

National Severe Storms Laboratory Review

Dr. Jeff Kimpel
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National Weather Center
Norman, Oklahoma



OVERVIEW





NSSL Overview Outline

- Who we are
- What we do
- Why we are relevant to NOAA
- How we measure quality
- How we measure performance
- Summary

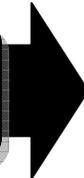


National Severe Storms Laboratory

- Who Are We?

NOAA's Mission Line Offices

Oceanic & Atmospheric Research



National Marine Fisheries Service

National Weather Service

National Environmental Satellite,
Data & Information Service

National Ocean Service

Oceanic & Atmospheric Research

**Assistant Administrator for
Oceanic & Atmospheric Research**

Richard W. Spinrad

**Deputy Assistant Administrator
Laboratories & Cooperative Institutes
Director, Earth System Research Laboratory**
Alexander E. MacDonald

Air Resources Laboratory

Earth System
Research Laboratory

Atlantic Oceanographic &
Meteorological Laboratory

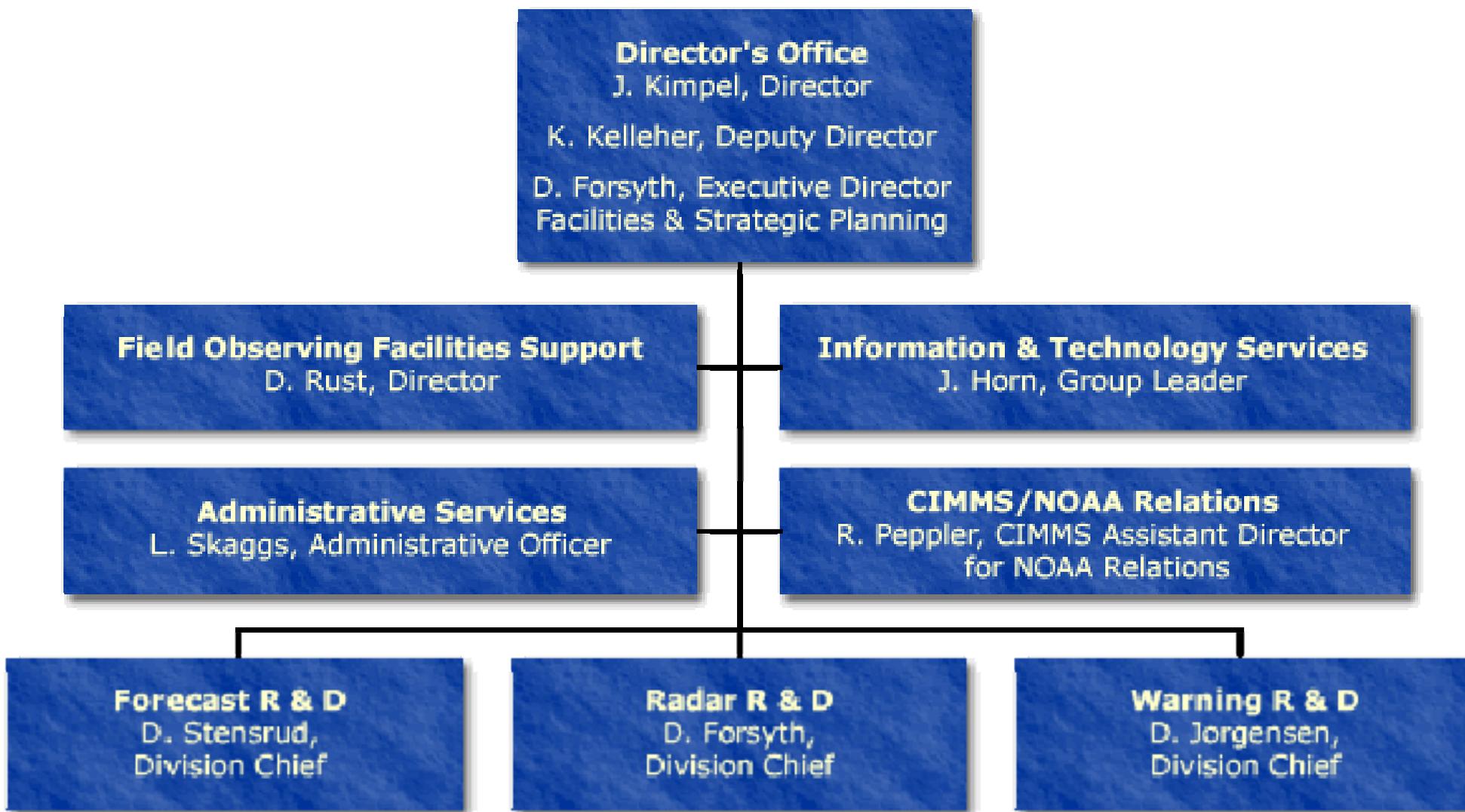
Great Lakes Environmental
Research Laboratory

