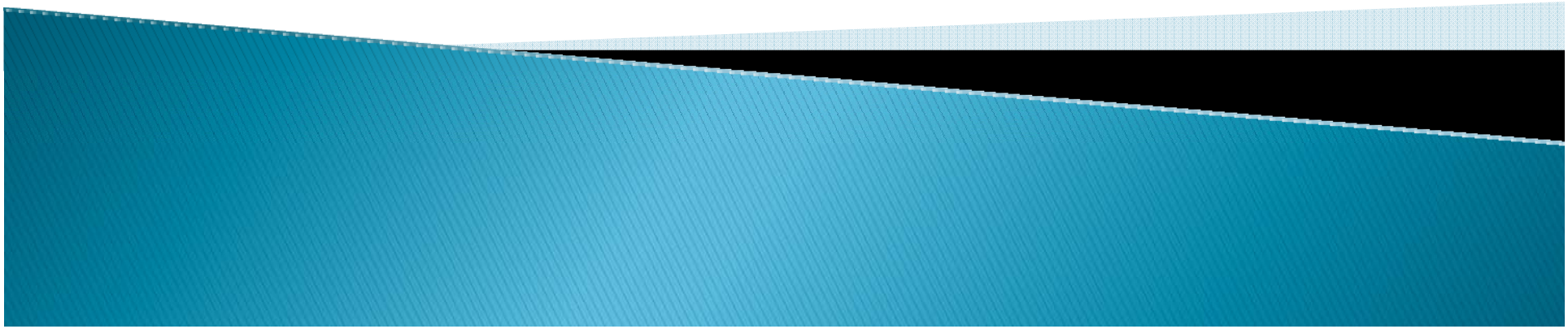
Measuring Up with Metrics

Helen Moshak, NCAR Director's Office

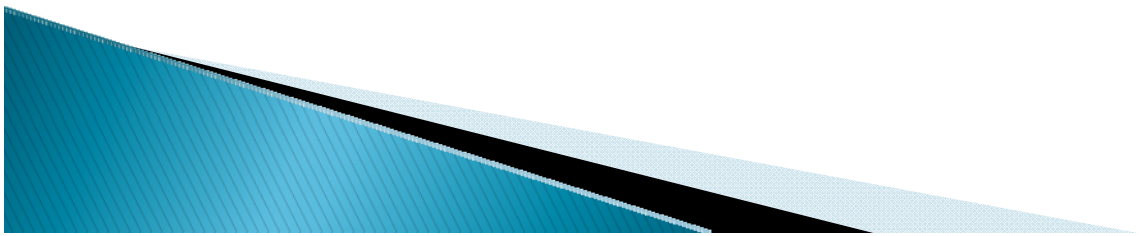
2010 NSF Large Facility Workshop

May 5, 2010



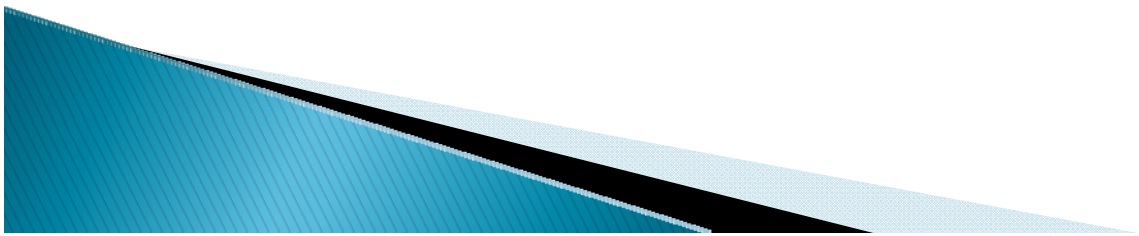
Metrics

- Can characterize quality, productivity, impact and efficiency
- Create standard success indicators for evaluation and comparison
- Support decision processes, public relations, strategic planning, performance reviews and resource allocation



What to measure?

- Quality – how good is it?
  - *Peer review, return customers, recognition*
- Productivity – how much is being done?
  - *Counting, mapping, and trending*
- Impact – How is it affecting others?
  - *Number of collaborators, resulting papers or discoveries*
- Efficiency – How much does it cost?
  - *Rates, costs, and returns*



How to do it?

- Identify your critical and essential business
  - Work with your sponsors, administrators & managers
  - Review your Mission, Goals and Strategic Plans
  - And then ask – What, Who, How, & When?

The NCAR Mission

To understand the behavior of the atmosphere and related physical, biological, and social systems

To support, enhance. and extend the capabilities of the university community and the broader scientific community, nationally and internationally

To foster the transfer of knowledge and technology for the betterment of life on Earth

NCAR Annual Report Metrics

These metrics are some of the qualitative and quantitative measurements and assessments of the productivity, quality, and impacts of NCAR Research programs and activities.

- Publications
- Field Campaigns
- Editorships
- Presentations
- Colloquia & Symposia
- External Committee Service
- Workshops
- Teaching Appointments
- Fellowships
- Visitor Appointments
- Thesis Committee
- Graduate Advisors
- Student Appointments
- K-12 Outreach
- Awards
- Informal education
- Partners

http://www.nar.ucar.edu/2009/NCAR/index.php/metrics

Another Source: Data Prospecting

- Managers and Administrators create and maintain data every day to do their jobs –
  - Budgeting and allocating
  - Scheduling
  - Recruiting & supporting users
  - Managing inventory

- Work with them to locate and mine this treasure trove!

