A conversation about the needs and future of **public engagement in Earth and space science**

NISE
NATIONAL INFORMAL STEM EDUCATION NETWORK

NISE Network Partner Meeting
Tempe, Arizona - February 2019

EXPLORE SCIENCE
Earth & Space

www.nisenet.org

Presenters

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Overview

- Science Activation goals
- Ideas from our panel
- Discussion

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SCIENCE ACTIVATION

NASA Science Activation Primer

National Aeronautics and Space Administration

Kristen J. Erickson
Science Engagement & Partnerships Division
Science Mission Directorate, NASA

November 5, 2018

https://science.nasa.gov


BE A LEADER
IN SCIENCE
FOCUS ON IMPACT
DISCOVER SECRETS OF THE UNIVERSE
SEARCH FOR LIFE ELSEWHERE
PROTECT & IMPROVE LIFE ON EARTH
ENABLE INNOVATION
BE INTERCONNECTED
INTERNATIONAL PARTNERS
ACROSS THE AGENCY
COMMERCIAL PARTNERS
INSPIRE LEARNERS
OF ALL AGES

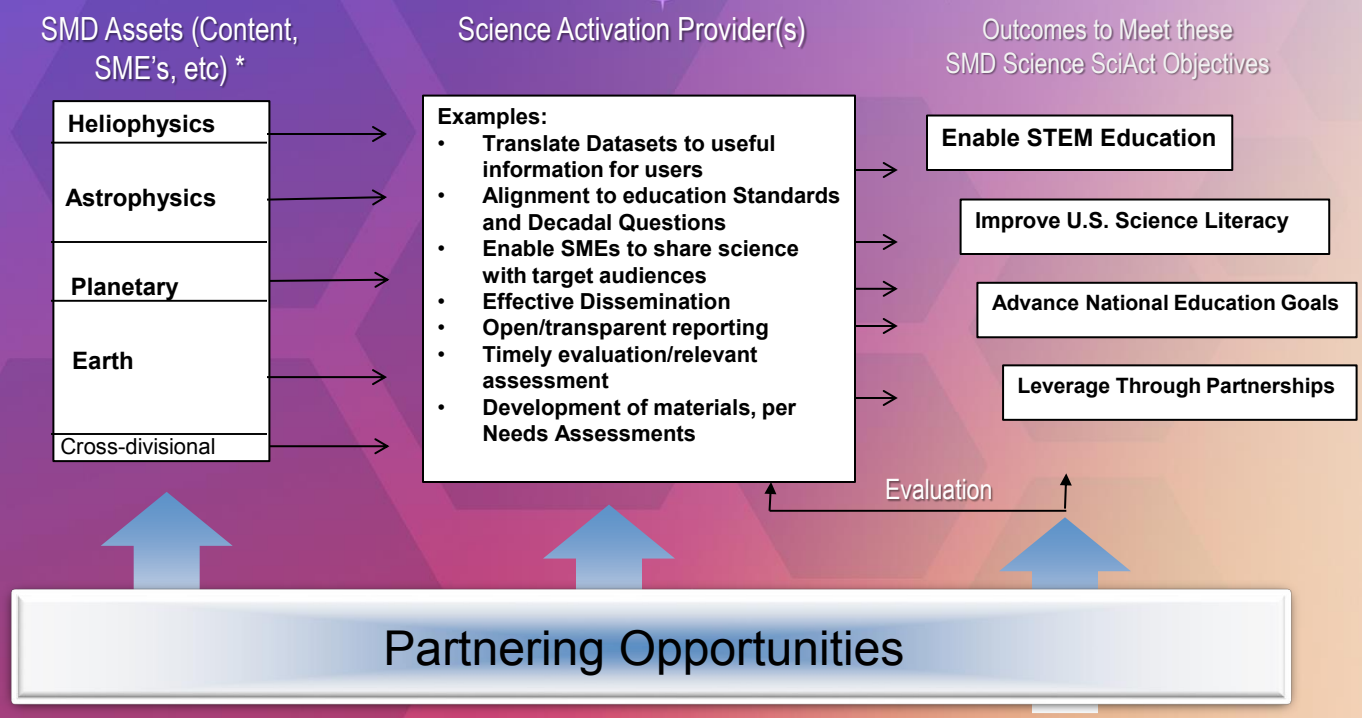
SMD Science Activation Desired Outcome:

To further enable NASA science experts and content into the learning environment more effectively and efficiently with learners of all ages.