Pacific Marine
Environmental Laboratory

**National Severe
Storms Laboratory**

Geophysical Fluid
Dynamics Laboratory

NSSL Organizational Chart

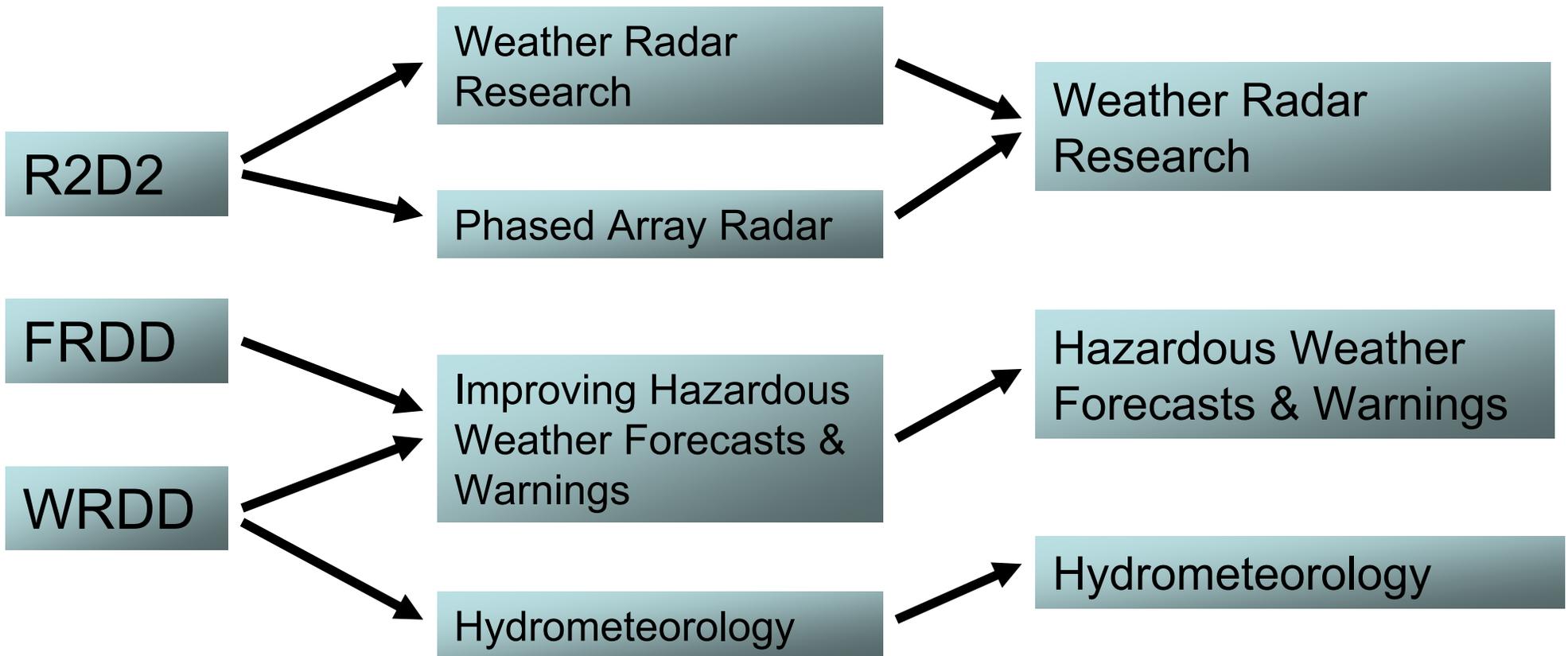


Themes for this review

Divisions

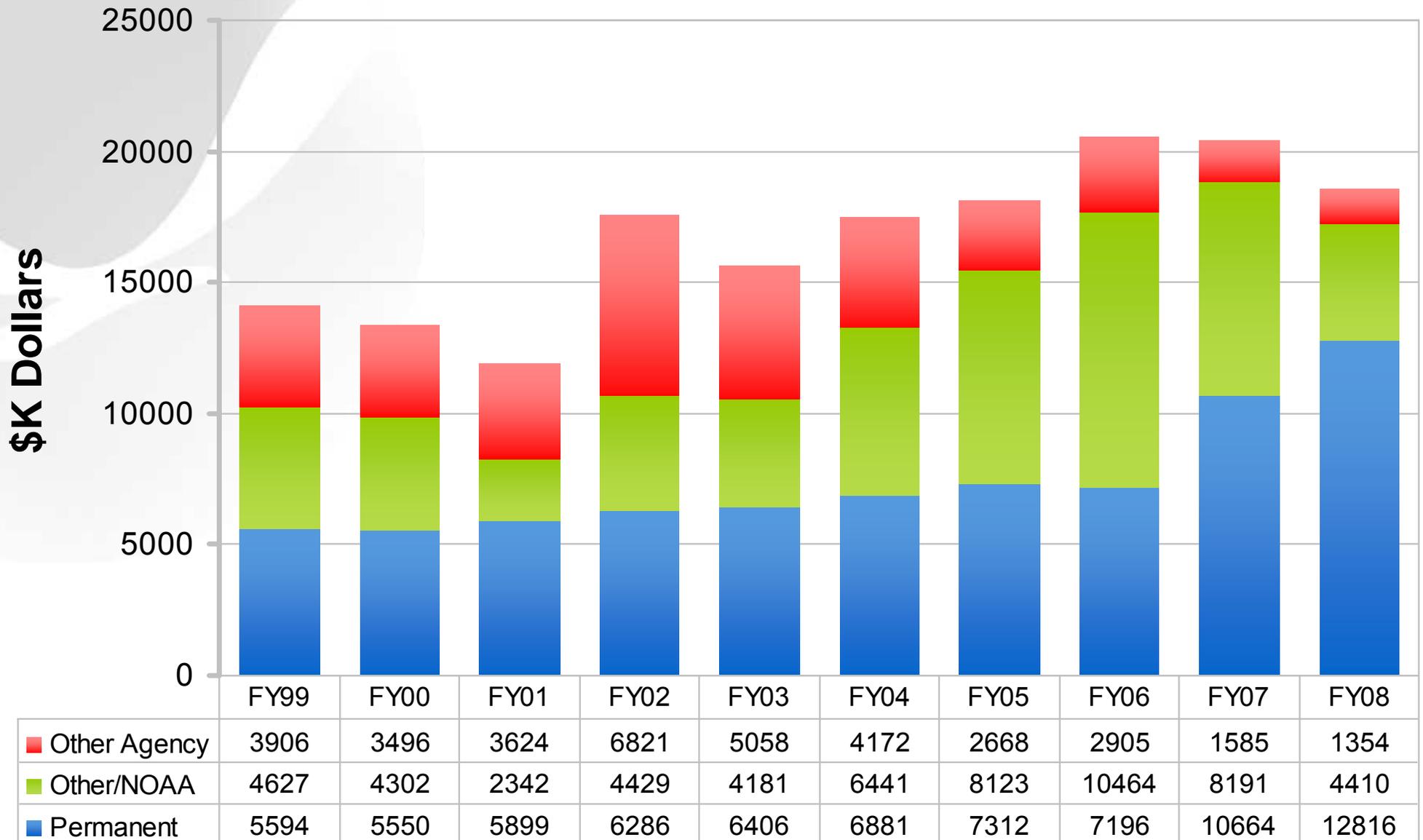
PPBES Capabilities

Review Themes

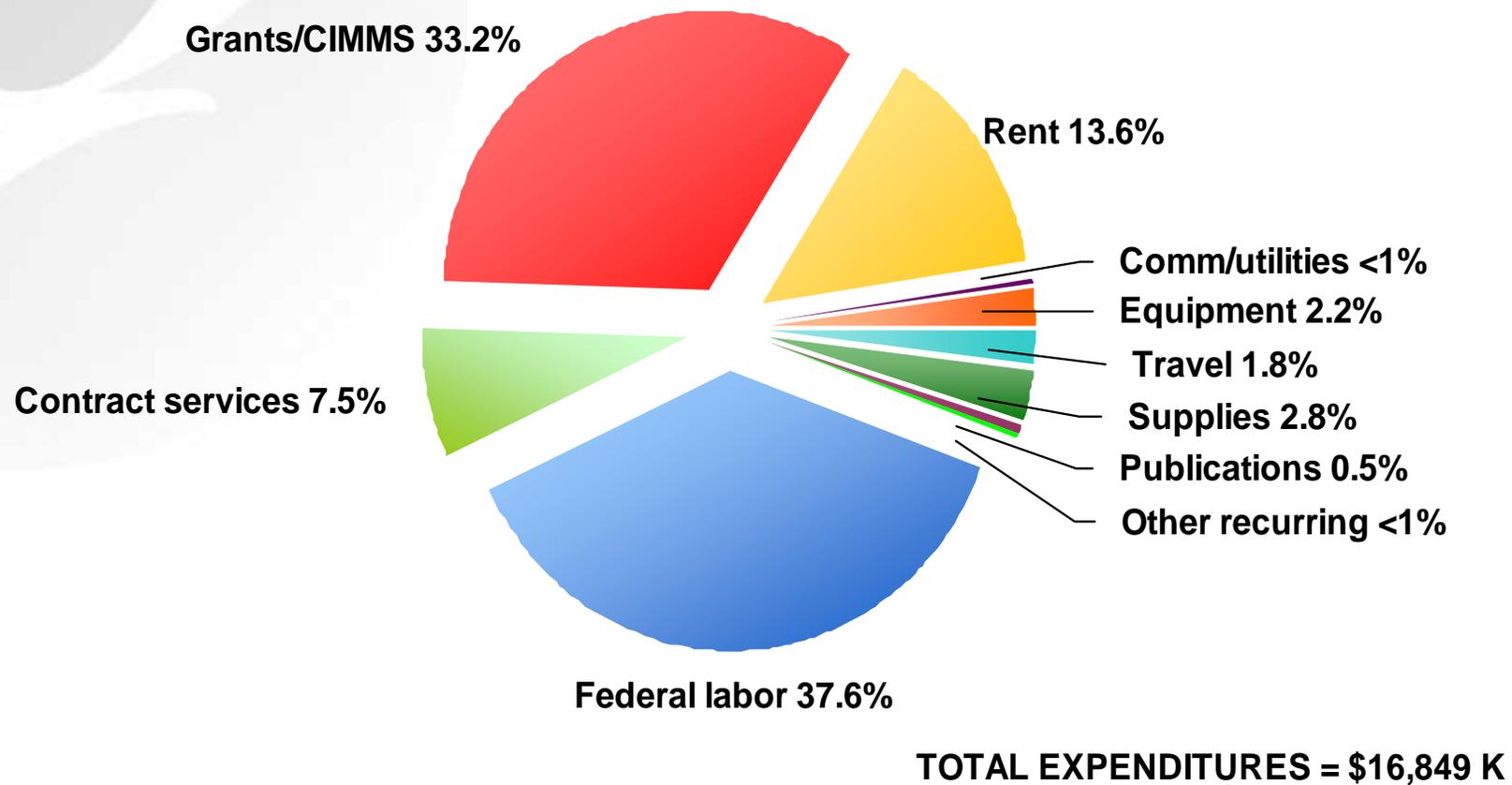