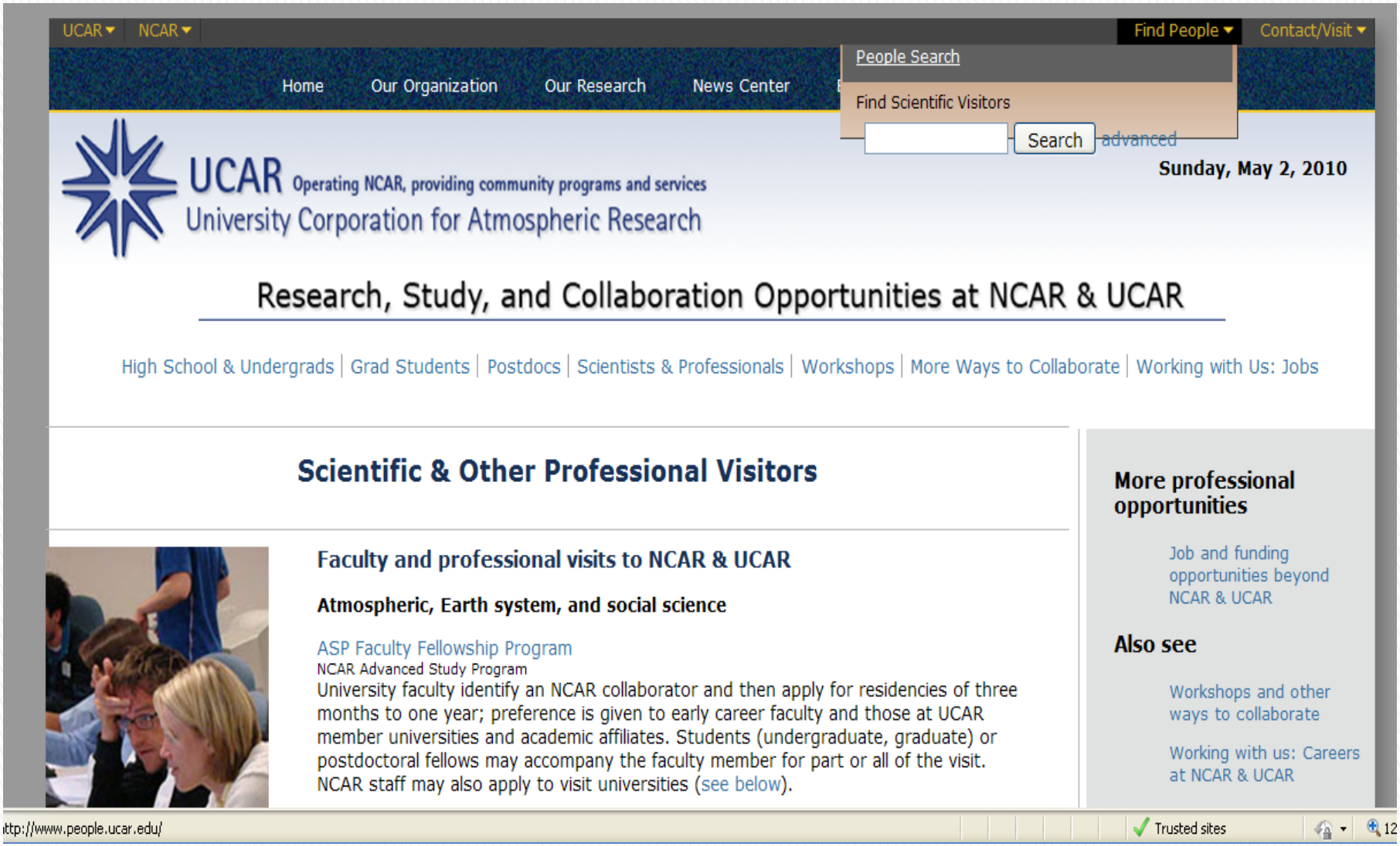
Data Mining

With the data, try:

- Classifying people, events or things into groups by attributes or patterns
- Collecting data sets over multiple periods
- Sharing the wealth!

Visitor Programs ⇨ Metrics
Space management ⇩

NCAR & UCAR Visitor Programs



http://www.ucar.edu/opportunities/professionals/

NCAR Visitor Metrics

Scientific and Technical Visitor Appointments

(top)

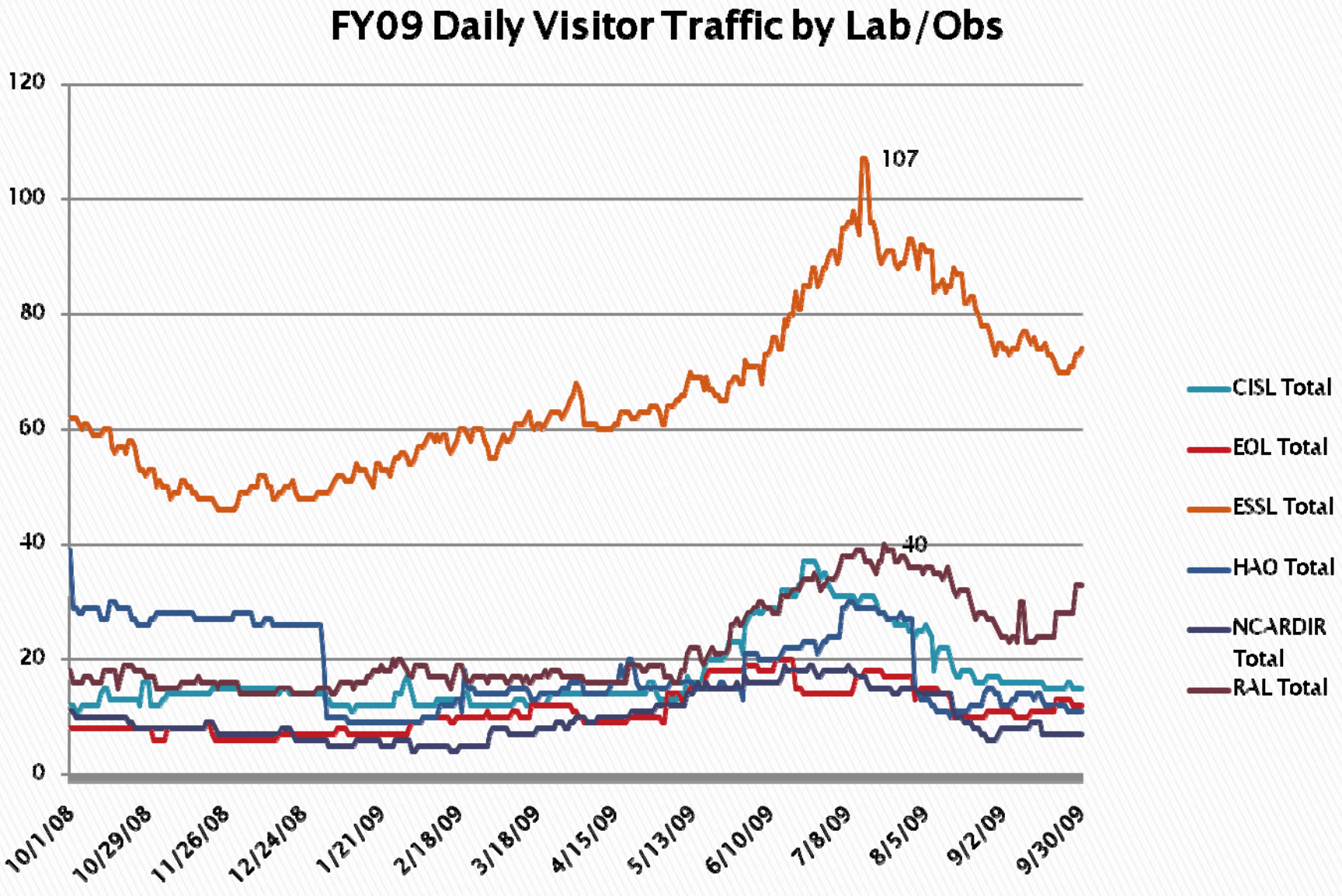
Each year students, scientists, engineers, weather forecasters, and other professionals from around the country and world receive special visitor appointments from labs and programs across NCAR to collaborate with scientific, educational, or technical staff; conduct independent research; or participate in and/or oversee a professional project. Many receive financial support for their visits and some visitors temporarily join the NCAR staff.

