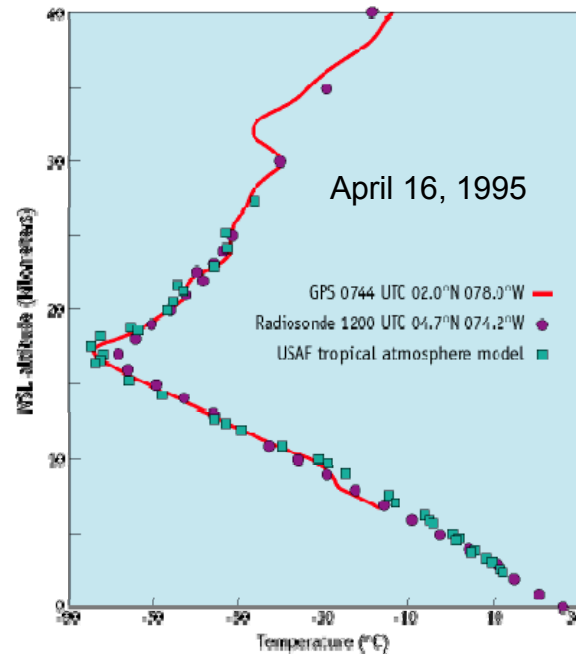
GPS/MET Launch  
April 3, 1995



Mike Exner (UCAR), Charley  
Dunn (JPL), Tom Meehan  
(JPL), David Finn (OSC)