(100% Weather & Water: Science, Technology & Infusion)

National Severe Storms Laboratory 10 Year History Income Profile, FY99-FY08



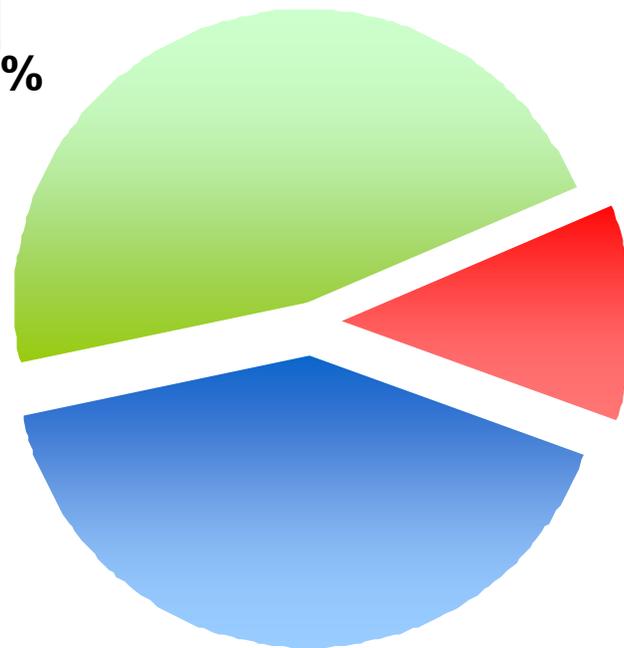
National Severe Storms Laboratory FY08 Expenditures



National Severe Storms Laboratory FY08 Research Theme Investments

(Expenses)