Visit Length	Number of Scientific and Technical Visitors in FY09
1-7 Days	213
8-14 Days	88
15-30 Days	109
1-2 Months	87
3-6 Months	228
6 Months - 1 Year	36
Total	761

Scientific and Technical Visitor Types	Headcount in FY09
Visitors on Payroll	50
NCAR funded Visitors	335
Externally funded Visitors	376
Total	761

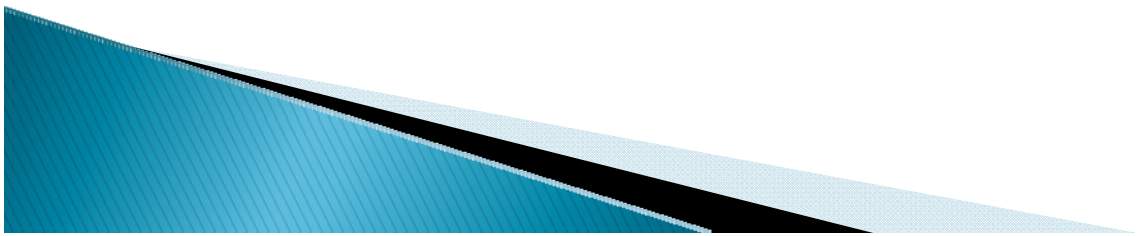
NCAR Visitors hailed from 317 institutions, located in 46 different U.S. states and 42 different countries.

Space Management– Visitor Data



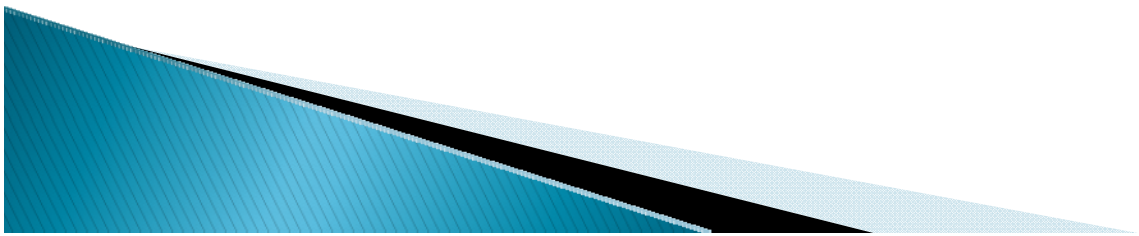
Next

- Develop standard measures, definitions and formats
- Create tools for data gathering and management
- Set schedules and deadlines
- Schedule a training for new folks and a rollout meeting at the start of the metrics collection season



Support People in Data Collection

- Name and network with Point People
- Create 2 Web pages or Wikis
  - One to support Metrics Point People, One to display the results!
- Create a Mailing list or Email alias
- Create an FAQ
- Set standard definitions everywhere
- Support data validation in your tools
  - Formatting
  - Drop down lists



Metrics Tools

Can be as sophisticated as web-based databases and financial/reporting systems

And as simple as excel templates

Metrics Guidelines and Resources

NCAR Annual Report (NAR) Metrics: Data Collection and Formatting Instructions

Table of Contents

INTRODUCTION: DATA COLLECTION
OVERVIEW: NCAR ANNUAL REPORT
TEMPLATES: EXCEL WORKBOOK

1. TIMELINES AND GENERAL INSTRUCTIONS
2. FIELD PROGRAMS
3. COMMUNITY SERVICE
4. EDUCATION AND OUTREACH
5. AWARDS AND FELLOWSHIPS
6. PEOPLE
7. PUBLICATIONS - TBD

FAQs

This site describes the procedures for collecting and reporting metrics for the NAR (www.nar.ucar.edu) and provides the Excel workbook template for collecting and transmitting the data. The purpose of the metrics is to demonstrate how well NCAR is performing against its stated mission, strategic plan, goals, and priorities. Laboratories, divisions, and institutes will also be able to use this list for internal purposes: to prepare performance appraisals, to assess the use of resources, and to measure performance against its own priorities and goals. Metric definitions and workbook examples are presented here.

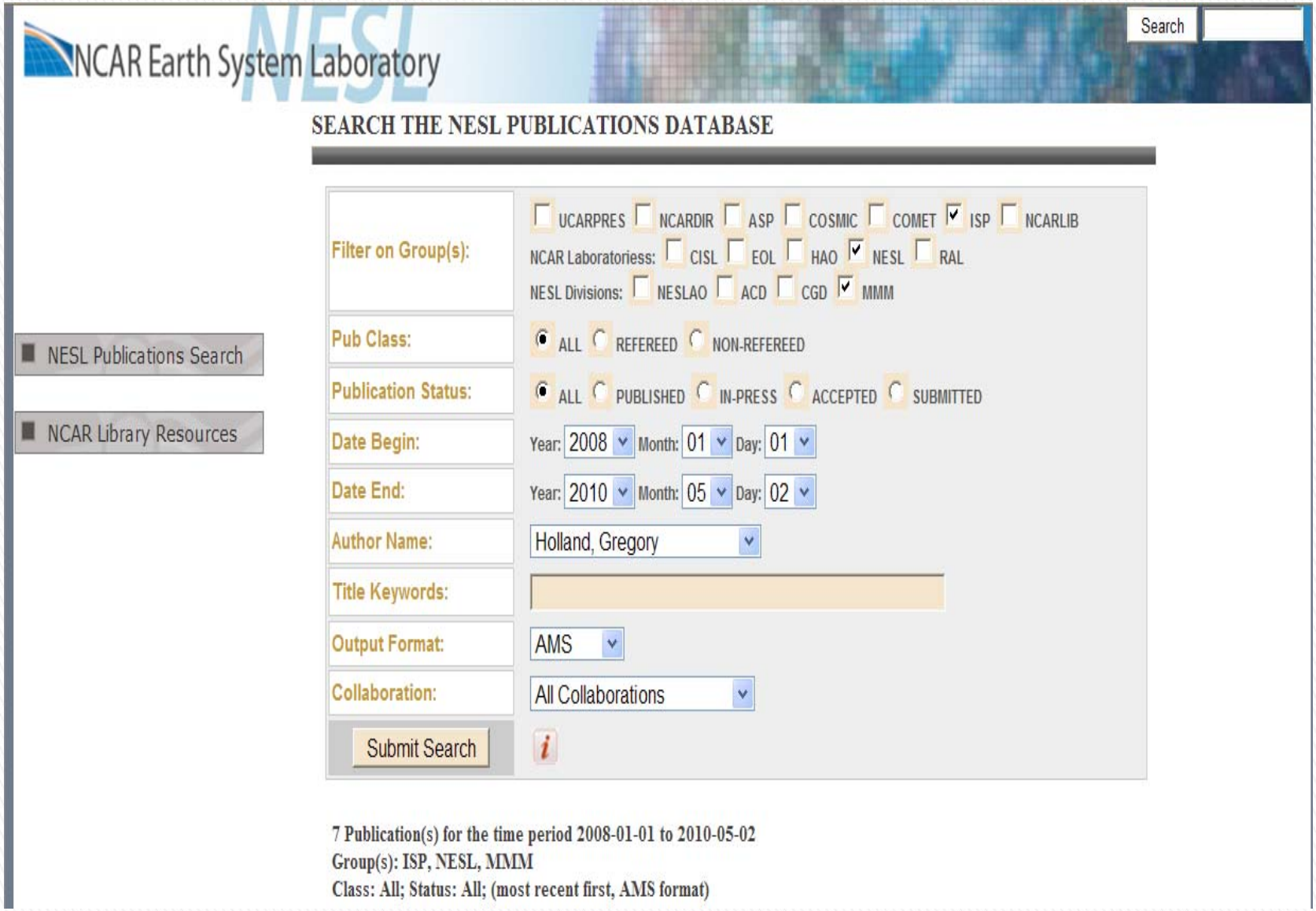
NAR Metrics Template Workbook:

Metrics Templates 2009.xls

We've set up an email alias to help us communicate, share, and improve our information. The NAR Metrics mailing list is designed to serve as a "NAR Network"; to disseminate information, schedules, questions, answers in regards to the NAR Metrics Handbook, and data collection process. Only NCAR/UCAR email addresses may be subscribed to this list. Attempts to subscribe other kinds of email addresses will be rejected. To subscribe to the NAR Metrics Mailing List (NARmetrics@ucar.edu), follow the instructions at: http://mailman.ucar.edu/mailman/listinfo/narmetrics.