Science Activation

- Baselined in November 2016, this collaborative model leverages over 200 partnerships through network of science and community-based institutions using “multiplier effect” across U.S. to achieve objectives
- 25 Competitively-selected awardees enables NASA science experts and content to engage more effectively and efficiently with learners of all ages
- Each agreement uses independent evaluators to validate performance; new community of practice established
- Volunteer networks, such as Solar System Ambassadors and Night Sky Network, mobilized across the U.S.
- National Academies assessment scheduled for 2019
- Annual SMD funding $45M for Science Activation activities

SMD Science Activation Model



* Divisions responsible for science content datasets), SME selection, and enabling flight opportunities

PANEL

KELIANN LACONTE

NASA@ My Library

A National Earth and Space Science Initiative that Connects NASA, Public Libraries and their Communities

NCIL National Center for Interactive Learning

STAR net

Science-Technology Activities & Resources For Libraries

ALA American Library Association

PACIFIC SCIENCE CENTER

LUNAR AND PLANETARY INSTITUTE

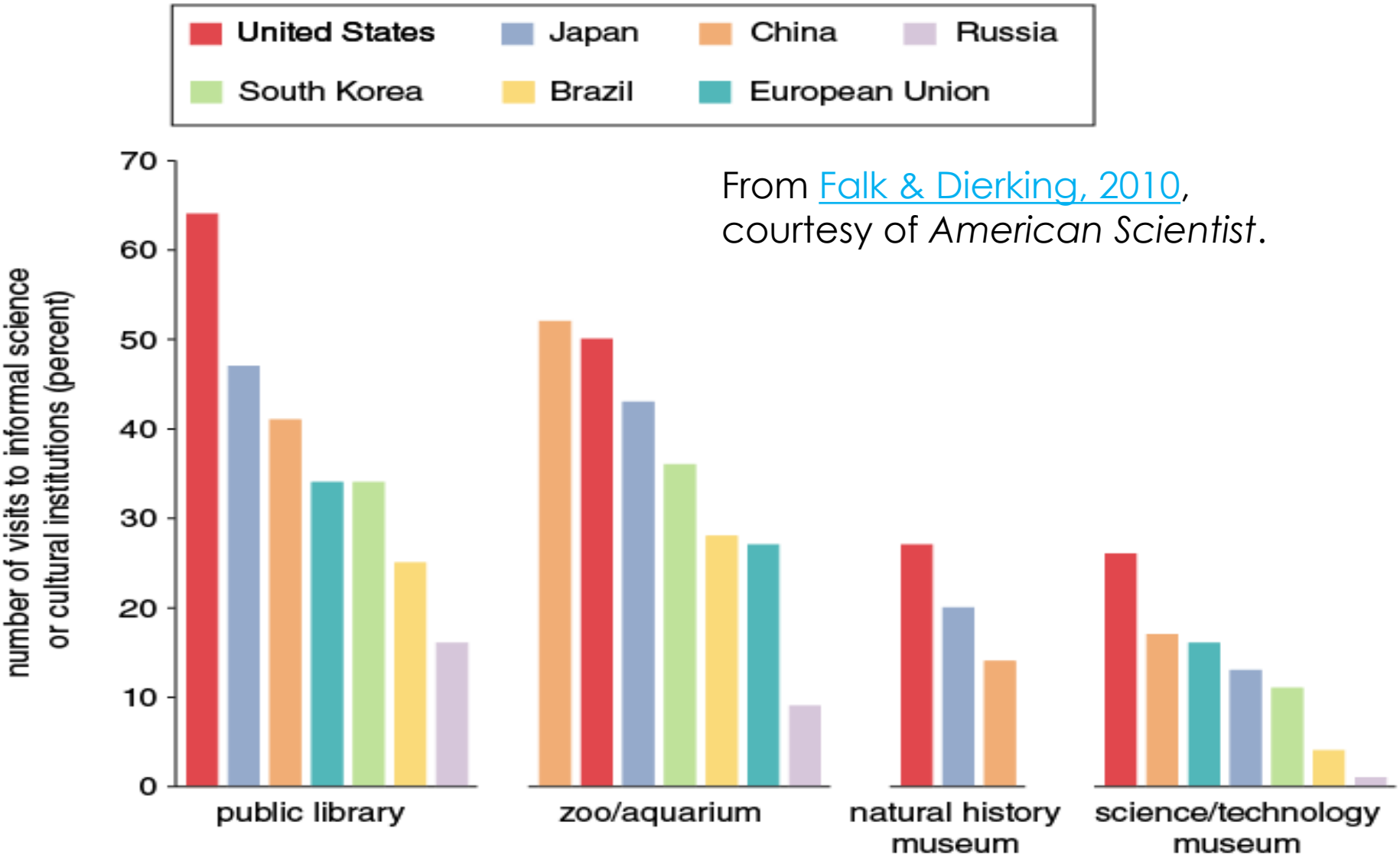
SPACE SCIENCE INSTITUTE

NCIL National Center for Interactive Learning

EDC Learning transforms lives.