PAR/Radar, 47%

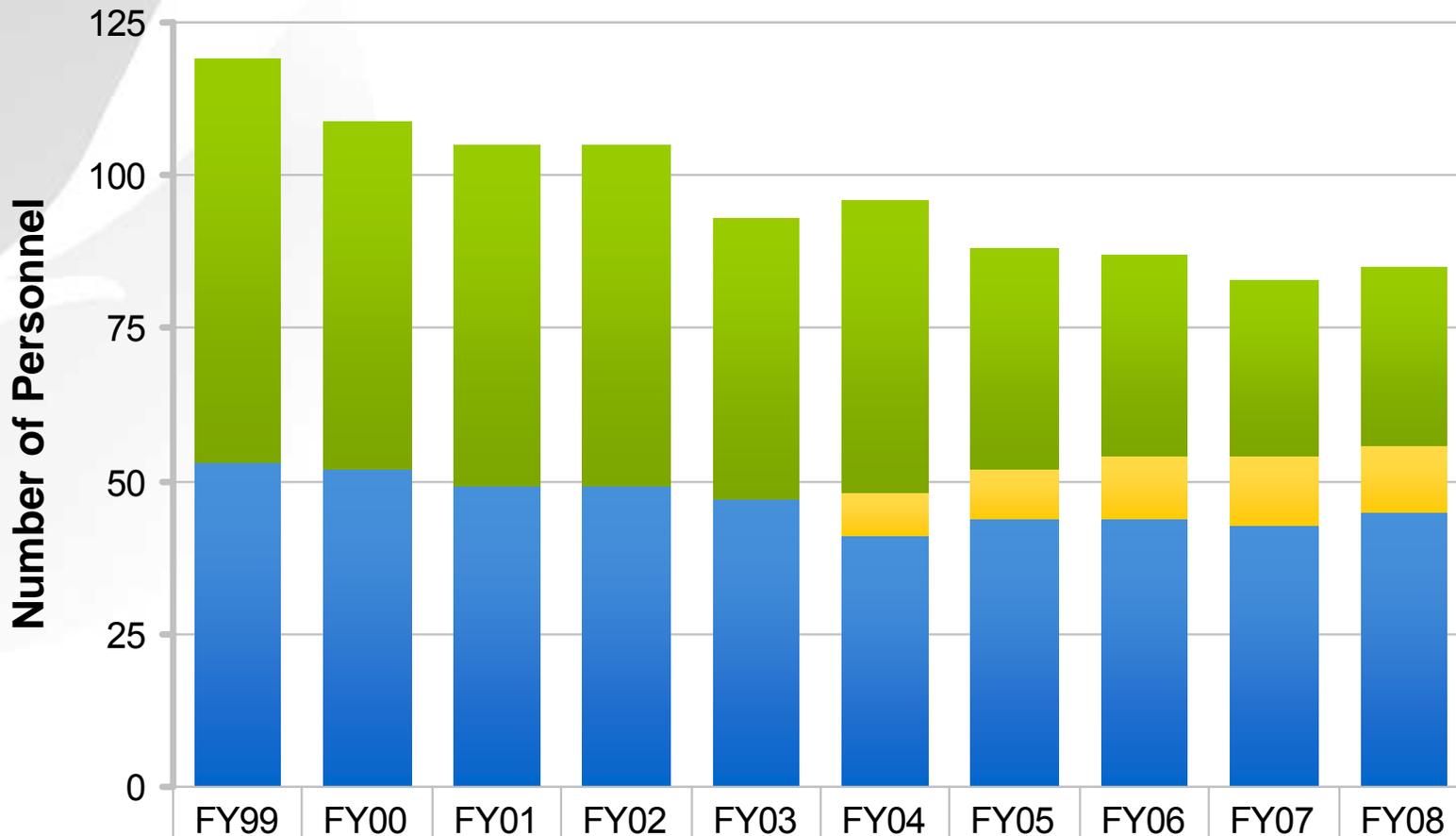


Hydrometeorology, 12%

Hazardous Weather, 41%

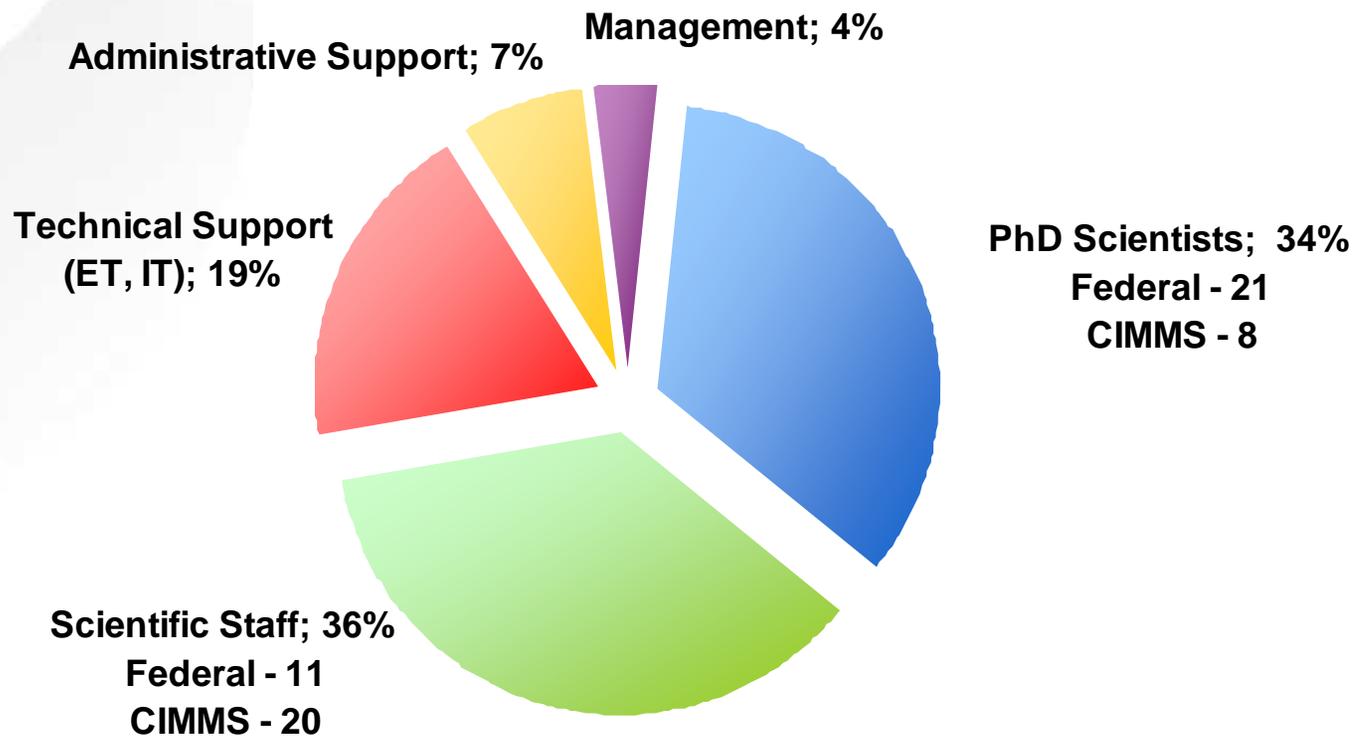
TOTAL EXPENDITURES = \$16,849 K

National Severe Storms Laboratory 10 Year Staff History



CIMMS (JI)	66	57	56	56	46	48	36	33	29	29
Contractor	0	0	0	0	0	7	8	10	11	11
Federal	53	52	49	49	47	41	44	44	43	45