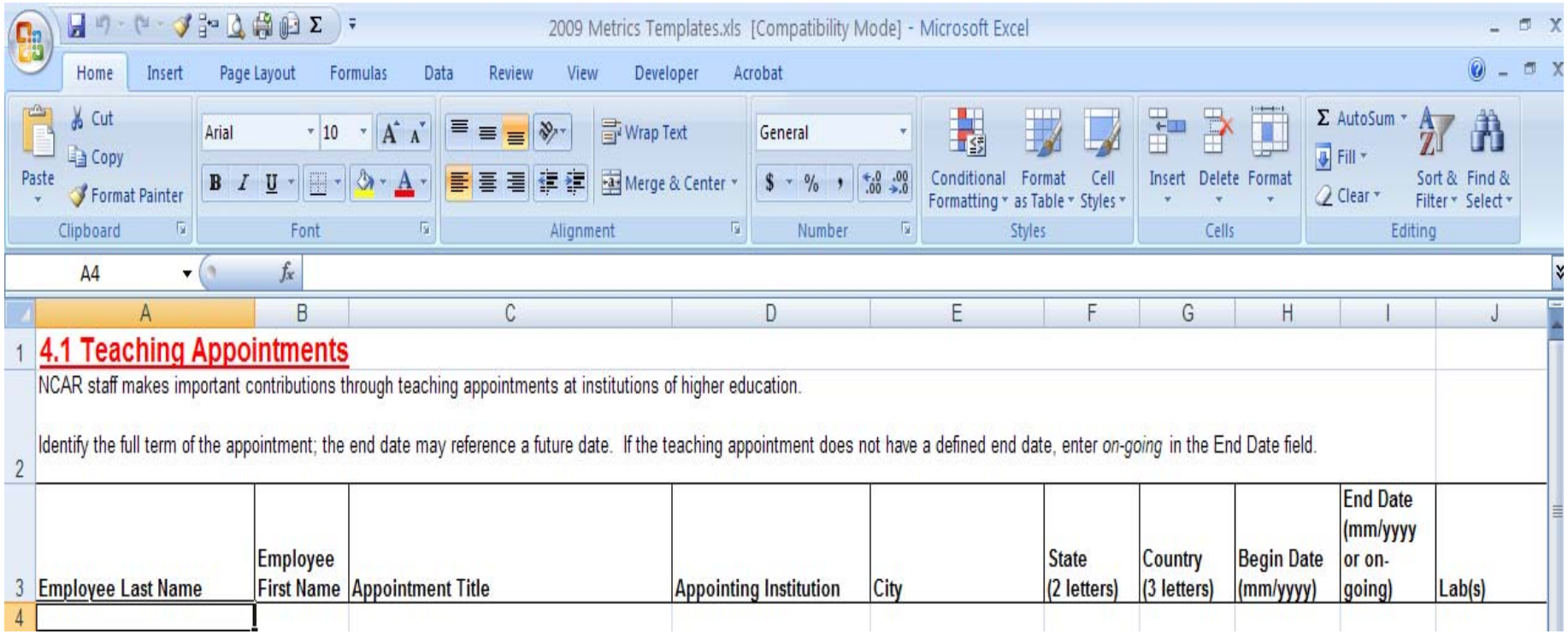
http://www.nar.ucar.edu/metrics_instructions/index.html

Publications Database



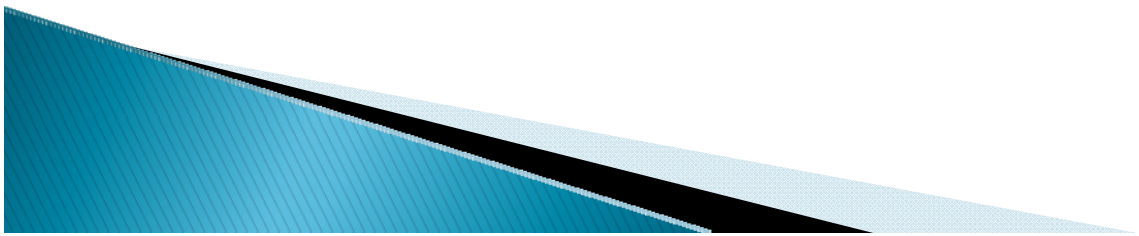
https://www.nesl.ucar.edu/publications/index.php

Excel Templates



While Collecting Metrics…

- Evaluate data as it is coming in and require clean and consistent data
- Return data to Metrics Collectors if edits/corrections are needed
- Clarify definitions and avoid tweaking standards

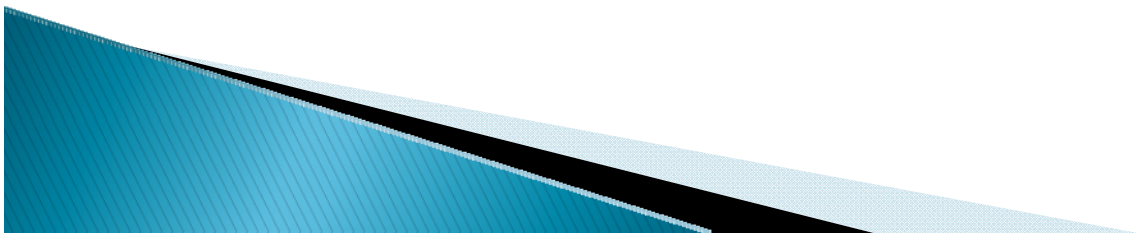


After Collecting Metrics…

- Celebrate the efforts and results
- Work to publicize your Metrics
  - Email to stakeholders
  - Blurb on main web page
  - Inclusion in annual report
  - Dedicated Metrics web pages
- Debrief on the process with Metrics Collectors
- Annually reassess metrics & priorities – are any new or changing?
  - Make sure to fully document any additions and changes for the next round

Implementing Metrics

- Work with your stakeholders and data collectors
- Define terms and data requirements
- Provide Help resources and training
- Develop tools that include data validation
- Encourage questions and publish answers
- Debrief with data collectors after each round
- Celebrate the efforts and answers