Cornerstones of Science awakening curiosity, enriching lives

Use of Informal Science Venues



From Falk & Dierking, 2010, courtesy of *American Scientist*.

Science Learning Ecosystems

Network of science learning providers

The Science Learning Ecosystem

John H. Falk
Institute for Learning Innovation
Oregon State University

ABSTRACT

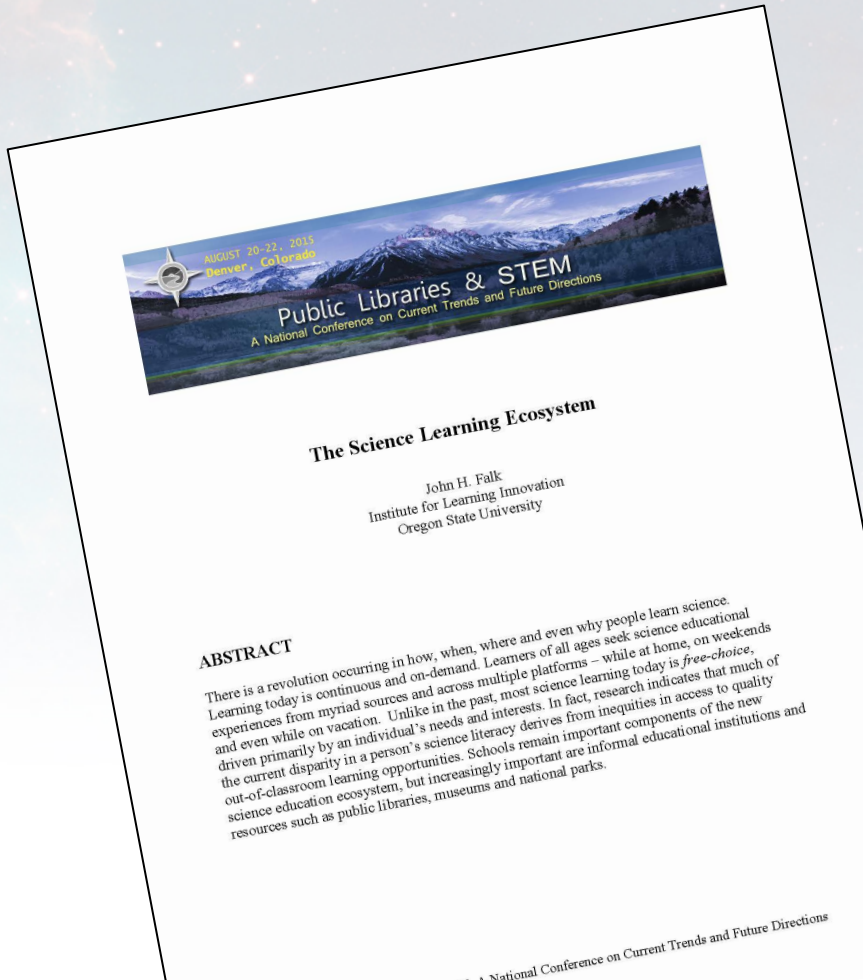
There is a revolution occurring in how, when, where and even why people learn science. Learning today is continuous and on-demand. Learners of all ages seek science educational experiences from myriad sources and across multiple platforms – while at home, on weekends and even while on vacation. Unlike in the past, most science learning today is *free-choice*, driven primarily by an individual's needs and interests. In fact, research indicates that much of the current disparity in a person's science literacy derives from inequities in access to quality out-of-classroom learning opportunities. Schools remain important components of the new science education ecosystem, but increasingly important are informal educational institutions and resources such as public libraries, museums and national parks.

www.starnetlibraries.org/stem-in-libraries

Science Learning Ecosystems

Network of science learning providers

Individuals



www.starnetlibraries.org/stem-in-libraries

Questions

1. Where are the “third places” in our communities that can be watering holes for STEM learning?
2. How can we create alliances with other organizations for greater impact?
3. How can we tap into the family movement?