Micro-Lab-1

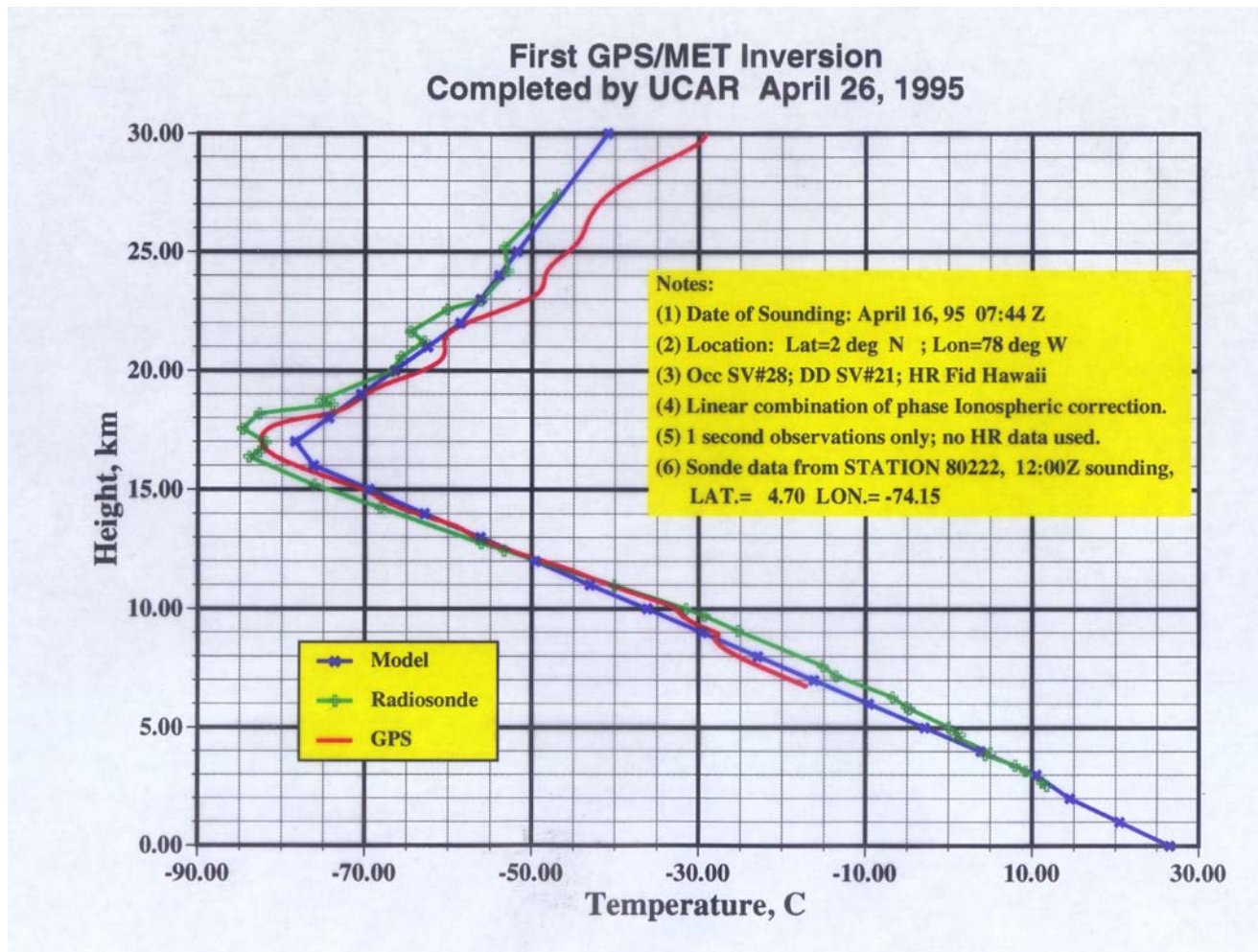
John McLucas



The first  
RO profile  