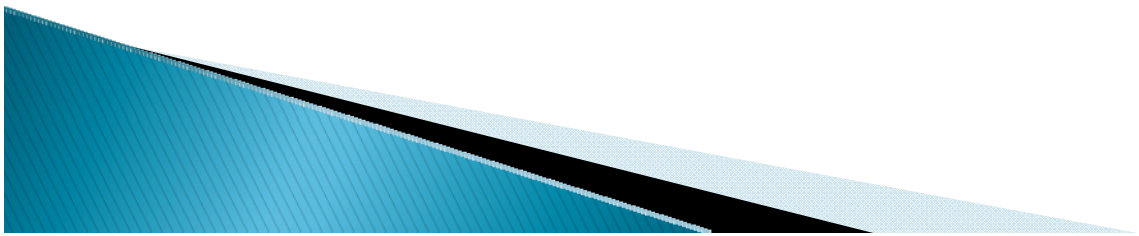


Increase Your Miles/Metric

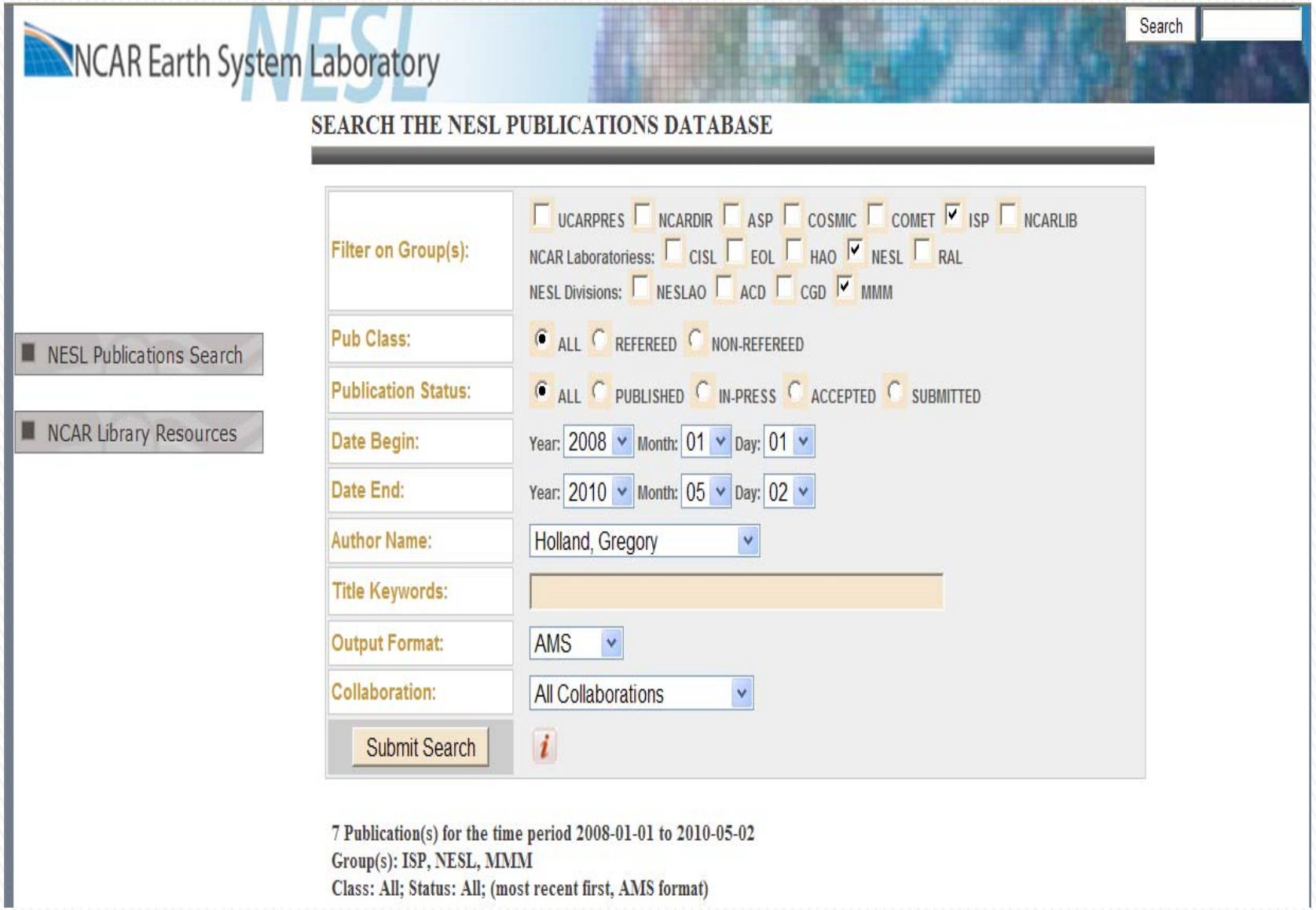
When folks ask- What's in it for me?

Make it worth their while

- Provide the raw data for other analysis
- Support Team and Individual web pages
- Update CV materials
- Provide performance appraisal inputs
- Document staff and program highlights
- Provide facts for public relations/press releases
- Allow easy access for use in presentations and publications



Miles per Publication



https://www.nesl.ucar.edu/publications/index.php

Publications Metrics

Publications

(to

A publication is an academic or technical work of writing containing original research results, reviews of existing results, or scholarship. "Refereed" publications undergo an editorial "blind" or anonymous process of peer review by one or more referees (who ar experts in the same field) in order to check that the content of the paper is suitable for publication in the journal. A paper may undergo a series of reviews, edits and re-submissions before finally being accepted or rejected for publication. "Non-refereed" articles have been reviewed by editors or boards before being accepted for publication but have not gone through a formal blind review. Attached are NCAR's referred and no -referred publications lists for the period October 1, 2008 to September 30, 2009. Search for recent NCAR publications by author, date, keyword or status please go to the NCAR Publications database at:
http://www.essl.ucar.edu/publications/index.php

For excellent library resources please go the NCAR Library Web site at:
http://www.ucar.edu/library/

NCAR Refereed Publications: 550 (**download PDF Bibliography**)

550 Publication(s) for the time period 2008-10-01 to 2009-09-30
Group(s): ASP, ISP, NCARLIB, CISL, EOL, HAO, NESL, RAL
Class: Refereed; Status: All; (most recent first, AMS format)
Author Collaborations Summary:

UCAR Only: 86
UCAR & University: 176
UCAR & Other: 67
UCAR, University, & Other: 188

Web Pages and CVs

Greg Holland UCAR | NCAR | ESSL | MMM

MMM

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Professional Interests

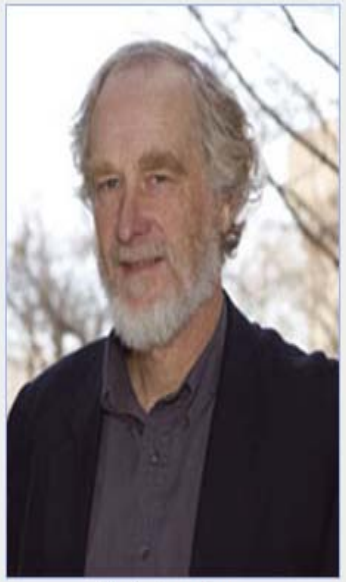
Hurricanes, Tropical Meteorology and Severe Local Storms

Recent Publications

To search my complete list of publications, please see The ESSL Publications Search.

