

How Federal Agencies Are Working with the ISE Community

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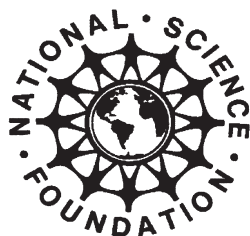


ISE Summit 2010 | Surrounded by Science
Washington, D.C. March 3-5

caise | center for advancement of informal science education

This document is intended to be a faithful synthesis of a session that took place at the Informal Science Education Summit 2010, *Surrounded by Science*, in Washington, D.C. March 3-5. It is meant to serve as a resource for those who attended and for others in the field.

Participant comments have been paraphrased and reordered. These are not exact quotes, rather they are an attempt to capture the content and meaning of the ideas presented. The contents of this document do not necessarily reflect the views of CAISE, the National Science Foundation, or individual meeting participants.



<http://www.nsf.gov>

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This is one of a series of documents covering the ISE Summit 2010. For more visit insci.org

Sparks!

These illustrated, online posts about informal science education projects appear on the CAISE Web site, contributing to a picture of the field.

<http://insci.org/sparks>

Documentation

Catherine McEver
The Bureau of Common Sense



Above: Summit participants explore project materials

How Federal Agencies Are Working with the ISE Community

Informal Science and NOAA

Richard W. Spinrad, PhD, CMarSci
NOAA Assistant Administrator, Office of Oceanic and Atmospheric Research, National Oceanic and Atmospheric Administration (NOAA)

It is a pleasure to be here today as part of a team representing several federal agencies, which should offer you some good, broad perspectives. I, of course, am here from NOAA, and there are a couple of points I want to start with. One is that I was delighted when I walked in here to see so many of our colleagues from outside of government—universities, informal science education centers, science museums, aquariums. To me, it is a confirmation that a lot of the things we are doing at NOAA are targeting and involving the right group of people.

Hopefully you will get a sense of how we are trying to conduct ourselves at NOAA through these brief remarks, but the other thing that I am going to tease you with is that I know that a large number of you here are interested in what is happening with respect to our recent request for letters of intent for our program. At the end of this talk I will update you on the status of that.

For us at NOAA, the issue of STEM education and informal science education is really a multilateral one. Why do we do this? Partly because it is the right thing to do. It is also due to this vision that we have, which I think is now more important than ever in light of some of the statistics you heard during the “Hot Topics” portion of this summit regarding perceptions and societal views of what science is all about.

“A society that uses the results of our research as the scientific basis for more productive and harmonious relationships between humans and the environment.”



SCIENCE
SERVICE
STEWARDSHIP

That use of the results of our research is wide ranging and includes things like how well I can predict whether my flight in two or three days will depart on time—a rather lofty concept right now, though we are pretty good at doing that



Richard Spinrad

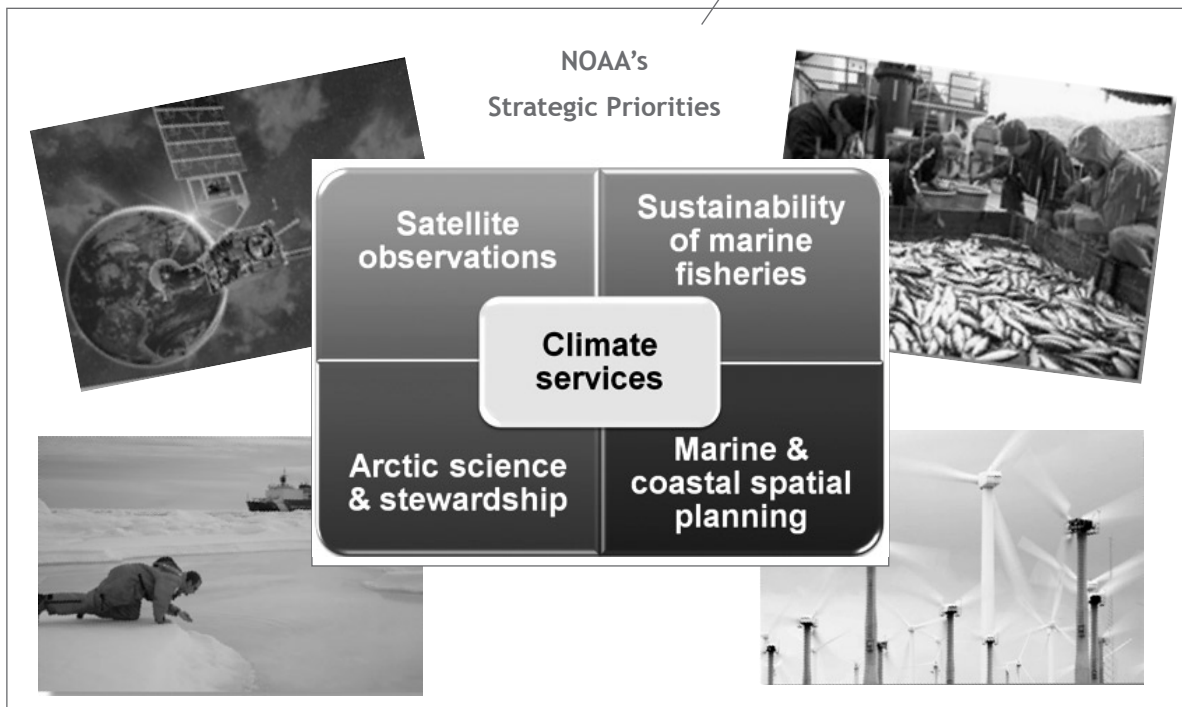


twenty-four hours in advance. What about the air quality? If I go to Beijing, for example, what can I expect in terms of air quality? Will I be able to swim at the beach today? These are the kinds of questions which, for most Americans right now, are somewhat mysterious. There is magic to the concept that you could predict beach quality. Well, there really isn't, as you all know as well or better than I. It is predicated upon performing the research, understanding the science, and translating that to a product that the public can use.

Within NOAA, we orient our thinking around a set of priorities. NOAA is an interesting organization. It really is an amalgam of several different functions: fisheries, weather service,

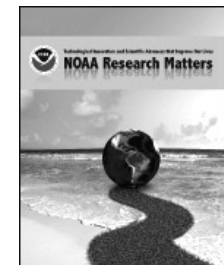
satellites, ocean service, and mapping and charting. In fact, as a little sidebar, NOAA was established in 1970 by Richard Nixon when he wrote an executive order. We actually don't have authorizing legislation, so we exist by virtue of faith in that executive order and therefore we are a faith-based organization.

What I've shown you on this slide [*lower left*] are NOAA's strategic priorities and not surprisingly, it is about satellites, it's about fisheries, it's about marine and coastal spatial planning. It's also about how these centrally focus on a number of services, climate services being one. We try, through our various educational activities, including the Office of Education, Sea Grant, and the National Marine Sanctuaries program, to express what it is we are doing around these various strategic priorities. Rather than dwell on that, I refer you to *NOAA Research Matters* to give you some sense of how we try to translate what can sometimes be rather esoteric research activities.



*NOAA Research Matters:
Technological Innovations
and Scientific Advances
that Improve Our Lives*

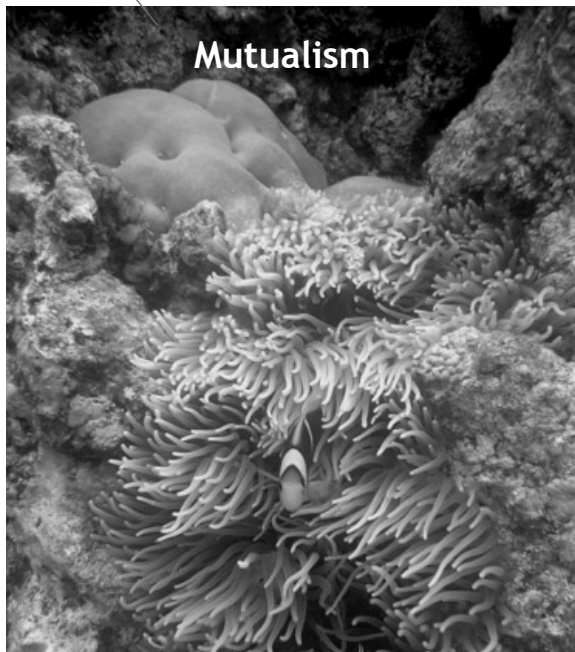
<http://www.oar.noaa.gov/researchmatters>



I could talk about our latest finite icosahedral geophysical dynamics model, but I suspect that wouldn't be very exciting. How can we

translate that into what it means in terms of, let's say, a seven-day forecast for hurricanes? That is a pretty phenomenal concept.