Centennial Park Library, High Plains Library District, CO

DENISE SMITH

Scientific Literacy

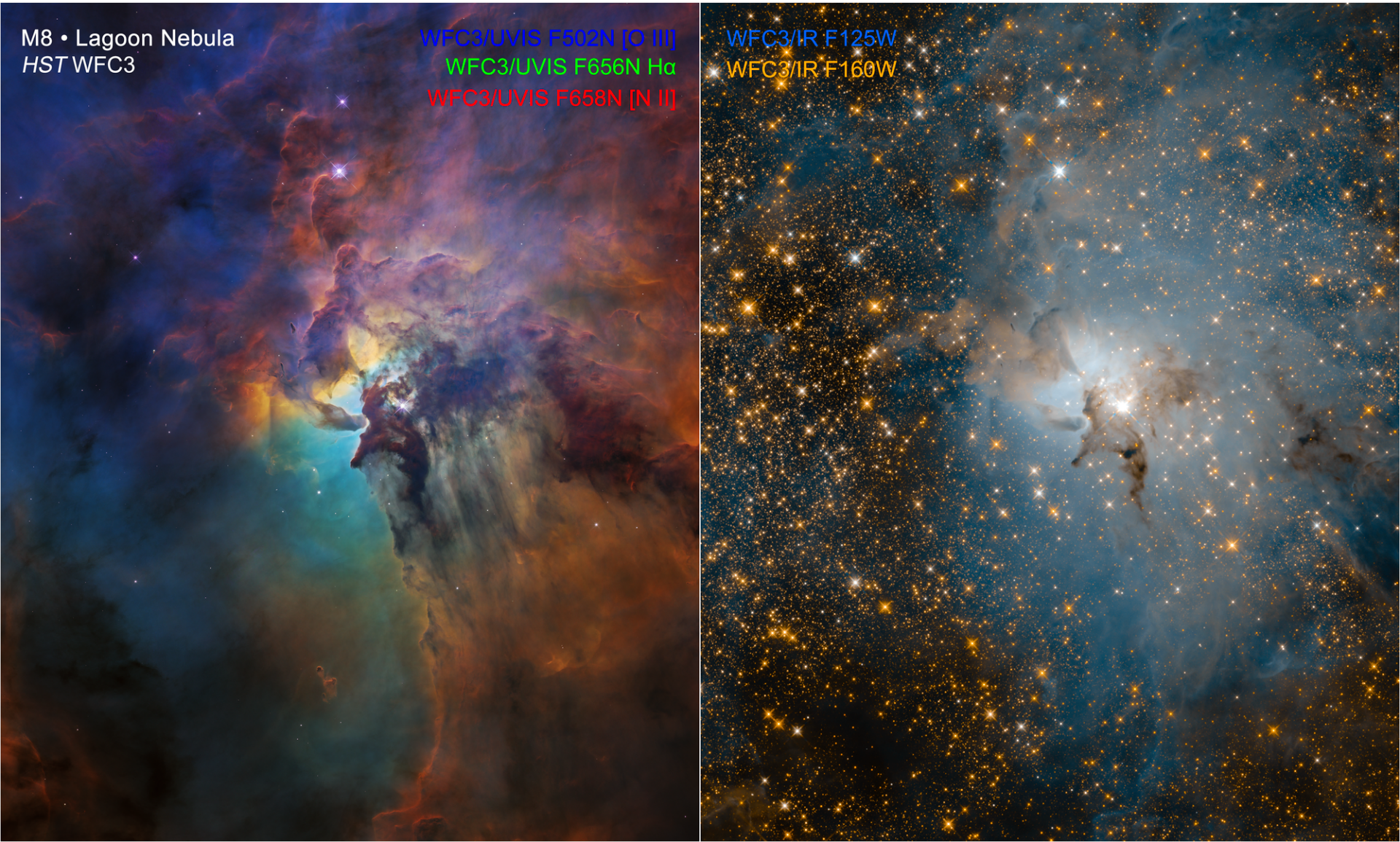
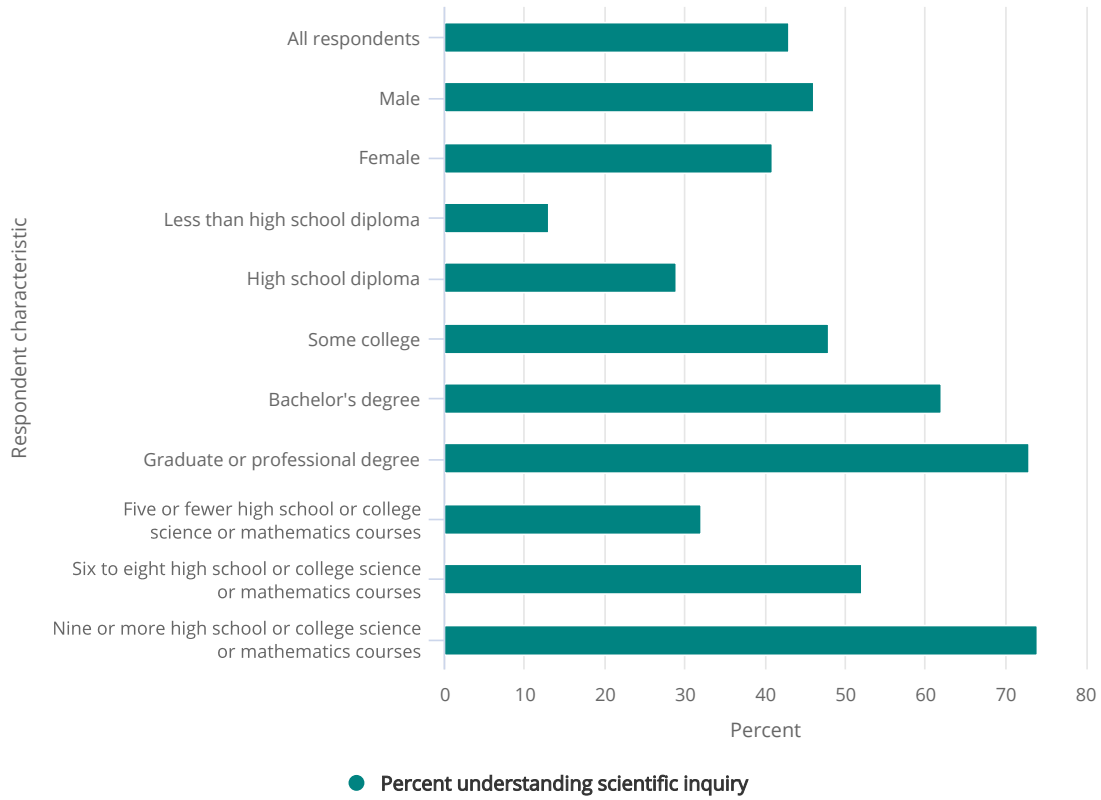