Xiao, Q., Zhang, X., Davis, C. A., Tuttle, J. D., Holland, G. J., Fitzpatrick, P., 2009: Experiments of hurricane initialization with airborne doppler radar data for the advanced-research hurricane WRF (AHW) model. *Monthly Weather Review*, **137**, doi: 10.1175/2009MWR2828.1, 2758-2777.

Rotunno, R., Chen, Y., Wang, W., Davis, C. A., Dudhia, J., Holland, G. J., 2009: Large-eddy simulation of an idealized tropical cyclone. *Bulletin of the American Meteorological Society*, doi: 10.1175/2009BAMS2884.1.



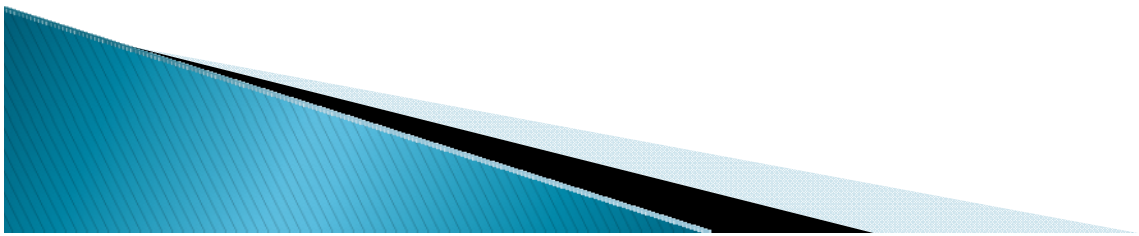
click for larger image

Greg Holland's Vitae

Shared Files

Tell the Story of the Numbers

- Explain your terms and categories
- Apply filters and subtotaling
  - How many unique institutions?
  - How many countries, states, partners, schools?



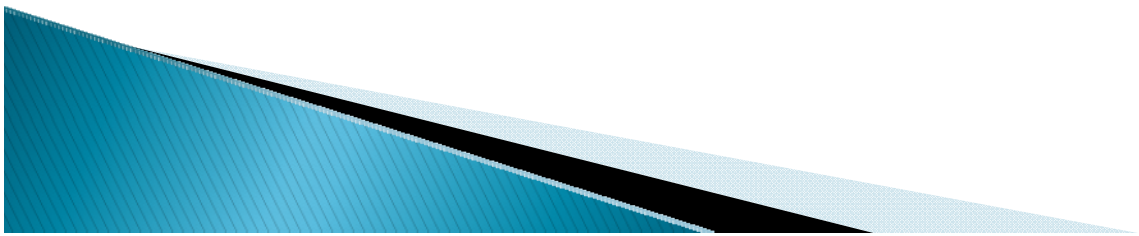
Terms, Filters and Subtotals

Workshops

(top)

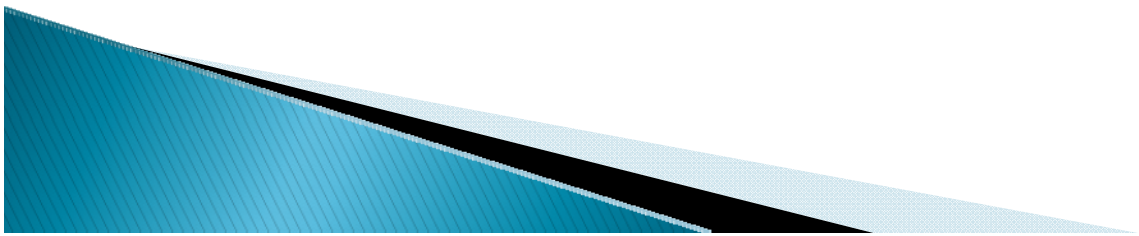
NCAR-hosted or -co-hosted workshops and conferences are generally larger, bilateral events convened for the purpose of discussion, consultation and exchange of views and information.

NCAR sponsored 99 workshops and conferences in seven countries and nine U.S. states. We partnered with sponsors from the university community, such as the California Institute of Technology and Boston University, government agencies including NOAA, DOE and NASA, as well as with non-profit partners like the World Meteorological Organization and the American Statistical Association. In total, these workshops and conferences reached just under 6,000 participants, a 20% increase over last year.



Next

- Highlight unique or intriguing aspects
- Create links to more information



Highlights and Links

NCAR Student Appointments

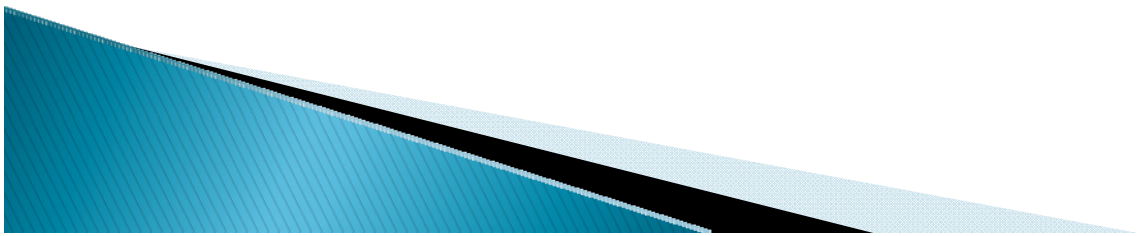
(top)

Students also enjoy NCAR-based appointments.

In FY09, there were 63 student appointments: five Graduate Students, five Graduate Research Assistants and 35 undergraduate Student Assistants appointments. There were also 18 student internships coordinated through the Summer Internships in Parallel Computational Science (SIParCS) program, **http://www.cisl.ucar.edu/siparcs/index.jsp** and the EOL Undergraduate Engineering Internship program at **http://www.eol.ucar.edu/about/work/eng-internship**. These students hail from home institutions ranging from Denver's Metro State College to Louisiana State University. NCAR also awarded 38 postdoctoral fellowships to talented staff through the Advanced Study Program at **http://www.asp.ucar.edu/** and other laboratory visitor programs **http://www.ucar.edu/opportunities/postdocs/**.

Tell the Story

- Expand on a simple metric with more story



Fellowships

(top)

a fellowship is typically a special appointment granting support for a term in order to support advanced research or study.