We do this, and we try to reach out and educate through partnerships—what, in the biological world, might be called mutualism. That is, a symbiotic relationship that benefits both parties, not unlike the clown fish and sea anemone shown here.

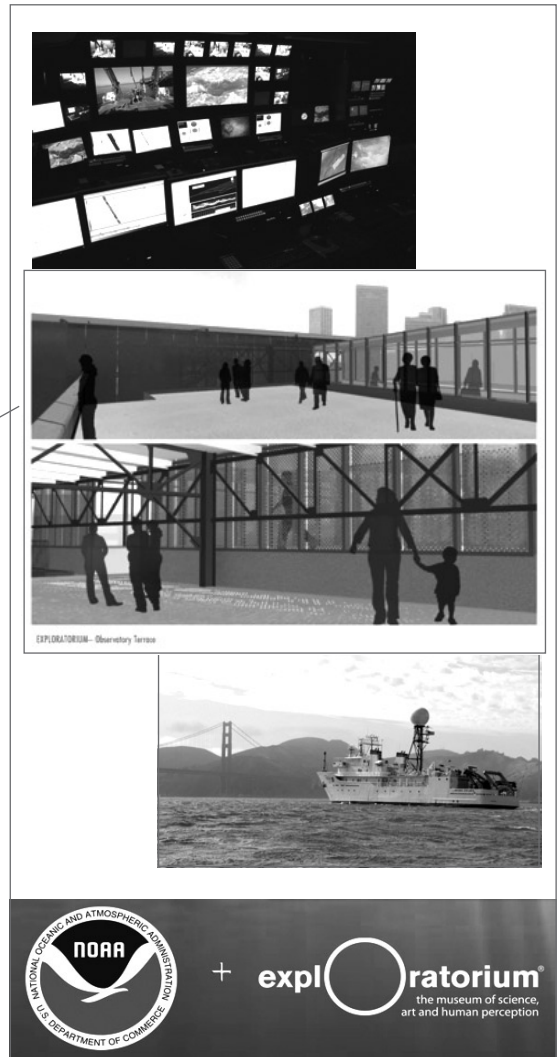


Our contribution to a relationship with the informal science education community is really mostly our people, our researchers, and the thousands of scientists who either work in our laboratories or with whom we work through academia, through our cooperative institutes, and through grants and contracts.

What informal science education brings to that relationship is the extraordinary capability to reach the public—everyone from kids to decision makers to policy makers—as well as the expertise in how to take that scientific education and that understanding, and probably most importantly, in how to get us the feedback that we need that these are the right kinds of bits of information or understanding that the public can really relate to.

I want to take a couple of minutes and give you some examples of how we try to do that, how we try to relate to our partners through a variety of different mechanisms. One that is going to resonate with at least a half-a-dozen of you in the audience is our relationship with the Exploratorium. A little bit of a personal anecdote here. I am a member of the American Geophysical Union, and the AGU meets in San Francisco every year in December. For thirty-five years, I have been going to the AGU meeting, and the very first meeting I went to I played hokey. After three days of going to talks from morning to evening, I decided to go to this place somebody told me about at the Palace of Fine Arts in San Francisco called the Exploratorium, set up by Frank Oppenheimer and his colleagues. What an extraordinary place it was.

I worked my way up through the career ranks from graduate student to the point now, where I actually have some influence, and said, “Why don’t we try and partner with the Exploratorium?” I know Rob Semper (Executive





Associate Director of the Exploratorium) and he and I and several others started having a dialogue a number of years ago. We realized that there is an opportunity to take something that is unique to NOAA, and that is our ocean exploration activity. We now have a dedicated ocean exploration vessel, the *Okeanos Explorer* and its command center [see photo, sidebar, page 5]. We can feed the data using Internet2 connectivity for real-time ocean exploration. You no longer need scientists on board ships. How can we get this information—the discovery of a hydrothermal vent in the ocean bottom as it is happening—in the hands of anybody who wants to go to a science museum like the Exploratorium?

We signed a formal memorandum of understanding with the Exploratorium last June and have already begun designing exhibitry, curricula, new programs, and we are even working with the Exploratorium on their concepts for their new location on the piers on the San Francisco waterfront. It has been an extraordinary development. My prediction is, within a couple of years you will be going down to the Exploratorium and you will see real-time feeds of all of the data that we collect and all of the kinds of programs we have established, everything from ocean exploration to climate and everything in between.

Here in Washington, D.C., NOAA was the principal partner with the Smithsonian Institution for the Ocean Hall and the Ocean Initiative. If you haven't already done it,

go down to the Natural History Museum and take a look at that. The Sant Ocean Hall is extraordinary, their largest permanent exhibit, and it has a wonderful blend of science information with real-time data coming in, as well as kiosks for people to learn more. It represents the cutting edge of scientific expertise, drawing on both NOAA's ocean science expertise and Smithsonian expertise. System dynamics and marine conservation blend beautifully, not just to show you the pickled squid, but to actually show you how the ocean works as a dynamic system, with the atmosphere and the land, the river input and the atmospheric input. It is really a wonderful way to teach system dynamics. There's a Web site for this, the *Ocean Portal*, which we also worked on developing with the Smithsonian.

Now for another concept. How many of you have heard of ocean acidification? This is perhaps the most phenomenal finding of the ocean and climate community in the last five years. The oceans are 30% more acidic now than they were 100 years ago, and every indication is that will increase. This has dramatic impacts on everything from oyster farms to salmon prey to infrastructure that depends on understanding the chemistry of the ocean. That is pretty terrific information, and there are people in our laboratories, including Dick Feely and Chris Sabine working on this [see photos in the slide below]. These are really two of the pioneers in understanding ocean acidification.

They have been working on this for decades,

but it wasn't until Niiji Films developed a feature film called *A Sea Change*, which has since won all of the awards that you see on the lower left, that we were able to start getting the information out to people. This is a screen shot from their Web site with our two NOAA scientists inserted on the right.



This is one of the reasons why scientists like Dick Feely and Chris Sabine are so valuable to NOAA: their preeminent research, and their ability to work with film makers who really didn't know a whole lot about ocean science. It also begs the question, how do we build more of these kinds of scientists within our own work force, the Dick Feelys and the Chris Sabines? Here is my plea to you, that we work together on rewards systems.

I am actually about to retire from the federal government to go work in academia. One of

the things I am very keen on understanding is, how can we diversify the reward systems within academia? We are doing the same thing within government. This award, named after scientist Dan Albritton, one of the preeminent client scientists, is something we set up within NOAA to recognize the communication skills

of our scientists. It is not about how many publications they've got or how many presentations they've given at the AAAS meeting, but rather: What have they done to communicate the latest science to a breadth of audiences?

In fact, this is Keith Dixon from our Geophysical Fluid Dynamics Lab in Princeton. Keith was actually a weather broadcaster before he decided to go work

in a laboratory for the government, and those skills show very well. He has been one of our best spokespersons. He is the person we rely on to talk to people who are in denial about climate change. Keith has a wonderful ability to walk through the science in a very understandable fashion. We have to reward these people. We have to find ways of recognizing them. I'm delighted to say that Keith takes this Albritton Science Communicator Award very seriously, and it's one of the first things he puts on his CV when he goes out and talks with people.