National Severe Storms Laboratory 2008 Workforce Distribution



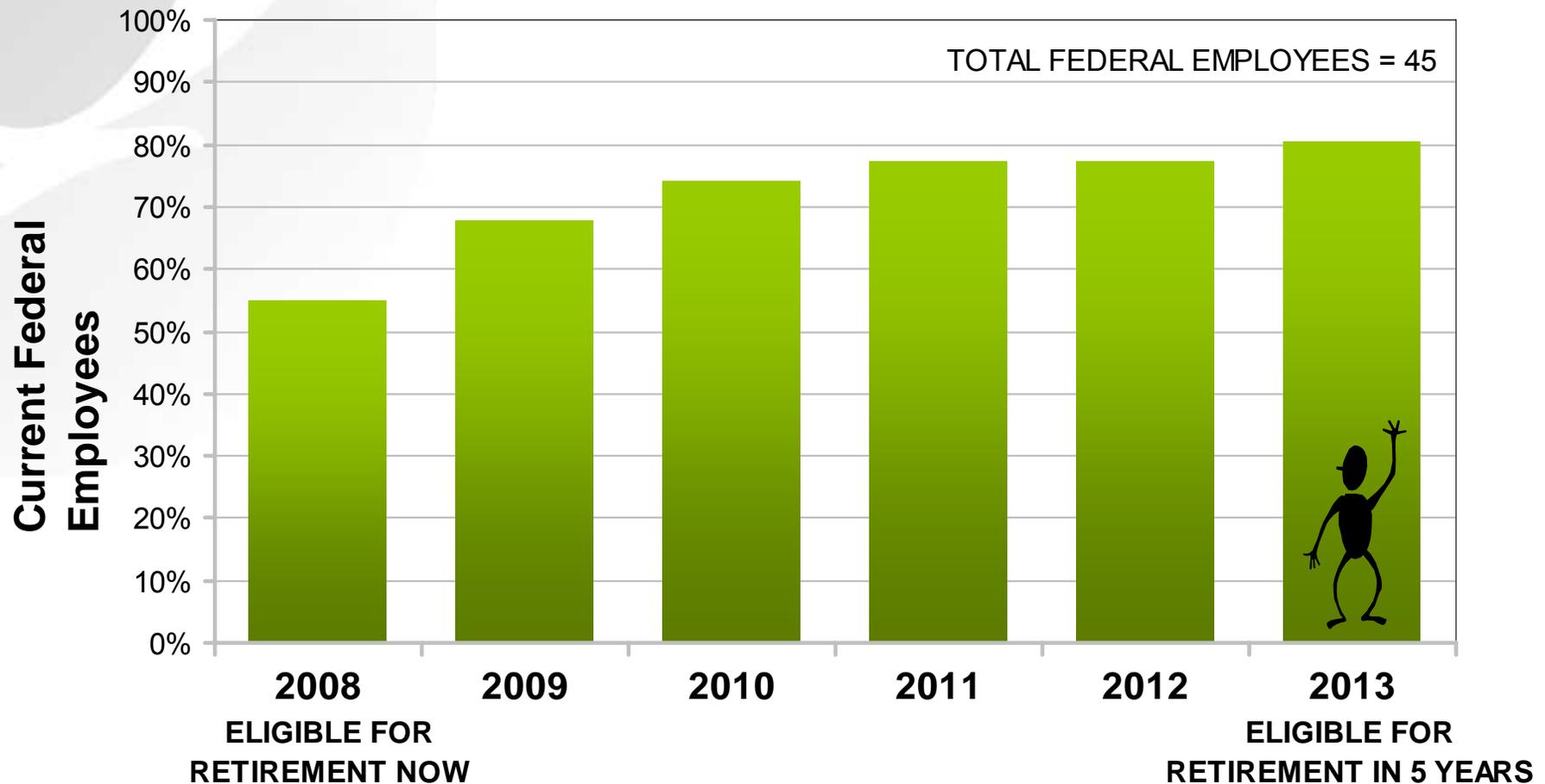
Total NSSL & CIMMS Staff = 85

National Severe Storms Laboratory Employee Statistics by Gender and Race

	FEDERAL Total	FEDERAL Scientists	CIMMS	Contract
Totals	45	32	29	11
Male	37	31	25	8
Female	8	1	4	3
Native American	3	1	0	0
African American	0	0	0	0
Hispanic	0	0	1	0
Asian	1	1	2	0
Other	0	0	0	0

National Severe Storms Laboratory Federal Employee Retirement Eligibility

Average age of
Federal Scientists - 54





What we do...

- NSSL is NOAA's primary radar laboratory.
- We are known for our contribution to the NEXRAD (WSR-88D) national weather radar network (NWS, FAA, USAF).
- We are currently working with the NWS to dual-polarize the WSR-88Ds.
- We perform R&D in storm and mesoscale NWP.
- We develop warning decision support systems.
- We are entering the hydrometeorology R&D area to take advantage of dual-pol in QPE and runoff modeling.



Relevance to NOAA: 20 Year Research Vision

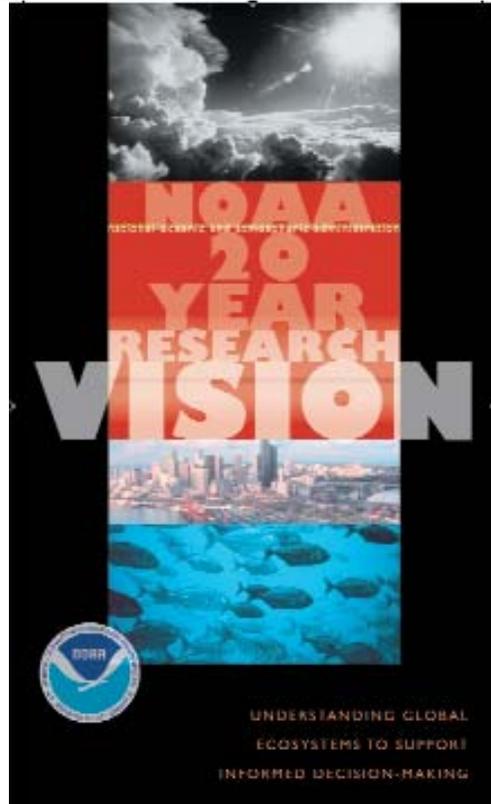
Warn-on-
Forecast

“...tornado warning lead times will be on the order of one hour, rather than minutes...”