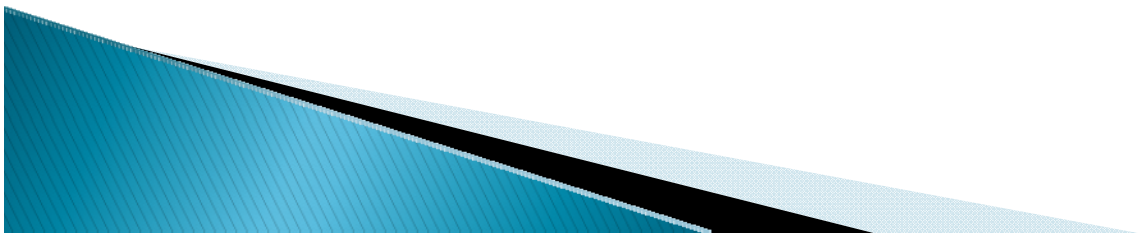
Natasha Flyer was granted a fellowship at the Oxford Center for Collaborative Applied Mathematics (OCCAM), situated in the Mathematical Institute at the University of Oxford. The objectives of OCCAM are to develop innovative mathematical and computational methods for application to biology, engineering, geoscience, and industry. During her stay, Natasha's research focused on the development of radial basis functions, a novel mesh-less computational method, for three dimensional modeling of geophysical phenomena.

Aaron Andersen continued his fellowship at the Uptime Institute. Using benchmarking, abnormal incident data, and industry Best Practices collected from members of its knowledge communities, The Uptime Institute, Inc. (the Institute) has distilled uptime management into scientific disciplines and practices which can be confidently applied. The synergy of a knowledge community encourages more to be shared so that more is known, and then there is even more to be shared. This exponential increase in knowledge is facilitated by the Institute and its faculty of Distinguished Fellows. **http://www.upsite.com/TUIpages/tuihome.html**

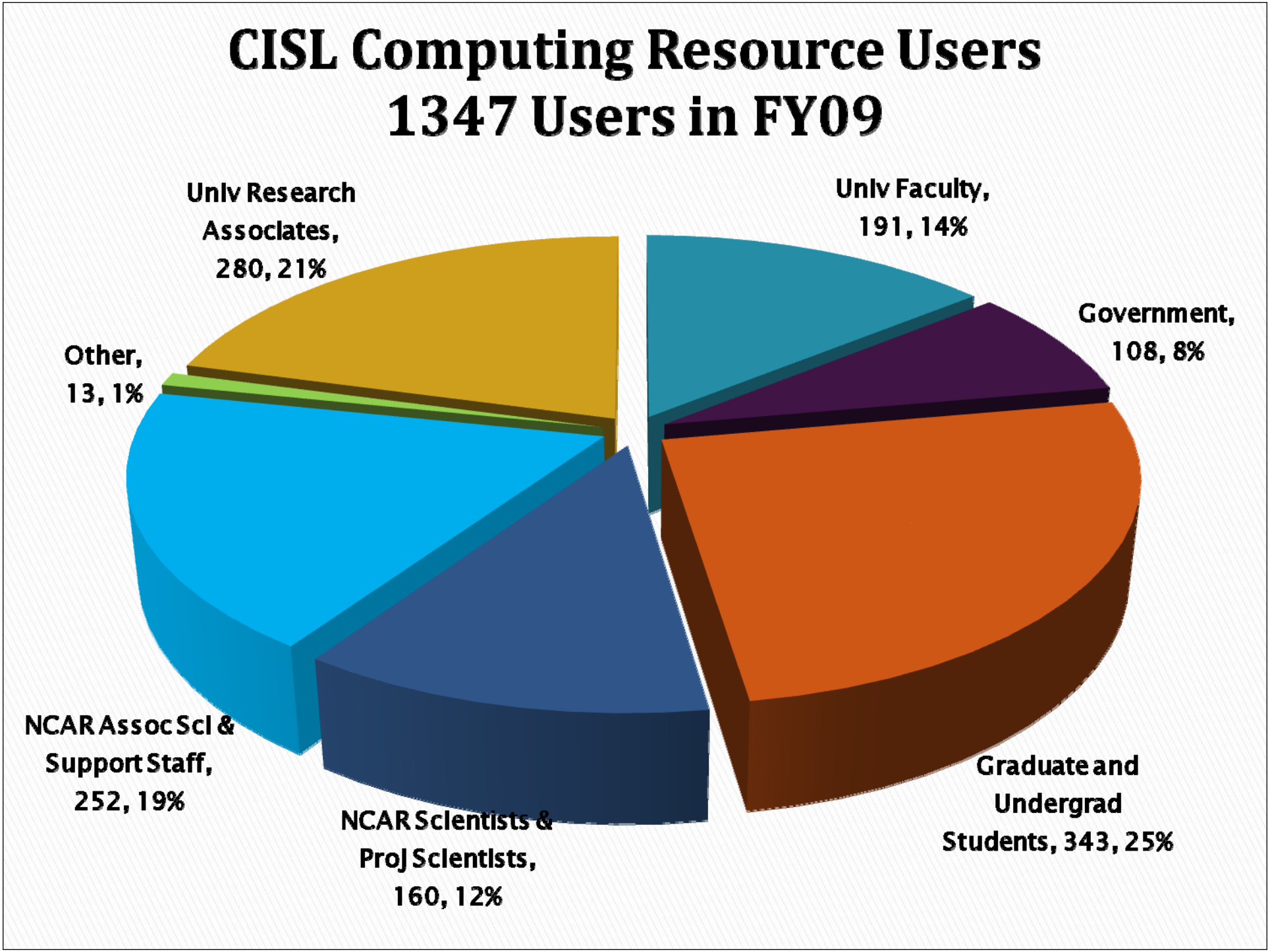
Carl Drews graduated in August 2009 from the University of Colorado at Boulder (CU) with a Master's Degree in Atmospheric and Oceanic Sciences. The CU Department of Atmospheric and Oceanic Sciences (ATOC) awarded him a travel fellowship in the amount of $1,000 to travel to the Symposium of the Office of Naval Research (ONR) in Chicago, Illinois and present the results of his thesis research into wind-driven storm surge. Mr. Drews used the Regional Ocean Modeling System (ROMS) to model storm surge in Manila Bay, forced by WRF wind fields over a range of possible typhoon tracks. The conference provided the opportunity to meet and discuss his research results with other oceanographers funded by the ONR.