Albritton Science Communicator Award



NOAA Climate Scientist, Keith Dixon, talking to a Café Scientifique audience

Science On a Sphere®



sos.noaa.gov

Informing Policy



Dr. Lubchenco gives a demonstration of the science of ocean acidification - P

Demonstrating ocean acidification during testimony to Congress

But it's not just about communication, it's not just about outreach, it's also about innovation. The fellow in the middle of this photo is Sandy MacDonald, our laboratory director for our lab in Boulder. He is the inventor of Science On a Sphere®, a phenomenal concept that actually started when Sandy painted a beach ball white, set up four slide projectors, and said, "I wonder if I can project the four different aspects of a globe onto a sphere and portray geophysical information?"

This concept was developed a few years ago purely for scientific analysis. It has now been used in a number of science museums. We are working with Google on a cooperative R&D agreement to allow us to put dynamic information on a sphere. You can depict anything that fits on a sphere, from teaching plate tectonics, to demonstrating the dynamics of the moon, to showing ocean currents. In fact, that particular photograph was taken in Copenhagen during the climate conference, COP 15, last December. It is a remarkable tool.

Finally, It is about science communications. I will close simply by pointing out that we really do have a special advantage these days in NOAA. Our Administrator, Dr. Jane Lubchenco, is herself a strong advocate of science education and science communication. She helped to establish the Leopold Leadership Program to train environmental scientists to be effective communicators.

Dr. Lubchenco was asked to testify on ocean acidification, so she showed up with her flasks

and her bottles and some dry ice and litmus paper and demonstrated ocean acidification right there in the halls of Congress, in what I would say was a pretty daring move. Where most of us would be happy to read testimony, she was more than happy to share her understanding of the science this way, and demonstrate to those of us in NOAA how to do this kind of thing.

Hopefully, I have been able to show you just a snippet of what we do in NOAA and how we do it. I will close by telling you now, as I promised, that for the recent solicitation we put out on informal science education, we had over 350 letters of intent. We will be responding next week, for those of you who are interested, and roughly one-quarter of those will be encouraged for full submission of their proposals. Thank you, and I look forward to your questions.



National Center for Research Resources, NIH

Barbara M. Alving, MD
Director, National Center for Research Resources,
National Institutes of Health

The National Institutes of Health (NIH) is a federation of twenty-seven institutes and centers, as some of you may know. Many of them are dedicated to specific diseases, such as the Heart, Lung, and Blood Institute. The National Center for Research Resources (NCRR) is non-categorical. We provide support to all of the other institutes and centers. We have about a \$1.12 billion budget to do that, about \$18 million of which goes to the Science Education Partnership Award (SEPA), and we can be interested in anything and everything.

We have funding that goes out to every



<http://www.ncrr.nih.gov/>

state in the nation and Puerto Rico, we fund training in all of the states, and we have a very rich comparative medicine program, as depicted by our little mice below. We have funding in biomedical technology, and we fund clinical research support through the Clinical and Translational Science Awards, which go to forty-seven institutions throughout the nation to bring basic science into preclinical or appropriate animal models, into clinical research, and then out into the community. Largely because of the tremendous efforts of Dr. Tony Beck, who is attending this summit, SEPA is in every one of these programs.

We have participation in formal science to increase the participation of our diverse population of young students, but we also have informal to improve K through 12 and public understanding and support for medical research that is conducted throughout the nation.

We have fifty project sites for the K through 12 STEM projects, and we have twenty-seven project sites for informal science education,

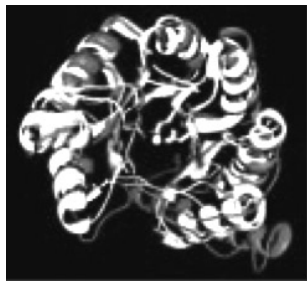
NCRR's role in a diverse pipeline

Encourages and supports partnerships between scientists and clinicians with educators, community organizations and science centers:

- **FORMAL:** Increase the participation of a diverse population of young people in clinical and basic research careers
- **INFORMAL:** Improve K-12 and public understanding of, and support for, NIH-funded medical research; understanding the relationship between lifestyle choices and health



www.ncrrsepa.org



• Biomedical Technology



• Clinical Research



• Research Infrastructure



• Comparative Medicine



• Science Education Partnership Award (SEPA)

NCRR SEPA models

Formal (K-12 STEM*)

- 50 project sites
- K-12 students, teachers, parents
- Small numbers, high contact mode
- Teacher Professional Development
- Community outreach

Informal Science Education (ISE)

- 27 project sites
- Science Centers and Museums
- Huge numbers, moderate contact mode
- Public outreach & health education

* Science, Technology, Engineering, Mathematics

and this is in science centers and museums throughout the country. We have large numbers of visitors, moderate contact mode, public outreach, and health education.

The map below shows our distribution throughout the country. The dark stars indicate the informal science education programs and the light stars indicate informal science education and K-12.

We are training our future leaders. Some of them are in Hawaii in elementary school for now, others are high school students in Pittsburgh.

I won't go into detail, but we have busses everywhere, mobile labs (one was just recently celebrated in Pittsburgh) that go out into the community to provide hands-on science learning opportunities. We reach into South Dakota, we have Seattle, and I understand that our future NIH director is going to come out of Urbana, Maryland, but it will take a bit of time.

