

The Next 30 Years of NASA Astrophysics: How Do We Bring 400 Million People Along for the Journey?

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As we look forward to 30 years of evolving astrophysics research and discovery, an essential question will be this: how will a taxpayer funded enterprise provide a rich return-on-investment to the public, improving their lives and perspectives? One answer is to employ a robust education and public outreach (E/PO) effort in concert with future scientific exploration and discovery. Science, education, and communication will thus go hand-in-hand in addressing the challenges that will define the next 30 years of NASA astrophysics. We must bring 400 million people in the U.S. (by 2043) along for the journey.

Our presentation focuses on three points:

1) *Today's NASA Astrophysics E/PO is high impact, paving the way for the future.* We outline how the science and education communities have partnered to effectively use NASA astrophysics science and technology to educate and inspire, as traced through a range of metrics and evaluation findings. These high impact models provide the building blocks for future E/PO through their success in strengthening critical thinking and STEM skills, engaging diverse audiences, motivating the future workforce, and enabling public participation in science.

2) *Public engagement over the next ten, 20, and 30 years must be innovative and adaptable to a rapidly changing landscape.* We review emerging trends, projecting how public engagement will need to evolve. For example, the next decade will see the implementation of the Next Generation Science Standards, with an increased emphasis on the process skills that lie at the heart of modern astrophysics. Students educated via these standards will become the next generation of astronomers and educators 30 years from now. Future E/PO must also be responsive to economic and political challenges, climate change, public participation in science, rapid evolution of communication technologies, private space adventure and other social phenomena.

3) *We will adapt to tomorrow's challenges with flexible E/PO approaches that enable a personal connection to science, breadth of opportunities, and deep experiences.* We address three key strategies that will determine how we rise to the challenge of providing the E/PO underpinnings to support future research and discovery:

- **Customized personal experiences:** Enabling a broad range of opportunities that are cognizant of the needs and aspirations of an increasingly diverse American population. Future E/PO must increasingly relate NASA Astrophysics research to the daily lives of people on Earth, helping them to feel a personal connection to the universe.
- **Exploitation of the latest technological advances:** Use of the latest technology and user interfaces to create innovative ways to increase public access to major observatories and data sets. Visualizations, animations, and other multimedia of the future make NASA Astrophysics discoveries accessible on-demand through a multitude of personal and institutional venues.
- **Incorporating E/PO in the core of mission design:** Identifying the elements of mission design, observation planning, data archiving, reduction, and analysis that provide mutual benefits to the public and the science communities. Doing so results in public engagement and scientific literacy, along with the citizen power to carry out modern science in an era of big data and crowdsourcing.