from Earth

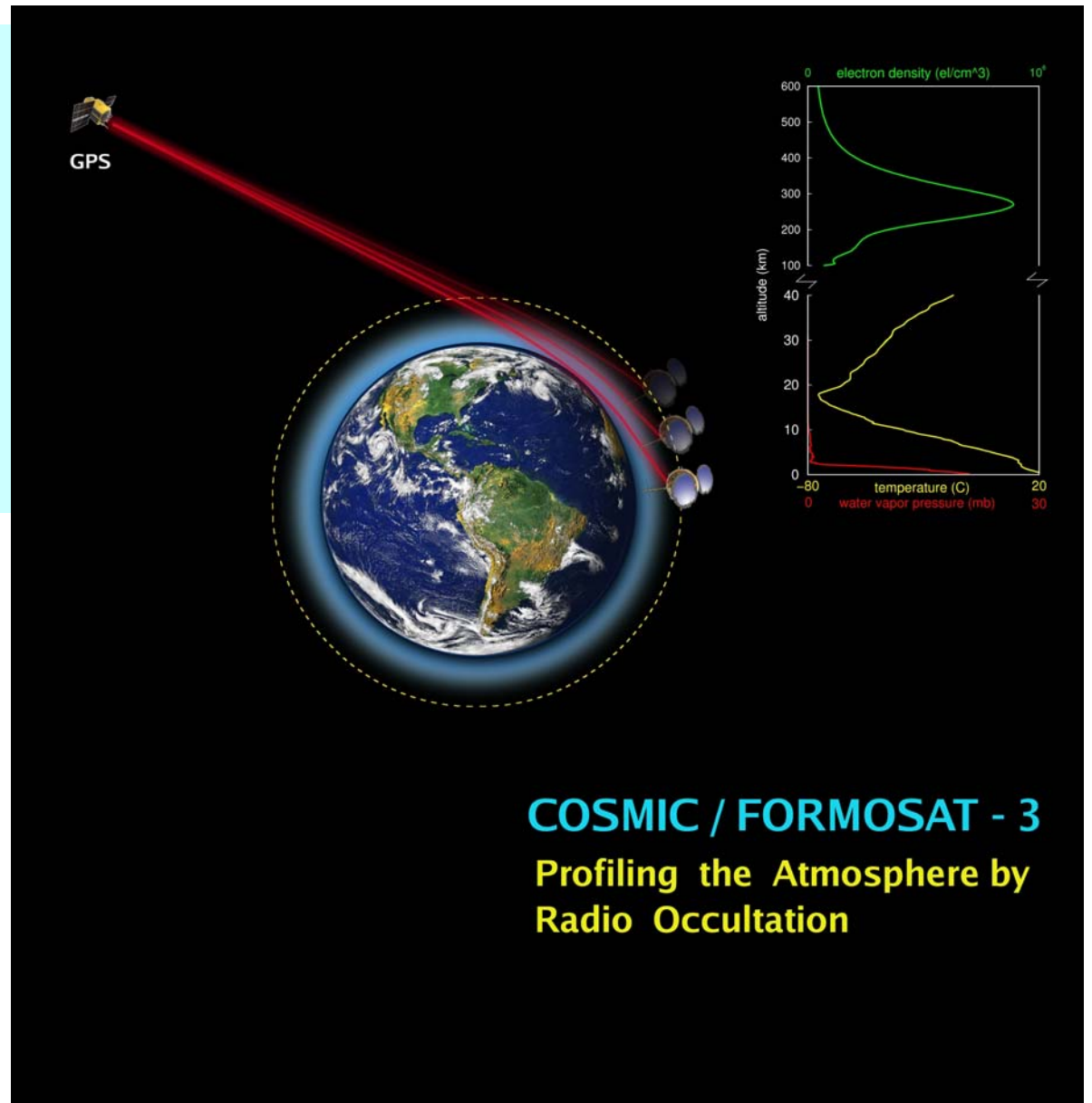
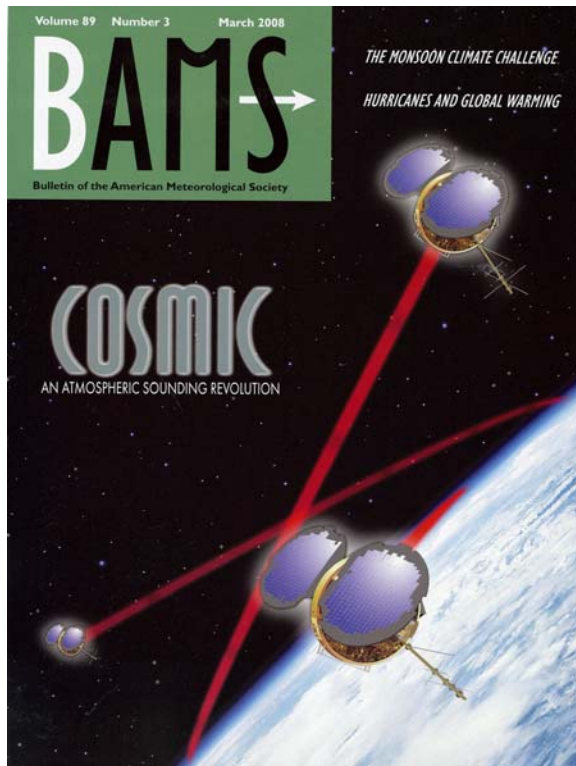