FORMAL - NCRR'S role in a diverse pipeline



Elementary School Students, Hawaii



Middle School Students, Seattle



Sisseton-Wahpeton Tribe, Tiospa Zina Elementary School, Sisseton, SD



High School Students, Pittsburgh



Future NIH IC Director, Urbana, MD

SEPA K-12 and ISE Projects

 = SEPA state
 = ISE
 = ISE & K-12

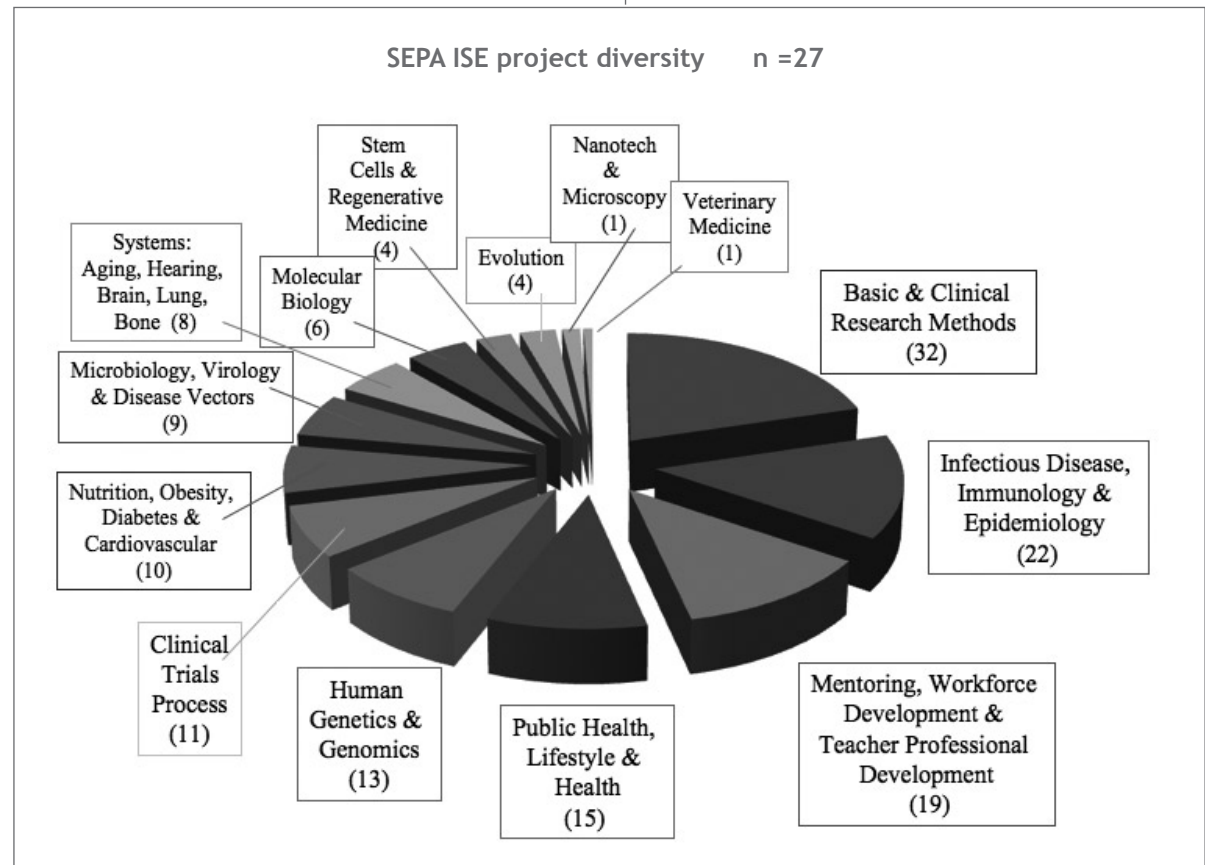
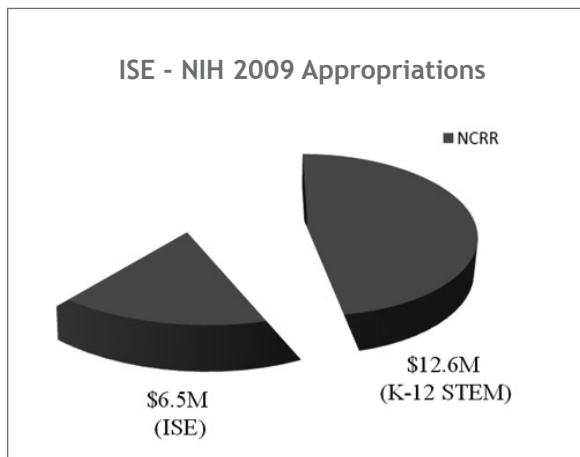
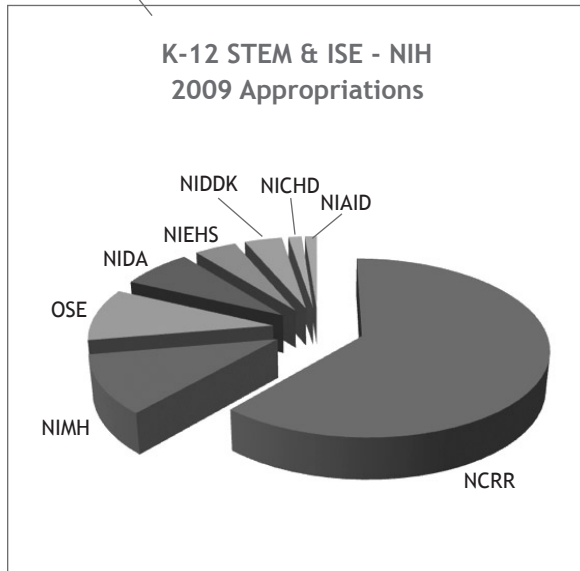


http://www.ncrrsepa.org/map/proj_state_list.jsp

So we have K through 12 STEM and informal science education. I think we could compete with anyone for acronyms, but suffice it to say that those below are some of the NIH institutes and centers. The great big slice of the pie is NCRR. We provide the majority of the funding for this type of education, and in

our appropriations we have about \$12.6 million towards K-12 STEM and about \$6.5 million for informal science education.

These pie chart below is offered to show you that there is tremendous diversity in terms of informal science education, from stem cells and regenerative medicine, to veterinary medicine, to infectious disease and immunology, to public health, to human genetics and genomics. Regarding stem cells, there is a wonderful exhibit up in Baltimore that has recently opened within the past year. We also touch



Barbara Alving



Diseases and Decisions: Current Science on Emerging Threats

SEPA PI, Dr. Erika Shugart
Marian Koshland Museum, Washington, DC

<http://www.koshland-science.org>



EDUCATING THE GENERAL PUBLIC

on nutrition, obesity, diabetes, cardiovascular diseases, and clinical trial processes, and sometimes on more than one of these at the same site.

We are working with the informal science education community through film and broadcast media, science centers, digital media and gaming, science journalism, and through community projects.

How is NIH Working with the ISE Community?

"The broad goal of the ISE Summit is to mobilize, energize, and empower the informal science education community—including:"

- film and broadcast media
- science centers and museums
- digital media and gaming
- science journalism
- youth, community, and after-school programs

Here is an example of a project in our own hometown. This is at the Marian Koshland Museum in Washington, D.C. It is focusing on *Diseases and Decisions: Current Science on Emerging Threats*.

There are also science cafés that help to relate some of these issues and areas of science. For example, if you are in town March 11, there is going to be a science café at the Koshland Science Museum, at which

Science Café *Pandemics in Retrospective*

How was the H1N1 pandemic handled?

- Dr. Nicole Lurie, U.S. Department of Health and Human Services
- Dr. Kathryn Edwards, Vanderbilt University

Discussion:

Medical community's response to the H1N1 outbreak to those of past influenza pandemics
How the media influenced public perceptions?

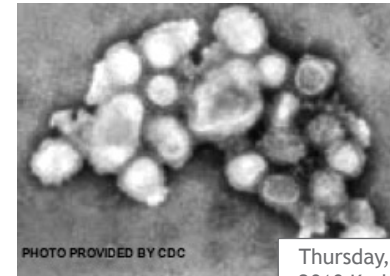


PHOTO PROVIDED BY CDC

Thursday, March 11,
2010 Koshland Science
Museum
6:30 PM to 8:30 PM

EDUCATING THE GENERAL PUBLIC

Pandemics in Retrospective will be discussed, and there we'll learn about how the H1N1 pandemic was handled. It will focus on the medical community's response to this and how the media influenced public perceptions. I think there's no better place to have this than in Washington, D.C., where we see media coming together with minute-by-minute health decisions. I think Dr. Tony Fauci of the National Institute of Allergy and Infectious Diseases

and Allergy was on the phone at least twice a day with the Department of Health and Human Services Director, working through the pandemic flu crisis.

We also have, if you are going to be in New York, a science café on *Human Health and Human Bulletins: Scientists and Teens Explore Health Sciences*. This science café will bring together discussions that will allow many different areas of interest, and it is going to

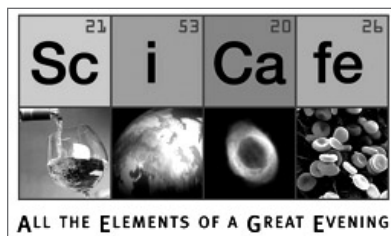
Science Café
Human Health and Human Bulletins: Scientists and Teens Explore Health Sciences

SEPA PI, Dr. Monique Scott
American Museum of Natural History, NYC

SciCafe brings together inquisitive minds for an informal evening emceed by experts on cutting-edge science topics.

Come with friends or meet new people, talk science, and more

Happening on the first Wednesday of every month, SciCafes are presented at the American Museum of Natural History in the Gottesman Hall of Planet Earth.



http://www.ncrrsepa.org/proj_grant.jsp?grant_id=221

EDUCATING THE GENERAL PUBLIC

include teenagers and very young persons. This will be at the Museum of Natural History in the Gottesman Hall of Planet Earth.

There will be planetarium shows, and they are currently ongoing, in *Regenerative Medicine Partnership in Education*. This is at the Planetarium in Pittsburgh, Pennsylvania. There we can see information about regenerative medicine, bone and cardiac modules, and also learn about diabetes and the immune system.

Another example is an exhibit at the Carnegie Science Center in Pittsburgh: *If a Starfish Can*

Museum Exhibit & K-12
If a Starfish Can Grow a New Arm, Why Can't I?