FIGURE 7-9

Understanding scientific inquiry, by respondent characteristic: 2016



Note(s)

See Appendix Table 7-11 for explanation of understanding scientific inquiry and questions included in the index and additional respondent characteristics.

Source(s)

NORC at the University of Chicago, General Social Survey (2016).

Science and Engineering Indicators 2018

Questions to Explore

How can NASA projects and the NISE Network community work together to:

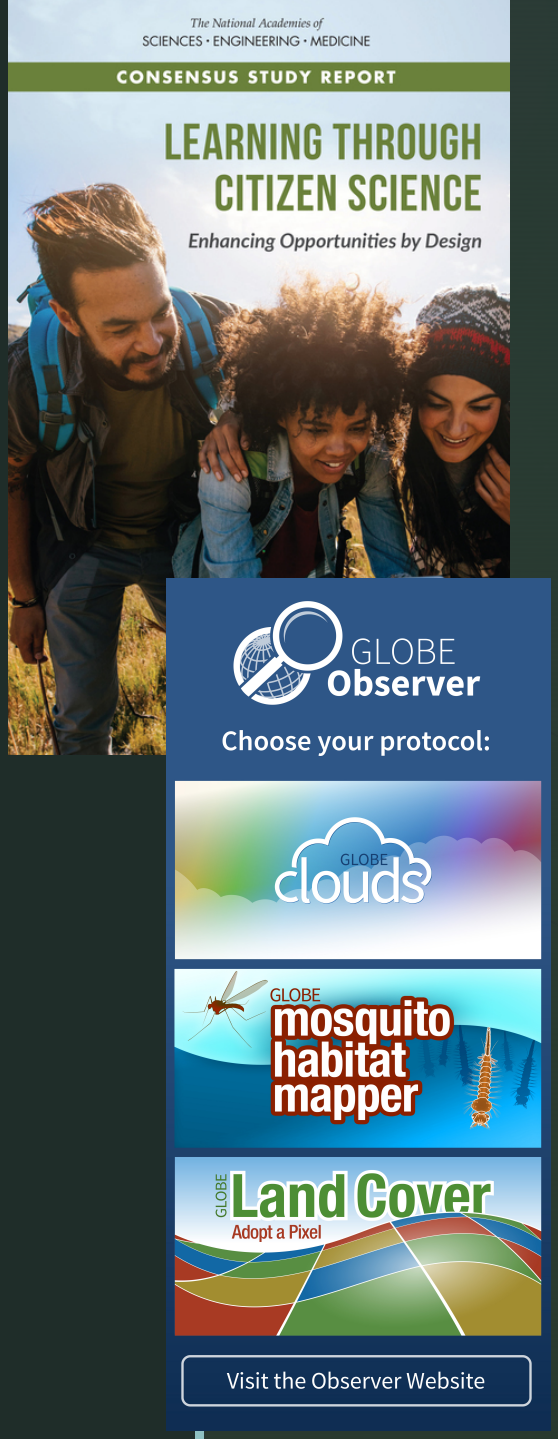
- have a bigger impact?
- increase scientific literacy on a national scale?