“Technology like the phased array radar, significant improvements in our understanding of mesoscale weather processes, and the development of models that embody this understanding will enable this [1 hour tornado warning lead times] accomplishment.”

Phased
Array Radar

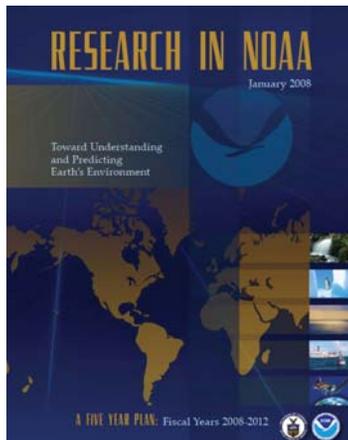
“Severe thunderstorm and tornado track forecasts at the sub-county level with one hour or more lead time...”



Relevance: 5 Year Research Plan

NOAA Relevant Mission Goal:

**“Serve Society’s Needs for
Weather and Water
Information”**



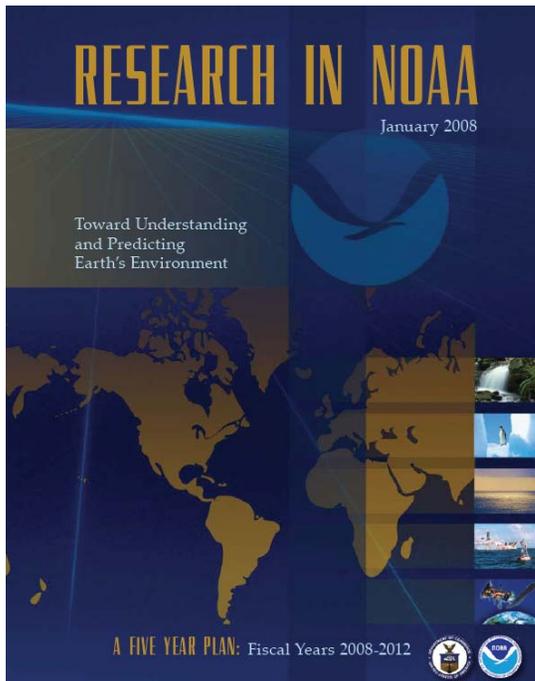
NSSL is contributing
to all 7 Performance
Objectives

Outcomes	Performance Objectives
Reduced loss of life, injury, and damage to the economy	<ul style="list-style-type: none"> • Increase lead time and accuracy for weather and water warnings and forecasts
Better, quicker, and more valuable weather and water information to support improved decisions	<ul style="list-style-type: none"> • Improve predictability of the onset, duration, and impact of hazardous and high-impact severe weather and water events
Increase customer satisfaction with weather and water information and services	<ul style="list-style-type: none"> • Increase application and accessibility of weather and water information as the foundation for creating and leveraging public (i.e., Federal, state, local, tribal), private and academic partnerships • Increase development, application, and transition of advanced science and technology to operations and services • Increase coordination of weather and water information and services with integration of local, regional, and global observation systems • Reduce uncertainty associated with weather and water decision tools and assessments • Enhance environmental literacy and improve understanding, value, and use of weather and water information and services

Relevance to NOAA: 5 Year Research Plan - Milestones

NOAA Relevant Mission Goal:

“Serve Society’s Needs for Weather and Water Information”



“Improve Weather Forecast & Warning Accuracy & Amount of Lead-time”

- Develop prototype PAR applications for tornado warnings...
- Provide decision-support services based upon probabilistic model guidance for coastal officials for storm surge...
- Testbed...
- Improved detection of severe storms using low-altitude, high-res Doppler data
- Deploy dual polarization...
- Implement a field project in Lower Miss/Gulf of Mexico...water quality/quantity
- Probabilistic forecasts for hazardous weather and explore Warn-on-Forecast

“Improve Water Resources Forecasting Capabilities”

- Deliver echo classification scheme to improve QPE using Dual Pol. radar
- Evaluate community-wide rainfall-runoff distributed hydrologic models
- Improve AHPS through multi-sensor QPE (Q2), including Dual Pol. and radar mosaics (NMQ)

“Improve understanding & forecast capability in coasts, estuaries, & oceans”

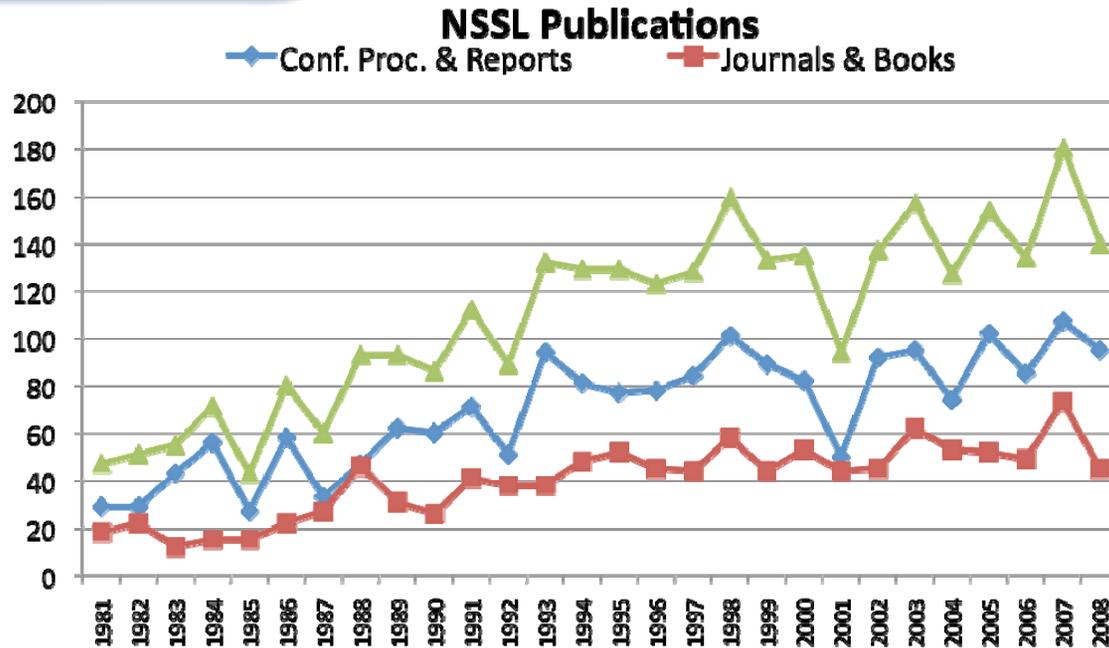
- Demonstrate a transition zone modeling system to integrate river, estuarine, and coastal models