SEPA PI, Joan Schanck,
Carnegie Science Center &
Pittsburgh Tissue
Engineering Initiative,
Pittsburgh, PA



<http://www.ptei.org/interior.php?pageID=186>

Carnegie Science Center
exhibit explores tissue
regeneration
TRIBUNE-REVIEW
Thursday, October 15, 2009



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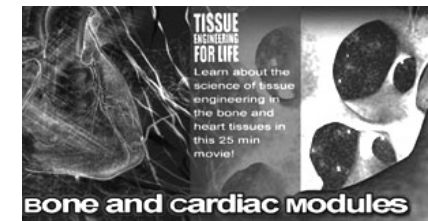


Planetarium Shows & K-12
Regenerative Medicine Partnership in Education

SEPA PI, Dr. John Pollock
Carnegie Science Center &
Duquesne University, Pittsburgh, PA



<http://sepa.duq.edu/forms/index.php5>



Tissue engineering and the field of regenerative medicine offer alternative methods that enhance the body's own process of healing.



Diabetes, immune system and metabolism, the role of the pancreas and digestion.

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**Teacher Professional Development
Curricula Modeled on Biodiversity & Vector-Borne Disease**

SEPA PI, Dr. Leonard Munstermann
Yale Peabody Museum, New Haven, CT

NEW TEACHER OFFERING !

Yale Peabody Museum of Natural History
Peabody Fellows Event-Based Collaborative
(Life & Earth Sciences, Grades 6 - 10)



<http://www.peabody.yale.edu/education/fellows/index.html>



EDUCATING THE GENERAL PUBLIC

Grow a New Arm, Why Can't I? This is very much hands-on. It's for children, and we all know when children learn, we as adults learn as well. There is no better way to increase science, biomedical research, and simply health literacy in our nation.

For teacher professional development we have *Curricula Modeled on Biodiversity & Vector-Borne Disease*. This can be seen at the Yale Peabody Museum of Natural History, and there is a Peabody Fellows Event-Based Collaborative for the grades six through ten.

And in Stamford, Connecticut we have a documentary that was developed on AIDS, race,

and culture. This is a candid look at HIV among African Americans. Students were very involved in developing this and of course, consent forms were included in the development of these programs.

Then there are the radio programs and health education story books. *World of Viruses* is available at the Nebraska State Museum in Lincoln, Nebraska.

**Documentary
Serial Passage: AIDS, Race, and Culture**

SEPA PI, Claudia Pryor, Diversity Films, INC,
Stamford, CT



<http://www.diversityfilms.org>

EDUCATING THE GENERAL PUBLIC

**Radio Programs & Health Education Story Books
World of Viruses**

SEPA PI, Dr. Judy Diamond, University of
Nebraska State Museum, Lincoln, NE



<http://www.worldofviruses.unl.edu/>

EDUCATING THE GENERAL PUBLIC

In West Virginia, we have the West Virginia Health Sciences and Technology Academy, known as HSTA. Here, the students are actually designing and analyzing public health clinical trials. In this example of studies of family networks of obesity and type 2 diabetes in

rural Appalachia, students were exposed to the process of clinical trials, the development of IRB questionnaires, and what it takes to get a

protocol through an institutional review board in order to have permission to do the studies.

They were then very much involved with the data analysis as well.

These are all of the URLs, which can provide you with the information you need if you want to delve into any of these projects in greater detail. SEPA is a wide-ranging program for us at the National Center for Research Resources. Tony Beck is a tireless advocate and promoter of the SEPA program along with Lisa Gough, and as I've said, SEPA is really going out and beyond, into all of our other different programs. Partnerships are forming and our investigators, who normally have to spend so much time and seriousness worrying about their R01 applications and the work in their own academic health centers, totally brighten up, and their creativity just lets loose when they think about SEPA and design these programs. They love working with the SEPA community, and you bring so much richness to everything we do in biomedical research and education, so thank you very much.

**Youth, Community, and After-School Programs
West Virginia Health Sciences and Technology
Academy (HSTA) Student Design Public Health
Clinical Trials**

SEPA PI, Dr. Ann Chester
West Virginia University, Morgantown, WV

<http://www.wv-hsta.org>



Family Networks of Obesity and Type 2 Diabetes in Rural Appalachia

Petr Pancoska, Ph.D., Shama Buch, Ph.D., Alfred Cecchetti, Ph.D., Bambang Parmanto, Ph.D., Marcella Vecchio, Stephen Groark, Stephanie Paulsen, Genevieve Bardwell, Cathy Morton, Ann Chester, Ph.D., and Robert Branch, M.D., F.R.C.P.*

www.ctsjournal.com, Vol 2, Issue 6

- 210 HS students
- 25 HSTA Clubs
- IRB Questionnaires (1760)
- 989 responses (56%)
- data analysis @ Pitt CTSA

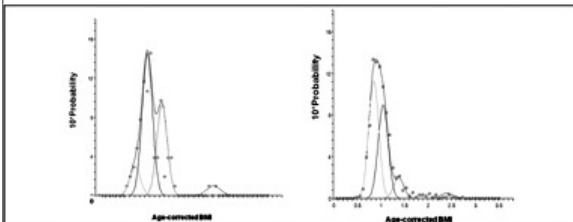


Figure 2. Normalized frequency distribution of age-corrected BMI. (A) Left Panel = non-diabetic subjects (n = 885) (B) Right panel = diabetic subjects (n = 103).

Figure 2. Normalized frequency distribution of age-corrected BMI vs. diabetes

EDUCATING THE GENERAL PUBLIC

Links to NCRR Programs and SEPA Projects

National Center for Research Resources (NCRR)

<http://www.ncrr.nih.gov/>

Clinical & Translational Science Awards

<http://ctsaweb.org/>

Science Education Partnership Awards (SEPA)

<http://www.ncrrsepa.org>

Marian Koshland Museum

Diseases and Decisions: Current Science on Emerging Threats

<http://www.koshlandscience.org>

American Museum of Natural History

Human Health and Human Bulletins: Scientists

and Teens Explore Health Sciences

http://www.ncrrsepa.org/proj_grant.jsp?grant_id=221

Duquesne University and Carnegie Science Center

Regenerative Medicine Partnership in Education

<http://sepa.duq.edu/forms/index.php5>

Pittsburgh Tissue Engineering Initiative and Carnegie Science Center

If a Starfish Can Grow a New Arm, Why Can't I?

<http://www.ptei.org/interior.php?pageID=186>

Yale University Peabody Museum of Natural History

Curricula Modeled on Biodiversity & Vector-Borne Disease

<http://www.peabody.yale.edu/education/fellows/index.html>

Diversity Films, INC

Serial Passage: Aids, Race, and Culture

<http://www.diversityfilms.org>

University of Nebraska State Museum

World of Viruses

<http://www.worldofviruses.unl.edu/>

West Virginia University and University of Pittsburgh

Clinical & Translational Awards (CTSA)

West Virginia Health Sciences and Technology Academy (HSTA) Student Design Public Health Clinical Trials

<http://www.wv-hsta.org>

SEPA Program Contact

L. Tony Beck, PhD

Division for Clinical Research Resources

National Center for Research Resources

National Institutes of Health

6701 Democracy Blvd., Room 916

Bethesda, MD 20892 (20817 for courier delivery)