How can we engage public audiences in NASA science discoveries that involve complex topics and use them as teachable moments?

THERESA SCHWERIN

Authentic STEM Engagement

How can informal learning organizations support deeper engagement and participation of the public in NASA STEM through citizen science?



Some Context

2018 National Academies of Science Report

- Need to explicitly design for learning
- Learning through citizen science has benefits for participants, scientists, communities, and science
- Broadens the scope of who can contribute, but issues of equity need to be considered and addressed

NASA Policy on Citizen Science

- Held to the same standard as any NASA science program
- Contribute to building a scientifically-literate nation

NASA provides numerous opportunities for the public to participate in NASA science

- Across all science divisions
- Range from data collection, data analysis, and problem solving
- Example: GLOBE Observer

Key Questions

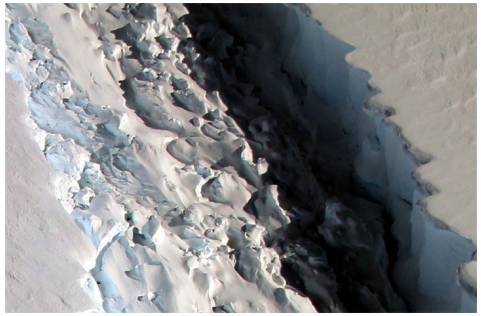
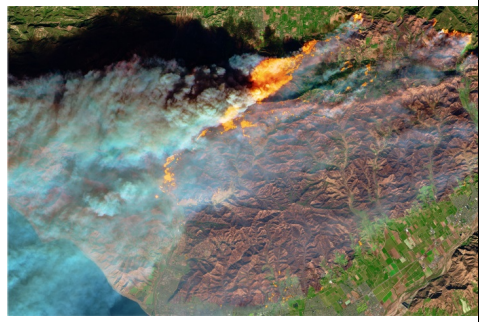
- What would motivate you to engage your public audiences to participate in citizen science?
- What specific roles do you see museums and science centers playing to engage the public in STEM through citizen science?
- What considerations would impact museums and science centers facilitating deeper STEM engagement in NASA citizen science for your community?
- How can we best support you? (other than $$)

LIN CHAMBERS

National Aeronautics and Space Administration

SCIENCE



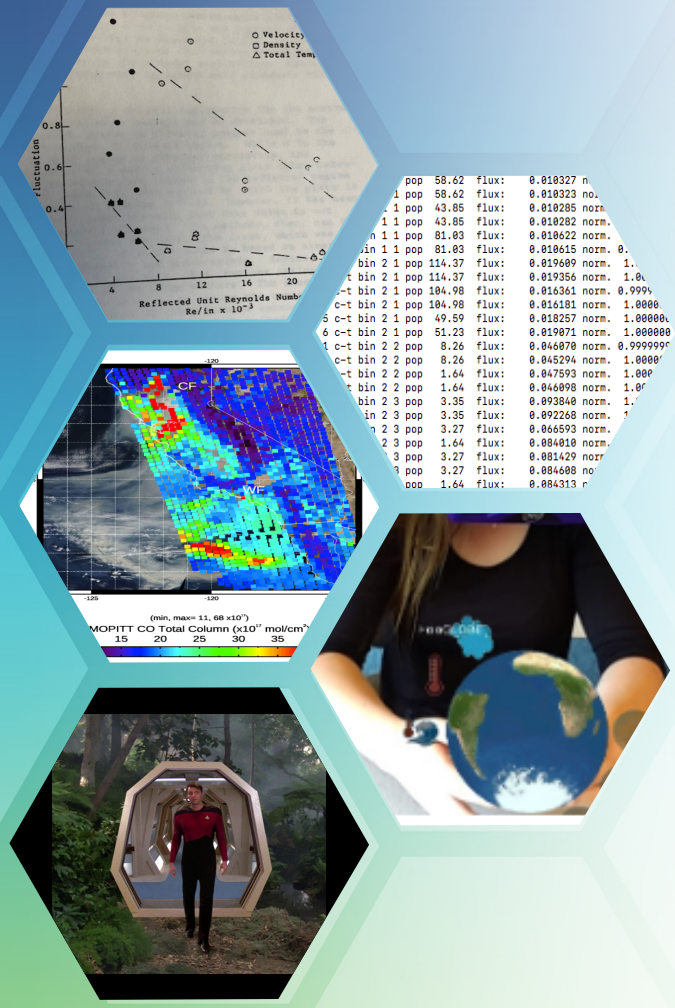
Data and Data Literacy

Dr. Lin Chambers
Science Education Integration Manager
Strategic Engagement & Partnerships Division
NASA HQ

Feb. 2019

Some context

- 2018 Co-STEM report focus: "Computational Literacy".
- NGSS Practices:
  - Analyzing and Interpreting Data
  - Using Mathematics and Computational Thinking
- NAS: almost 200 consensus study reports around big/massive (!) data.
- NASA:
  - 24 TB/day for a single new Earth observing mission!
  - ~6,000 data collections – just for Earth!