Picture the Story

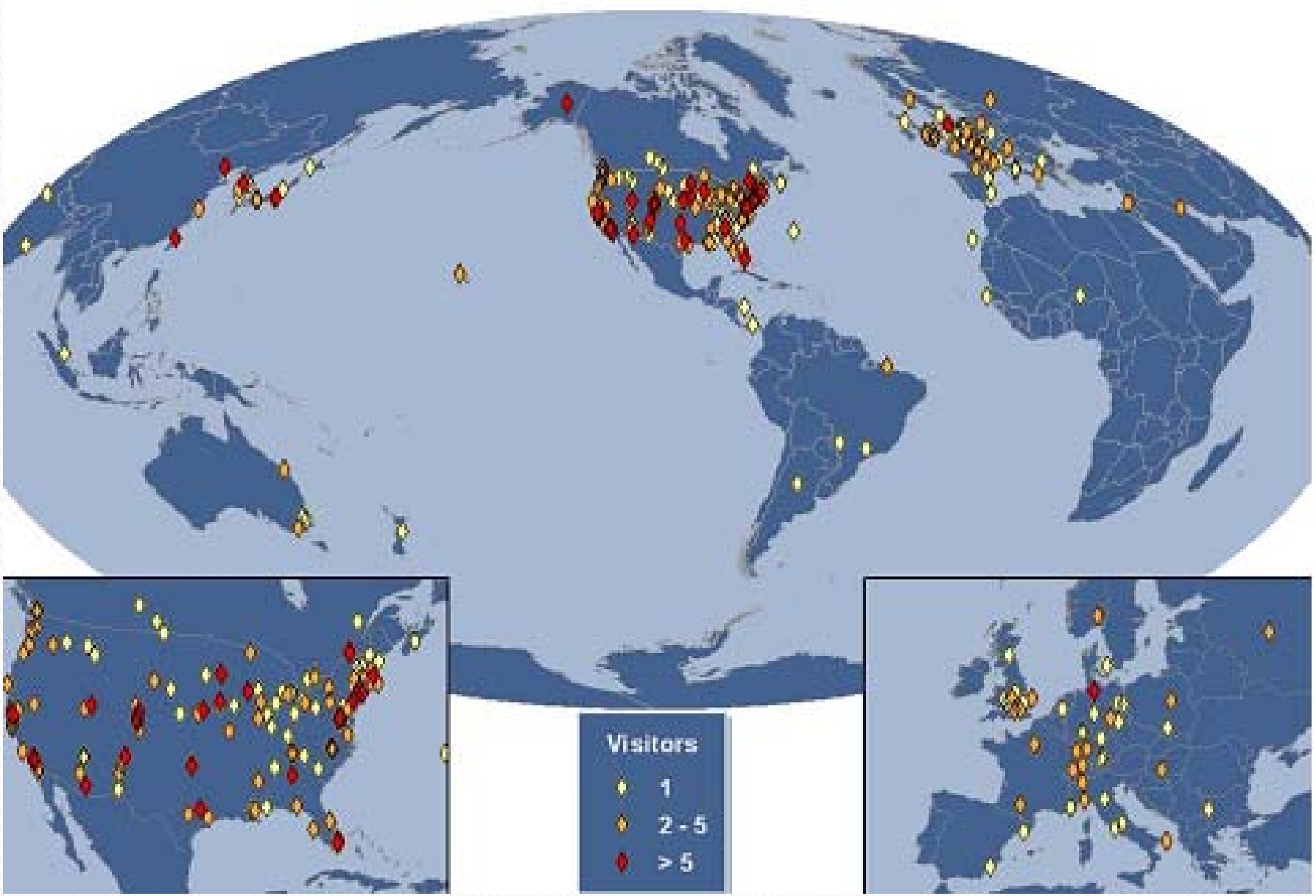
- Consistent data collection over time supports:
  - Charts and Graphs
  - Pie Charts
  - Trend Lines
  - Comparisons with other institutions
- Keep the link to the definitions and detailed data



CISL Computing Resource Users
1347 Users in FY09

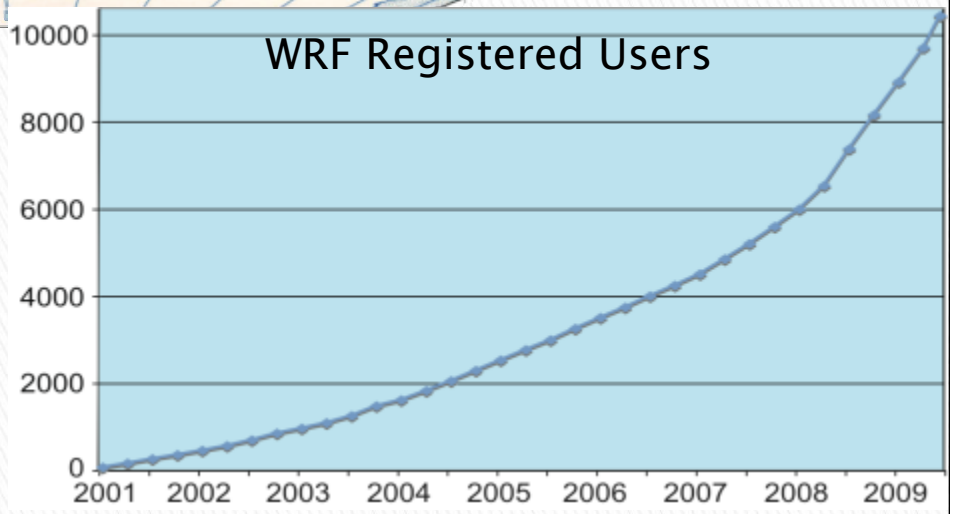


Mapping Visitors



Weather Research and Forecasting Model (WRF)

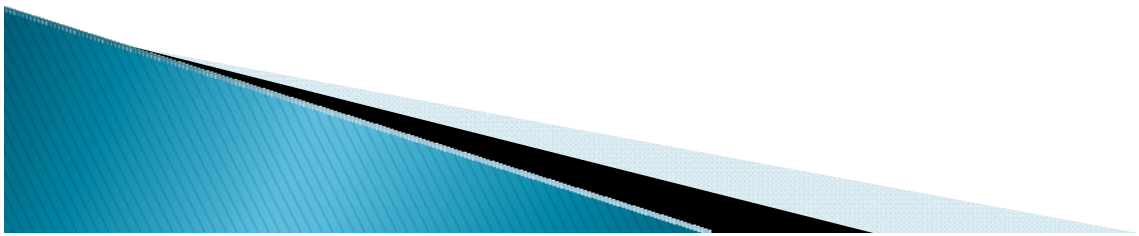
The leading atmospheric modeling System in the world, used in:
125 Countries
>50 Operational Forecast Centers
>11,000 registered users



Make ‘em Appetizing

Metrics

- What you measure is what you get
- Metrics send a message and deliver answers
- Done well, they are:
  - Meaningful
  - Accurate
  - Comparative
  - Consistent
  - Cost effective
  - Statistically significant

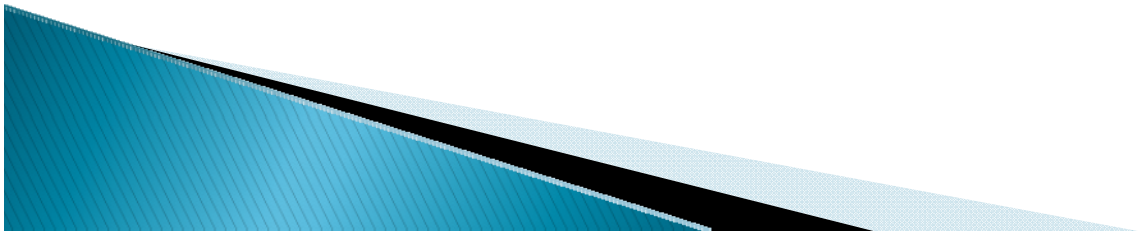


Possible Downsides

- Too much, too often, costs too much
- Metrics only tell part of the story, balance the information
- Measuring unimportant indicators can foster unimportant efforts – i.e. number of papers vs. impact or quality of papers
- Internal competition over metrics can create stress in a team or organization

The Upside

- Identify strengths
- Measure successes and progress
- Help recognize areas needing attention
- Inform decision making and resource allocation
- Focus on goal setting
- Prepare for new technology
- Create opportunities for celebrating

Questions?

Thank you!