301.435.0805; 301.448.3661 FAX

beckl@mail.nih.gov

www.nasa.gov



First Steps to a STEM Career



Joyce Leavitt Winterton



NASA and STEM Education

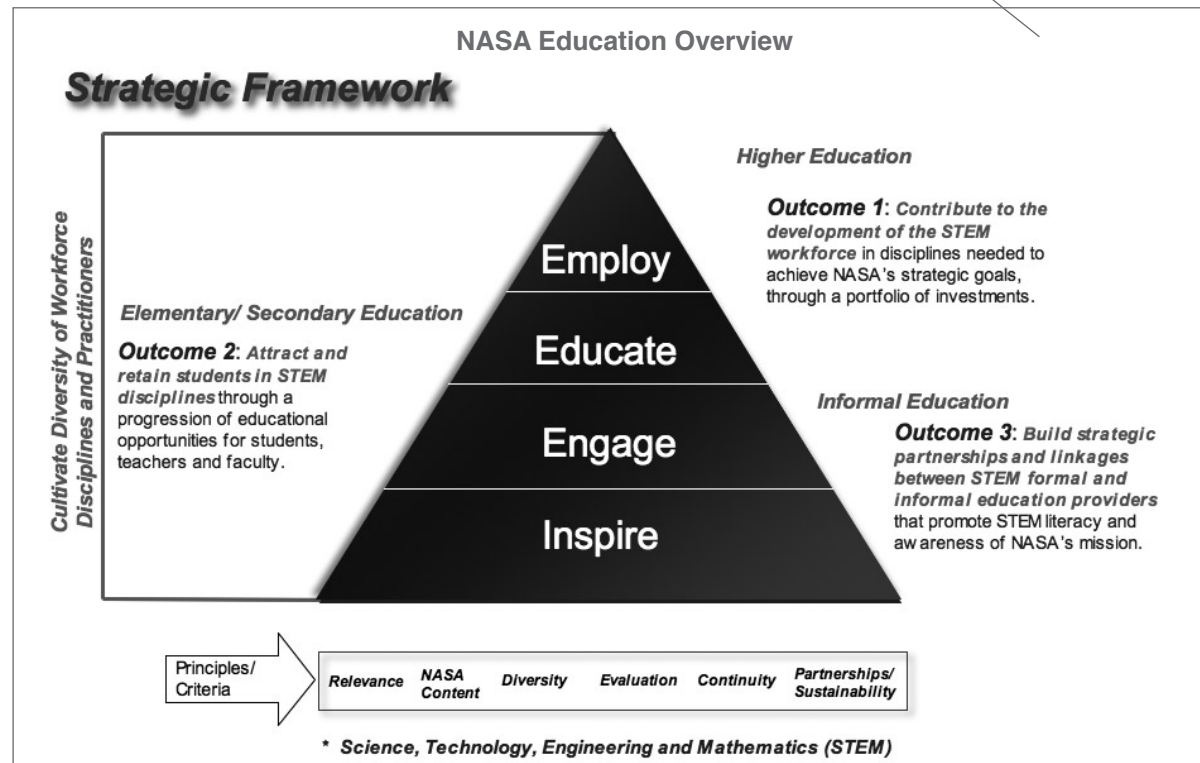
Joyce Leavitt Winterton, PhD
Associate Administrator for Education, National Aeronautics and Space Administration

The National Aeronautics and Space Administration (NASA) has a great history. You may recognize the image on this slide as the first footprint on the moon by Neil Armstrong. For many of my peers, that moon footprint was the great motivator for us to do better in mathematics and science subjects.

Our challenge today for you to solve with NASA is: What is that excitement, what is that “Wow” we can create for young people that

will inspire them to study difficult subjects and think about careers in science, mathematics and engineering and? How and where can young people acquire skills to support the invention of new technologies? Young people today have a lot more things that catch their attention than back when we first walked on the moon, so how do we get and keep their interest? So many times it’s the informal opportunities—available from museums, science centers, planetariums, student organizations—that not only capture students’ interests but help parents understand the importance of STEM.

NASA Education has a framework or roadmap. As you can see in this slide, we have three



major outcomes that we implement across the Agency. Outcomes include higher education, both undergraduate and graduate; K through 12 education, particularly support for student activities as well as professional development for teachers; and informal education, which works with formal and informal education in new partnerships. That third outcome supporting partnerships is a critical part of our portfolio across the agency. We are very proud of that, and it is our work with you and your colleagues that have made that a success.

At NASA, we take our mission, our findings and our content to both formal or informal education settings. We have four Mission Directorates. In Aeronautics Research the focus includes the next generation of air traffic control; different types of fuel efficiency; and design of quieter planes. We also work with other federal agencies in aeronautics partnerships.

Space Operations is the part of our mission that launches the Space Shuttle. And yes, it is true that there are only four more shuttle launches left, so if that's on your checklist for things you have to do before you die, you'd better get with it. There also is the International Space Station, now a national and international lab, and we are finding more ways, as that has been built out, to use it as a research facility.

Then we have our Exploration Systems Mission Directorate, which is looking at the next generation of technology that we are going to use to go to Mars and to asteroids on robotic

missions. It is really exciting work and again, we are trying to engage science centers and museums and the informal community to use that knowledge.

Then there is our Science Mission Directorate, where there are so many exciting missions going on that I can't even keep track of them. New Horizons, halfway out to Pluto; the Kepler Mission, that is finding planets similar to ours in size. I can tell Richard Spinrad that I do have first-hand experience that Science On a Sphere is valuable. I had the opportunity of escorting Queen Elizabeth at Goddard Space Flight Center, where she saw Science On a Sphere, and if it's good enough for the queen, I'd say it's good enough for every museum.

It has been a great experience for me, working at NASA, to see how we collaborate with other federal agencies. You will notice that the framework includes our underlying principles: evaluation; making sure we are reaching diversity, which includes ethnic, gender and geographic diversity; and working with partners.

One of the resources that a lot of people recognize is our astronauts. I wanted to be an astronaut myself; and that desire is something that lot of us share. NASA astronauts are a great way to talk about the STEM experience. In this slide, there are three astronauts that we are especially proud of. They are our Educator Astronauts. Ricky Arnold, the one sitting in the back, is actually a science teacher from Maryland and he serves on our Education

Dottie Metcalf-Lindenburger: Educator Astronaut



Coordinating Committee, which works across our agency. Joe Acaba, who is holding the microphone in the photo, has just been assigned to the International Space Station. It's going to be exciting for him to be able to do that and because he is of Hispanic heritage, it is great to have that role model. You need to be able to see people who look like you because it makes you think you can do it as well.

Dottie Metcalf-Lindenburger is going to be on our next launch on April 5 on STS131, and she is a teacher as well. These three astronauts are all lifetime members of the National Science Teachers Association and the International Technology Education Association. They are a great resource for us to use in informal education as well. Since Dottie will be using

the robotic arm as part of her mission, the resources that we've developed for our Web site that are available to all of you are around women in engineering and robotics. Dottie's passion is geology, and she has helped us to develop education resources.

How Dottie became an astronaut is an interesting story. She was teaching a classroom in the state of Washington and was asked a question that

often comes up: How do astronauts go to the bathroom in space? She was searching the NASA Web site to come back with the answer, as a good teacher would, and saw that there was a call for Educator Astronauts and she applied. Sometimes it's amazing where we find information that leads our lives in a different direction.

In the slide below is our Web site that focuses on informal education. There are a lot of resources there for you to utilize and we keep it fairly current with new opportunities. As we have tried to reach more communities and informal settings, we are doing a lot more on our Web site. We still have our Educational Resource Centers, we still have great printed materials that come from our mission directorates, but we really want more people to be able to access the Web site. With our Kids' Club we have a lot of hands on activities that

NASA Education Robotics Web Site
www.nasa.gov/audience/foreducators/robotics

Robotics

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 Multimedia
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Teaching From Space
 Learn more about how you and your students can get involved in real space missions.

Office of Education
 Visit the NASA Education Web site. You'll discover a wealth of information including a list of

Robotics

Overview

Welcome to the NASA Education Robotics Web site.

Innovation, creativity, problem solving -- the world of robotics at NASA is all of these things. Spend some time on this site to see if robotics might be in your future.

Things you can do on this site:

- Answer the question, What Is Robotics?
- Practice your programming skills with the interactive robotic activity.
- Watch and download video and multimedia features about robotics.
- Follow a timeline tracing the history of robotics.
- Check out lesson plans for your classroom.
- Stay up-to-date with information about NASA-supported robotics competitions.
- Visit the Robotics Image Gallery.
- Explore other worlds with NASA through robotic spacecraft discoveries.
- Read about scientists and engineers who design and test robots.