Key questions

- What do data look like in the 21st Century?
- How should we expect students or museum visitors to interact with data?
- What would a learning progression for data literacy look like?
- What particular role can museums and science centers play in supporting that learning?
- How important is it to interact with data?

RAE OSTMAN

Engaging all learners

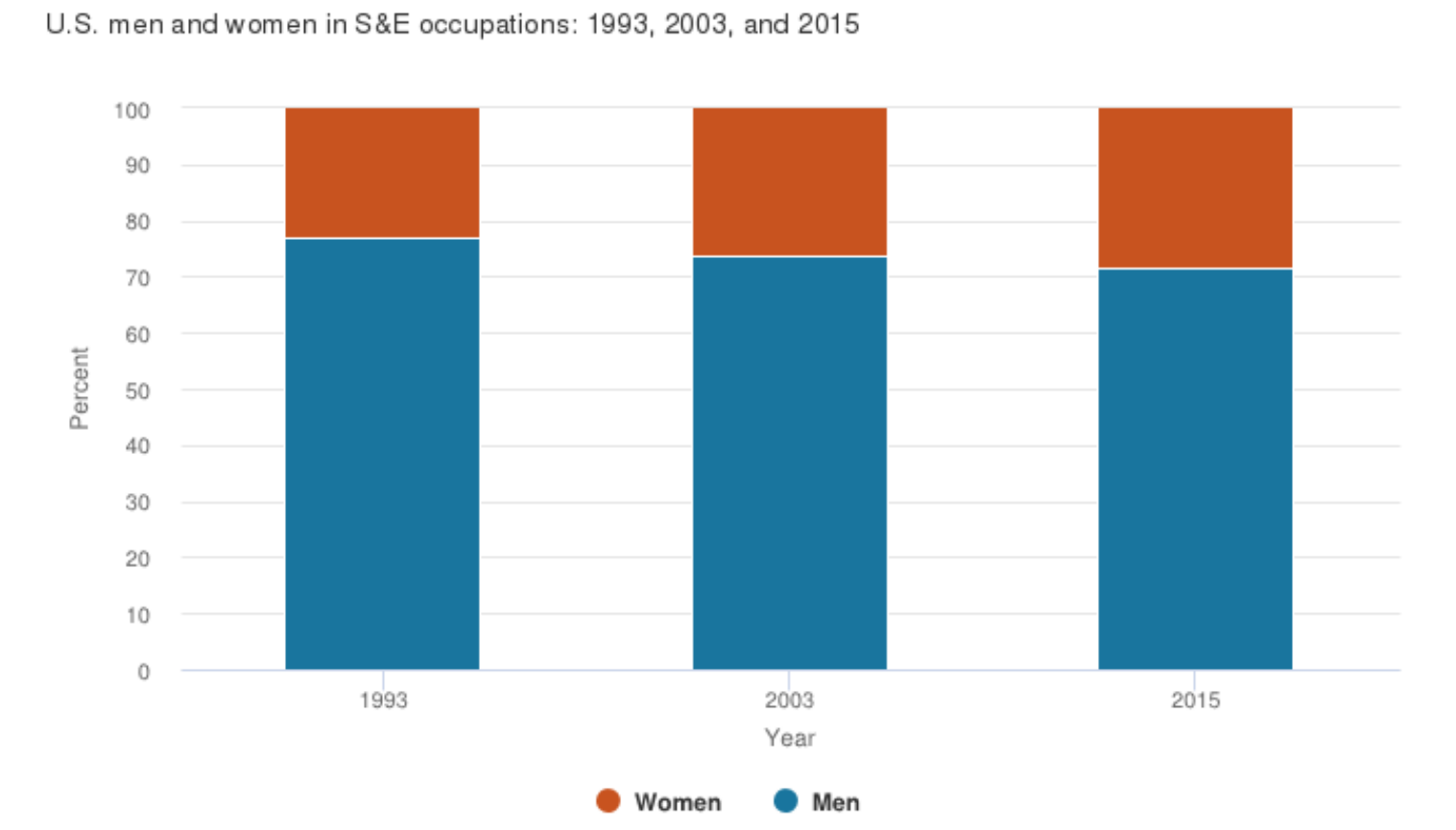
CoSTEM vision: All Americans will have lifelong access to high-quality STEM education and the United States will be the global leader in STEM literacy, innovation, and employment.