# GPS-MET First radio occultation sounding of Earth's atmosphere 1995



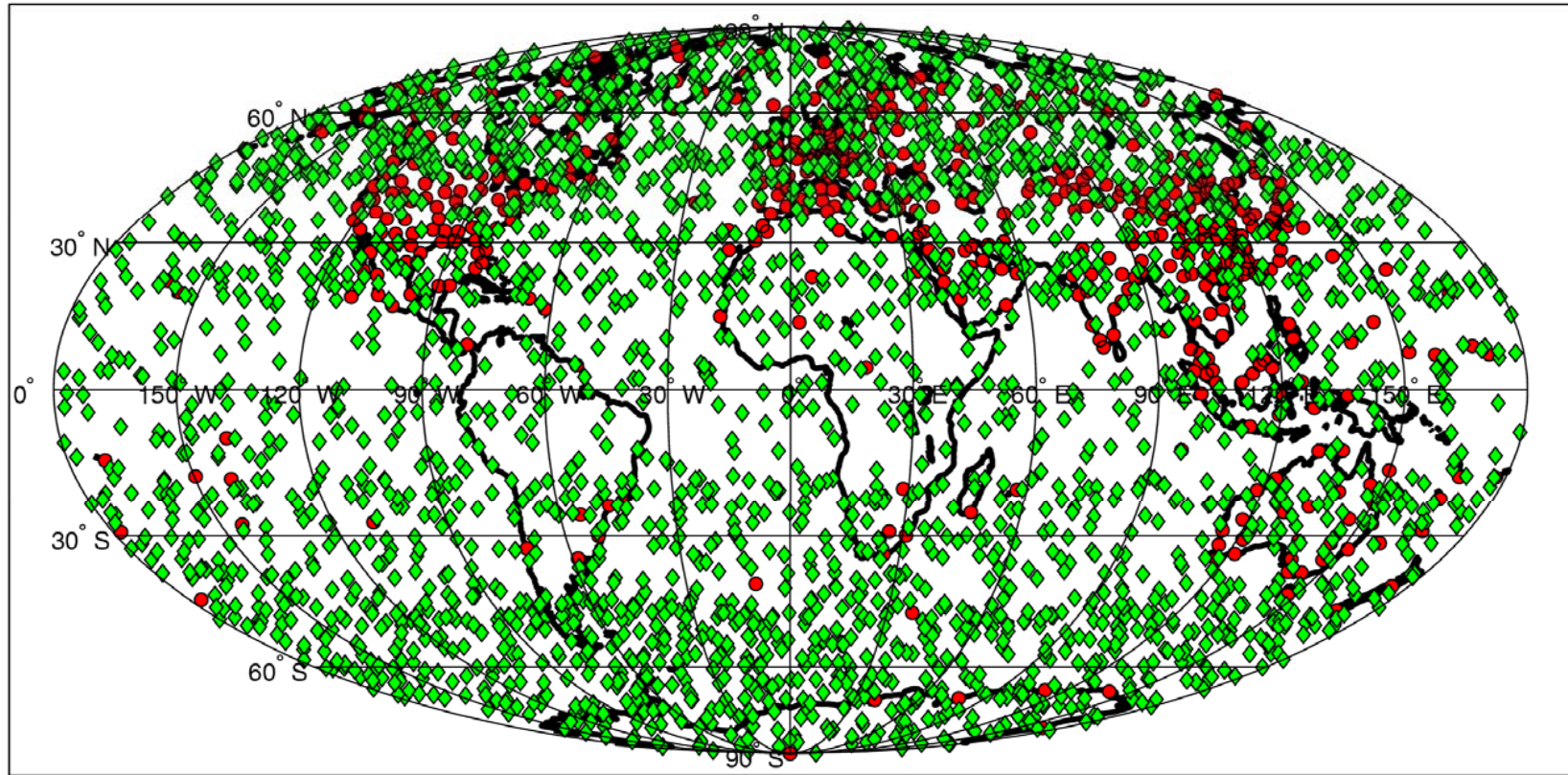
*Exploring the Atmosphere  
With Radio Occultation-  
contributions to weather, climate  
and space weather*