Read More

Read About It

02.09.10

NASA has launched an initiative to use its out-of-this-world missions and technology programs to boost summer learning, particularly for underrepresented students across the nation.

Read More

Top Stars Contest

Field Trip to the Moon Informal Educator Guide

View Archive

Museums and Planetariums

Youth and Community Activities

Visitor Centers and NASA Exhibits

NASA Visitor Centers

The general public is welcome to visit and tour many NASA installations.

Bringing NASA to Your Community

NASA exhibits provide an opportunity for people to interact with NASA in a tangible way.

Digital Learning Network

Digital Learning Network

The goal of the

Informal Education
www.nasa.gov/audience/foreducators/informal

Informal Education

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NASA Education

Read About It

NASA Supports the Summer of Innovation

02.09.10

NASA has launched an initiative to use its out-of-this-world missions and technology programs to boost summer learning, particularly for underrepresented students across the nation.

Read More

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Digital Learning Network

Digital Learning Network

The goal of the

young people can do at home, and that is on the Web site as well.

Looking at telecommunication, one of the resources we use is our Digital Learning Network, where we can connect our scientists and engineers in real time to a setting. That serves as an important resource. Our administrator, Charlie Bolden, as well as the President, have called on all federal agencies to use our scientists, our engineers, and our subject matter experts to help schools and communities to better understand science, technology, engineering and math—how it impacts them, how it is valuable to them. So this is a resource we use with the informal community as well.

Digital Learning Network

<http://dln.nasa.gov/dln>

Our Museum Alliance concept started with our Science Mission Directorate. The Alliance is now available across the country in every state, and it is a way that we can push out new information from all the Mission Directorates, new content, and opportunities. If something is going to happen with one of our missions, we send the information out to the Alliance at the same time we do press releases so that you are prepared and know what is happening as well

NASA Museum Alliance

<http://informal.jpl.nasa.gov/museum>

Over 700 professionals at more than 400 U.S. and 40 international organizations are currently partners in the Museum Alliance, presenting NASA information to both public and educational audiences. Conceived/ managed by Jet Propulsion Laboratory; Anita Sohus is manager.

- Ireland
- Japan
- Malaysia
- Mauritius
- Mexico
- Monaco
- New Zealand
- Auckland
- Wellington
- Nigeria
- Spain
- Valencia
- Sweden
- Stockholm
- Turkey
- U.K.
- Birmingham
- Leicester
- London
- Newcastle upon Tyne
- Nottinghamshire
- Powys

- Tasmania
- Wollongong
- Brazil
- Canada
- Calgary (2)
- Edmonton
- Ontario
- Prince George
- St. John's
- Vancouver
- Winnipeg
- Germany
- Berlin
- Hamburg
- Goettingen
- Laupheim
- Argentina
- Australia
- Canberra
- Melbourne (2)
- Millers Point
- Perth

**Hubble 3D IMAX Movie
Premiere: March 9, 2010**

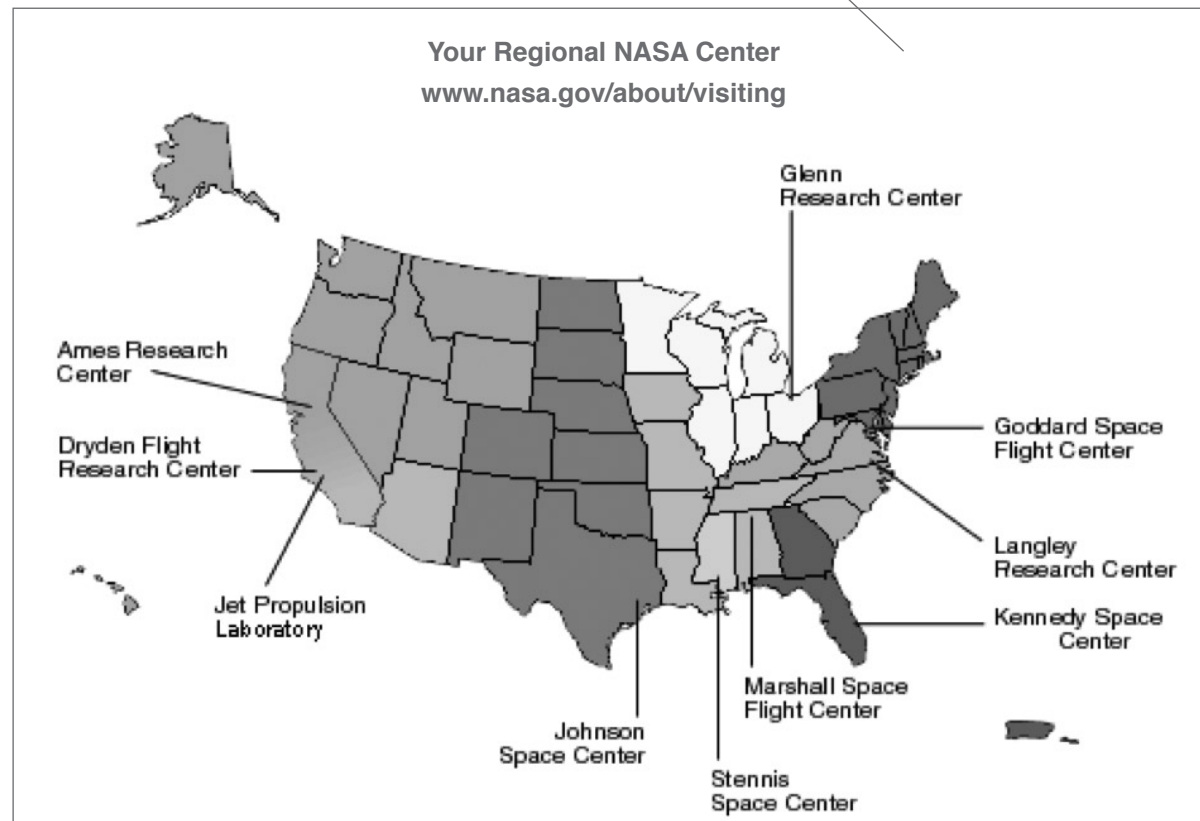


as the impact on your community. The Alliance is managed out of our JPL in California, and it is a great resource that has been very, very successful.

This next slide is an example of a result from NASA's mission. This is an image from the new, improved Hubble Telescope. The latest servicing mission to the Hubble Telescope is such a great story, combining science and engineering. It involved taking 32 screws out in space that were never intended to come out, and involved some amazing problem solving in real time. The national premiere of the new 3D IMAX movie

will show the servicing mission and the new images from the Hubble. The movie will then be shown in theaters around the country. I have seen an early premiere and it is going to be very exciting. It is a great way to tell a story about how science can bring us things that we didn't have any concept of when the process was originally started.

Hopefully, you do know that we have ten NASA centers around the country that you can connect to. Each center is assigned a certain number of states in K-12, so they are there to service you.



We also have our Space Grants in every state and they do work in informal education, so we also are there for you and want to support you and all of the community work that you are doing because it is important. You have the opportunity to reach young people and adults in a different way and motivate them to understand what these findings, this science, actually means to them. It is a unique capability that you have, and we want to continue to support that.

What does NASA bring to informal science education? We bring our staff, our research, our information, our technology and our facilities to you. Each of our centers has a visitor center that is very inspiring. Hopefully you will have the opportunity to take advantage of that, as I know some of your clients do as they travel.

We offer professional development opportunities for informal science educators. We want it to be easier for you to use our resources and our content in your own institutions. We collaborate with both formal and informal education communities to find ways to unite and support both these forms of education.

We also have unique opportunities available at each of our NASA centers. Each center has an Education Director who makes sure that Centers are serving your communities and that you know how to connect to our content and our resources to enhance what you are doing. Hopefully, you all know about www.nasa.gov. You can navigate from there to a lot of our

deep resources for adults and students, and it is continually expanding.