Goals:

- build strong foundations for STEM literacy
- increase diversity, equity, and inclusion in STEM
- prepare the STEM workforce of the future

Women in STEM

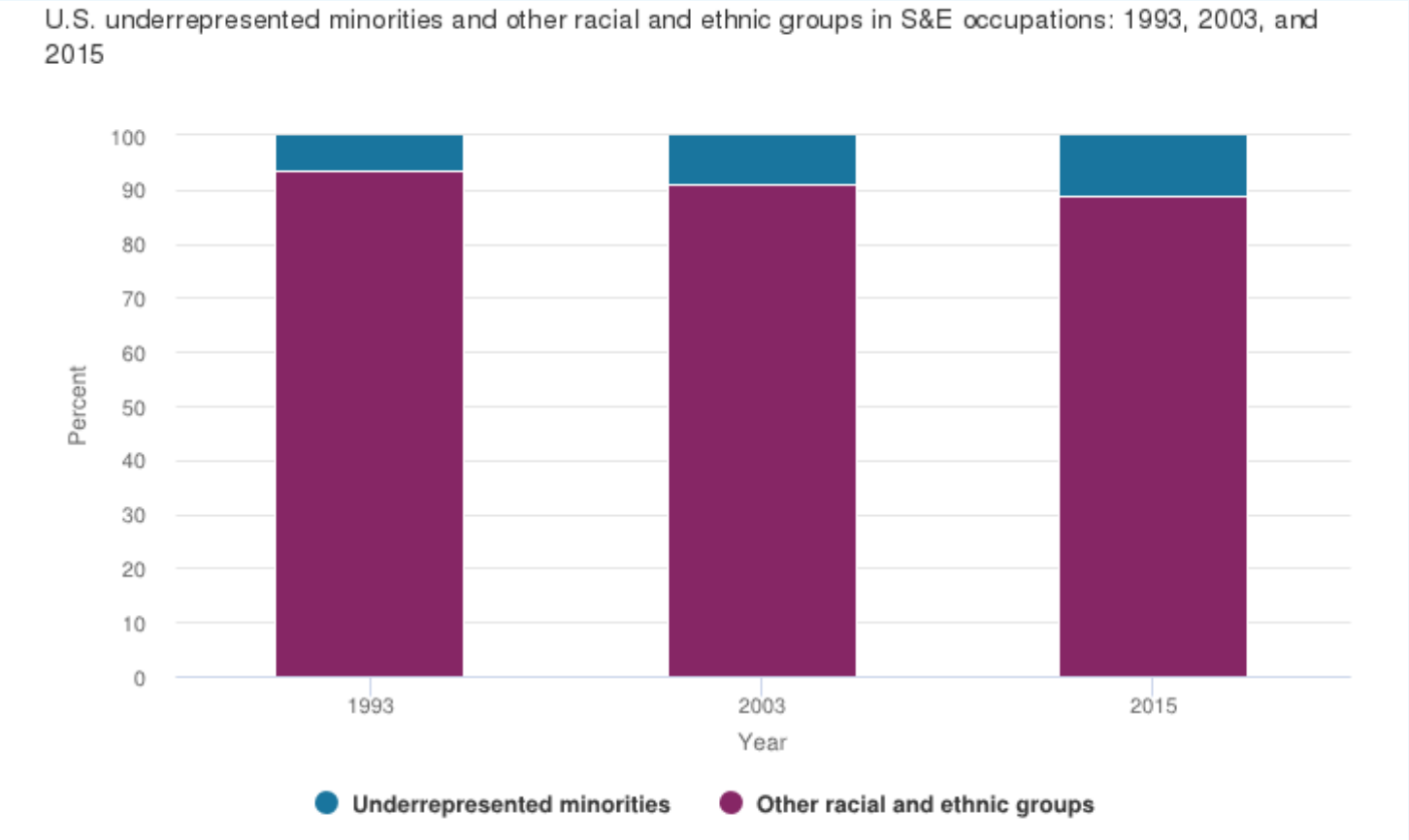
51% of population
<33% of scientists and engineers



National Science Board, Science & Engineering Indicators, 2018

Minorities in STEM

27% of population
11% of scientists and engineers



National Science Board, Science & Engineering Indicators, 2018

Engaging all learners

1. How can the NISE Network and NASA Science Activation work together to broaden participation in STEM learning?

1. What approaches, tools, and resources do we need to make a difference, in our communities and nationally?

DISCUSSION

Topics

- STEM ecosystems
- Scientific literacy
- Authentic STEM engagement
- Data literacy
- Engaging all learners

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Other questions

- What are the greatest needs and opportunities ahead of us in informal STEM learning / Earth and space?
- How can the NISE Network have the greatest impact as part of NASA Science Activation?

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Thank You

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