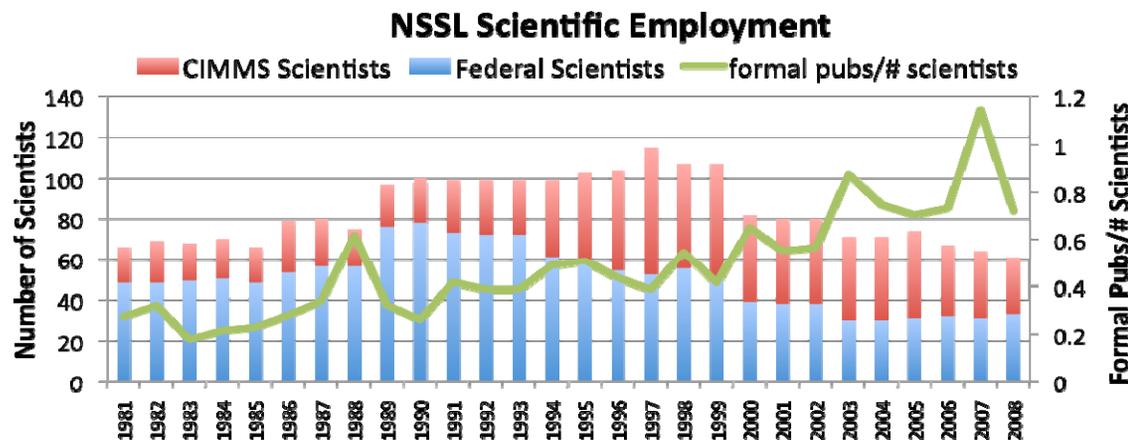
Quality

- Comparison to other R&D programs and federal agencies?
- Approaches to ensure high quality: NSSL scientists were asked what **they** expected of their colleagues.
 - ✦ Two refereed publications per year,
 - ✦ \$100k in reimbursables per year, and
 - ✦ Participate in fair share of outreach and educational projects.
- These overarching expectations are built into annual performance plans.

Quality - Publications

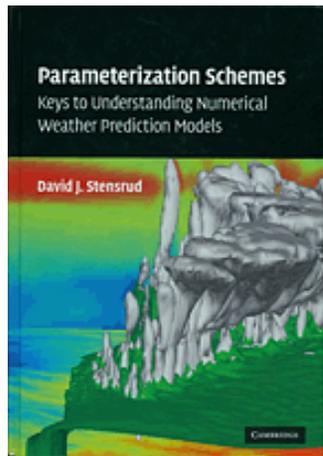


Refereed pubs *increased*, while scientist FTEs *decreased*

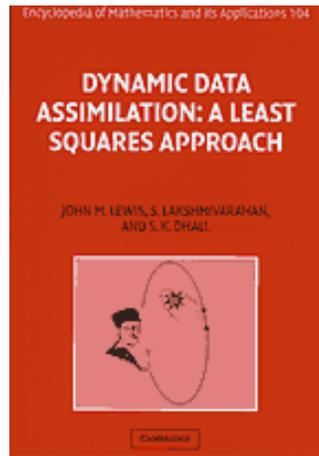


Average 1.5 – 2.0 refereed pubs per PhD scientist since 2000

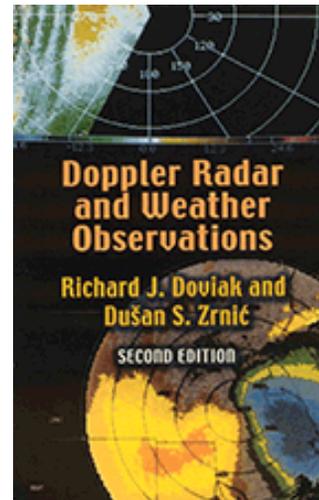
Quality – Recent Text Books



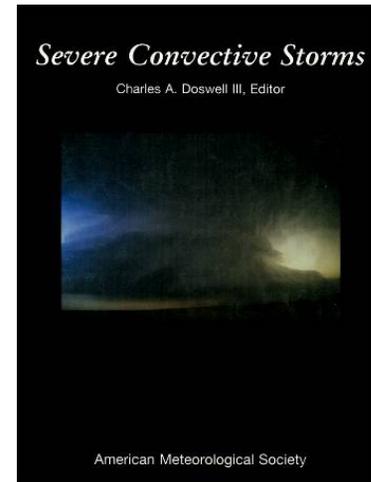
2007



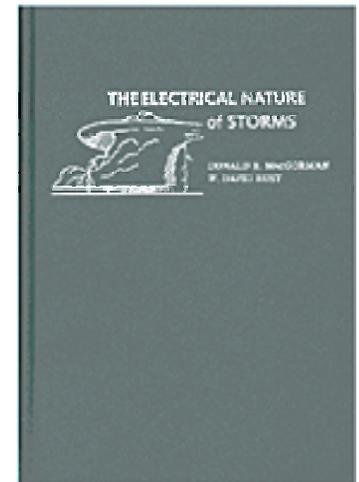
2006



2006



2001



1998

Quality - Citations

<u>Authors</u>	<u>Citations</u>	<u>H-Index</u>
Dusan S. Zrnić	3,653	30
Harold E. Brooks	1,318	21
Donald R. MacGorman	1,262	20
W. David Rust	1,240	20
David J. Stensrud	1,453	20
Alexander V. Ryzhkov	1,171	18
Qin Xu	964	18
Robert P. Davies-Jones	1,229	17
Richard J. Doviak	1,832	17
Conrad L. Ziegler	903	17
David P. Jorgensen	831	15
Donald W. Burgess	788	14
John S. Kain	1,551	14
Louis J. Wicker	721	14
Kenneth W. Howard	700	13
Gregory J. Stumpf	631	13
Rodger A. Brown	348	12
Robert M. Rabin	361	10
Terry J. Schuur	252	10
Vincent T. Wood	285	10
<hr/>		
NSSL Totals (all authors)	25,511	N/A

Tenured Full Professor 20
(Mean of 8 from U.S.)