It is important to track our NASA-related events. We have competitive grants and solicitations. Some of the PIs attending this Summit are those who were awarded our most recent grants for museums, science centers and planetariums. *Express Education* is an e-mail service that offers you information about these opportunities. It is very easy to subscribe this service online, and is a great way to make sure you understand what opportunities we offer.

We really do appreciate the opportunity to be here because it is important that we support informal education, but also that we collaborate across agencies, so I appreciate NSF including NASA in this event. We have a saying at NASA: NSF can bring you the dollars, but we can bring you Mars. Why would you want one without the other?

Opportunities to Engage NASA Education

- NASA's Informal STEM Education provides access to:
 - NASA staff, research, technology, information and facilities
 - Professional development opportunities for informal science educators
 - Collaboration between the informal and formal education communities.
- Opportunities are available at every NASA Center. Find the informal education leads at the various NASA Centers at NASA.gov or use the direct link: www.nasa.gov/offices/education/contacts/informal.html
- To track NASA-related education events, including competitive grant solicitations, subscribe to NASA's Express Education e-mail service: www.nasa.gov/audience/foreducators/Express_Landing.html



David Ucko moderating the Q&A session

Q & A: Evaluation Across Federal Agencies

- Could you talk about how the different federal agencies look at evaluation with a common framework? • Audience Member

Joyce Leavitt Winterton

- One thing I can say is that evaluation is equally important to all of our agencies. The President has made it very clear that if we don't have the evidence to document the value and impact of what we are doing, then don't count on it still being in the budget. I think we all struggle with making sure we are looking at significant impact metrics. We've gone from not only the number and the outcomes, to really looking at more substantial efforts regarding what difference did it make. That's really the big question: How can we prove it made a difference and was therefore a wise investment?

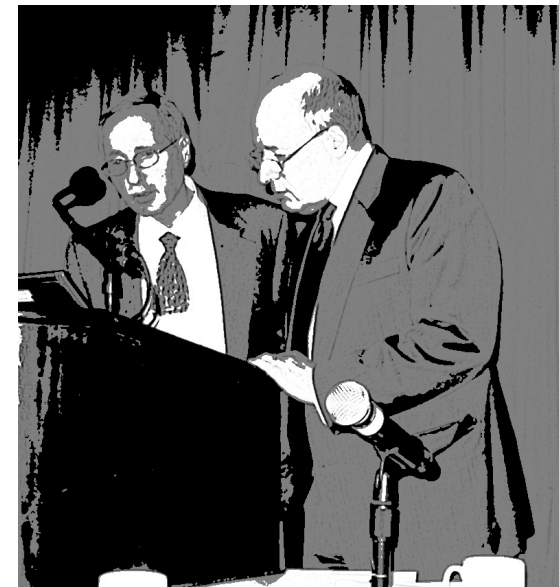
I know that we always struggle with how to do that substantially in informal education, so I compliment you on the work you're doing, and we're always looking for how we can do that better. The challenge is, what portion of the benefit can we claim? So it's critical, it's important, but we recognize that it is not easy. However, we certainly can't give up on it because it is important.

Barbara Alving

- I agree that this is a tremendous challenge. We do build evaluation into all of our programs, and I think evaluation also has to be somewhat specific to the site that is undergoing evaluation. For example, in West Virginia we are looking at whether there is an outcome on the types of careers that students may choose. Is there a greater interest, then, in an area of allied health sciences? Often I think the outcomes that you see are years later, as students decide they are going to go on to higher education, and it's a very changing environment in which we build and develop all of these opportunities.

So we are working on that with all of our programs at NCRR. We all use the word

David Ucko and Richard Spinrad



“evaluation,” but I think what we have to recognize is, we do need combined end points, quantitative and probably qualitative, and we also need to look at it in somewhat immediate fashion, but several years down the line. We have to look at what we see in terms of trends. And then we are never quite sure whether this was due to this program or to something else, such as improved state finances that provided opportunities for students to go to school and continue their education.

Richard W. Spinrad

- If I can give what may seem to be something of a unique perspective from NOAA, it has to do with the seemingly bureaucratic issue of authorization for education programs, which then invokes evaluation processes. Up

until just a few years ago, we were not even authorized to spend money on education programs except in specifically authorized areas, Sea Grant being one, the National Estuarine Research Reserve System as part of the “Coastal Zone Management Act.”

Then the “America COMPETES Act” was passed, which gave us authorization for broad-based education programs. That act is up for reauthorization now, and if there are issues associated with evaluation, there may be some target opportunities for identifying some of those inter-agency activities through that particular vehicle.

Joyce Leavitt Winterton and Barbara Alving



Barbara M. Alving, MD, MCAP

Director, National Center for Research Resources,
National Institutes of Health

Barbara Alving is the Director of the National Center for Research Resources (NCRR), which funds the development of new technologies for basic and clinical research, supports training for researchers in the biomedical sciences, develops preclinical models, and provides health and biomedical education for the public—including the Science Education Partnership Award Program, which funds innovative educational programs that create partnerships among biomedical and clinical researchers and K-12 teachers and schools, museums and science centers, media experts, and other educational organizations. Dr. Alving received her M.D. from Georgetown University School of Medicine, then later became a research investigator in the Division of Blood and Blood Products at the Food and Drug Administration, Chief of the Department of Hematology and Vascular Biology at the Walter Reed Army Institute of Research, and Director of the Medical Oncology/Hematology Section at the Washington Hospital Center in Washington, D.C. In 1999, she joined the National Heart, Lung, and Blood Institute (NHLBI), where she became Deputy Director and later Acting Director and Director of the NHLBI Women's Health Initiative. In 2005 she became NCRR's Acting Director; she was named Director in April 2007.

Richard W. Spinrad, PhD, CMarSci

NOAA Assistant Administrator, Office of Oceanic and Atmospheric Administration, National Oceanic and Atmospheric Administration (NOAA)

Richard Spinrad is Assistant Administrator for NOAA Research, which has the role of providing unbiased science to better manage the environment, nationally and globally. He holds a Ph.D. in marine geology from Oregon State University. Past President of the Oceanography Society and former Editor-in-Chief of Oceanography magazine, Dr. Spinrad has served on the faculty of the U.S. Naval Academy and George Mason University and as a research scientist at Bigelow Laboratory for Ocean Sciences. He also managed oceanographic research at the Office of Naval Research (including serving as the first manager of the Navy's ocean optics program). As Director of Research and Education for the Consortium for Oceanographic Research and Education, Dr. Spinrad co-authored the report *Oceans 2000: Bridging the Millennia*, which served as the guiding document for the establishment of the National Oceanographic Partnership Program. He also served as the U.S. permanent representative to the Intergovernmental Oceanographic Commission of UNESCO, and co-chairs the White House Joint Subcommittee on Ocean Science and Technology.

Joyce Leavitt Winterton, PhD

Associate Administrator for Education,
National Aeronautics and Space Administration

Joyce Leavitt Winterton directs the development and implementation of NASA's education programs, which strengthen student involvement and public awareness of its scientific goals and missions. In this role, she leads the agency in inspiring interest in science, technology, engineering, and mathematics, through its unique mission, workforce, facilities, research, and innovations. As Associate Administrator for Education, Dr. Winterton chairs the Education Coordinating Committee, an agency-wide collaborative structure that maximizes NASA's ability to manage and implement its education portfolio. The ECC works to ensure that the agency's education investments are focused on supporting the nation's education efforts to develop the skilled workforce necessary to achieve the agency's goals and objectives. Before coming to NASA, Dr. Winterton served as the Director of Education programs for USA TODAY, and developed educational strategies, resources, and partnerships for its K-12 and collegiate programs. She was the Founder and President of Winterton Associates, a consulting firm that specializes in working on joint projects with business and industry, education, and government. Dr. Winterton's previous experience includes serving as the Team Leader for Partner Development for the National Future Farmers of America student organization and the Executive Director of the National Council on Vocational Technical Education, a Presidential Advisory Council providing recommendations to the President, Congress, and the Secretary of Education.