*OPAC 2010  
Rick Anthes  
6 September 2010*



# Predicted COSMIC Coverage in 1 Day

Occultation Locations for COSMIC, 6 S/C, 6 Planes, 24 Hrs



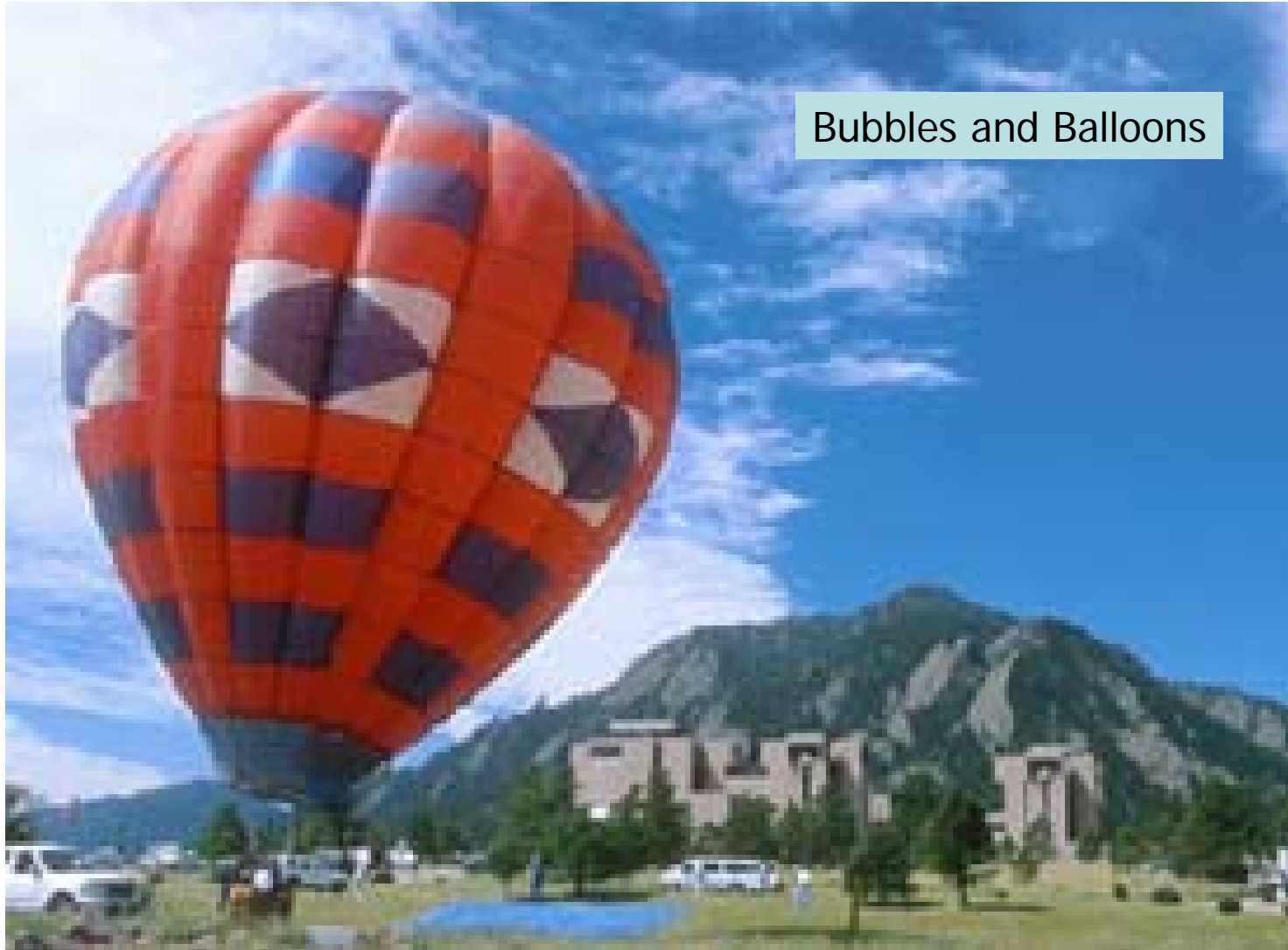
This may well be the most viewed slide from COSMIC. It was first shown in the late 1990s to Bob Corell (NSF-GEO AD) and others.

## 1998—Signing of Cooperative Agreement with NSF



Walt Dabberdt, Jewel Prendeville, Bob Serafin, John Snow, Jack Fellows. Cliff Jacobs, Dave Carlson, Dick Greenfield, Rick Anthes

# 2000—The 40<sup>th</sup> Anniversary



# Comment on Some Major Projects

- HIAPER (1982-2004)
- MM5 (1981-2005) → WRF (2005-present)
- COMET (1982-2010)
- Foothills Lab, Center Green
- CSMP→CCSM→CESM
- MECCA (1988-1995)
- SOARS (1993-present)
- GPS/MET and COSMIC (1990-present)
- NCAR-Wyo Supercomp Center (1994-present)

**Not one of these was easy!**

# Looking into the future

- “Heavier than air flying machines are impossible” (Lord Kelvin, 1895)
- “Everything that can be invented has been invented” (Charles Duell, Commissioner, US Postal Office, 1899)
- Louis Pasteur’s theory of germs is ridiculous fiction” (Pierre Pachet, Toulouse, 1892)
- “640K ought to be enough for anybody” (Bill Gates, 1981)
- “I think there is a world market for maybe five computers.” Thomas Watson, IBM, 1943
- “We don’t like the sound, and guitar music is on the way out.” (Decca Records letter of rejection to the Beatles, 1962)



# Thank You!

## And Here's to the next 50 years!