Meteorologists 27.5
National Academy of Sciences (Mean of 2)

Radar Engineers 17
National Academy Engineering (Mean of 3)



Quality – Research to Operations

Weather radar research 38 complete

- ✦ NSSL's NEXRAD R&D is often cited as the best example of transferring to operations in all of NOAA.

Forecasts and Warnings 23 complete

- ✦ NSSL radar data assimilation and ensemble techniques used by NCEP.

Hydrometeorology 2 complete

- ✦ NSSL's inter-radar comparison technique is being used by the NWS Radar Operations Center to correct calibration problems



Quality - Awards

- Presidential Early Career Awards
- Two Presidential Rank Awards
- AMS Remote Sensing Prize and Meisinger Award
- Awards from IEEE, DOC, NOAA, NASA, FAA
- 10 OAR Outstanding Research Paper Awards
- World Meteorological Organization Vaisala Award
- Two NSSL Scientists share in the IPCC Nobel Peace Prize



Quality - Memberships

- Member, National Academy of Engineering
- 10 Fellows, AMS
- 2 Fellows, IEEE
- 2 Fellows, Royal Meteorological Society
- 2 Certified Consulting Meteorologists
- 22 Fellows, Cooperative Institute for Mesoscale Meteorological Studies



Quality - Service

- AMS Publications Commissioner (present)
- 14 Chief, Co-Chief, Associate Editors of AMS journals since 2000.
- 8 members of AMS Scientific and Technical Advisory Committees
- 3 members of the National Weather Association Remote Sensing Committee
- Past President AMS

Quality - Collaborations

- 18 International organizations
- 17 projects with NOAA organizations
- 18 universities and academic organizations
- 8 federal (non-NOAA), 1 state , and 1 tribal collaboration





Quality – Patents and CRADAs

- Patents: Four, with one pending
- Multiple software disclosures and licensing agreements with the University of Oklahoma as a partner
- CRADAs:
 - WeatherData
 - Mitretech
 - Weather Decision Technologies
 - Salt River Project
 - Weather Services International

Quality - Media

NATIONAL PRESS FOUNDATION

NSSL has hosted a workshop focused on severe weather for reporters sponsored by the **National Press Foundation** in 2005 and 2007, and plans are underway for April 19-22, 2009.

<u>National Weather Festival</u>	<u># of People Who Attended</u>
2005	1,000
2006	3,000
2007	2,000
2008	3,000 +

<u>NSSL Tours</u>	<u>Total # of People</u>	<u>Total # of Groups</u>
2006	1,478	95
2007	3,893	166
2008	2,654	122

<u>Year</u>	<u>Hits on NSSL Website</u>
2007	34,868,003
2008	45,238,193

<u>Type of News</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>TOTAL</u>
NOAA News Releases	12	7	14	33
External News Releases	5	1	2	8
Media Interviews	86	41	67	194
Newspaper Stories	19	16	21	56
TV and Radio Stories	51	28	44	123
Internet and Other Media Stories	1	1	3	5





Quality - Education

NSSL's contribution to the next generation of scientists and engineers

- ✦ 20 NSSL and CIMMS scientists
 - ✦ serve as adjunct, affiliate, or emeritus faculty at OU, four other universities.
 - ✦ they have appointments in meteorology, electrical engineering, computer science and physics.
- ✦ These faculty have served on 85 M.S. and 85 PhD committees since 2000.
- ✦ NSSL and CIMMS scientists have mentored 69 undergraduate students (e.g., Hollings Scholars)



Performance – Research Leadership & Planning

1. NSSL updates its vision and long range planning every 4-5 years in an off site “Advance” setting.
 - ✦ Example: phased array radar. What is the meteorological equivalent of putting a “man on the moon”? Tornado warnings from storm resolving models.
2. Seed projects started annually from Director’s Discretionary Fund. Usually 5-7 projects.
3. Successful projects are proposed for stable funding in PPBES process.
4. Internal funds are repurposed each year toward higher priority projects.



Performance - Research Leadership and Planning

5. Key projects, such as WSR-88D improvements, are negotiated annually via MOU with NWS NPI and ROC.
6. NSSL has clearly defined and documented scientific objectives in Annual Operating Plan, PPBES documentation, NOAA milestones, MOAs with other agencies and, MOUs with the NWS.
7. Projects are terminated on a case-by-case basis when transitioned, lack of customer support, and/or reimbursable funding ends. Examples: Open Systems, winter weather, airborne Doppler radar research, Southwest U.S. monsoon research, and studies of Mesoscale Convective Systems.



Performance – Efficiency and Effectiveness

- Is NSSL efficient and effective?
- Is NSSL organized to optimize planning and creativity?
- Is NSSL integrated into the NOAA Program, Planning, Budgeting, Execution System (PPBES)? Yes, through the Science, Technology and Infusion Program Management Team under the Weather and Water Goal Team. Deputy Director leads.
- In 2008, external funding accounted for 33% of the NSSL budget.
- Human resources and diversity: Scientific workforce is aging. Improvements in diversity are needed.
- Support services are adequate.
- In 2008, external “grants in force” in OU/CIMMS totaled \$7.1M generated by NSSL Federal and CIMMS associates. All support the NOAA mission.



Performance - Transition

- NSSL has transferred over sixty R&D projects to operations over the past decade.
- Transitions occur in multiple paths to observational systems (radar), NCEP (forecasts and models), the NWS Forecast Offices (warning improvements) and to the private sector (CRADAs and patents).
- Stakeholders are involved from the beginning in workshops, planning activities, groups choosing to meet in the NWC. We share our facility with several of our customers so that daily interaction is possible (e.g., HWT).
- R&D results are communicated to stakeholders in meetings and workshops, by publication and via the media.

Review Summary

•Themes

- ✦ Weather Radar Research
- ✦ Hazardous Weather Forecasts and Warnings
- ✦ Hydrometeorology

•Focus Areas

- ✦ Quality
- ✦ Relevance
- ✦ Performance

