NASA Astrophysics Archives: Enabling Science Now and in the Future

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NASA's Long-Term Astrophysics Data Archives

- IRSA: NASA/IPAC Infrared Science Archive
- MAST: Mikulski Archive for Space Telescopes
- NED: NASA/IPAC Extragalactic Database
- HEASARC: High Energy Astrophysics Archive Research Center
- KOA: Keck Observatory Archive
- ADS: SAO/NASA Astrophysics Data System
- NASA Exoplanet Archive

NASA's Commitment to Astrophysics Data Archives

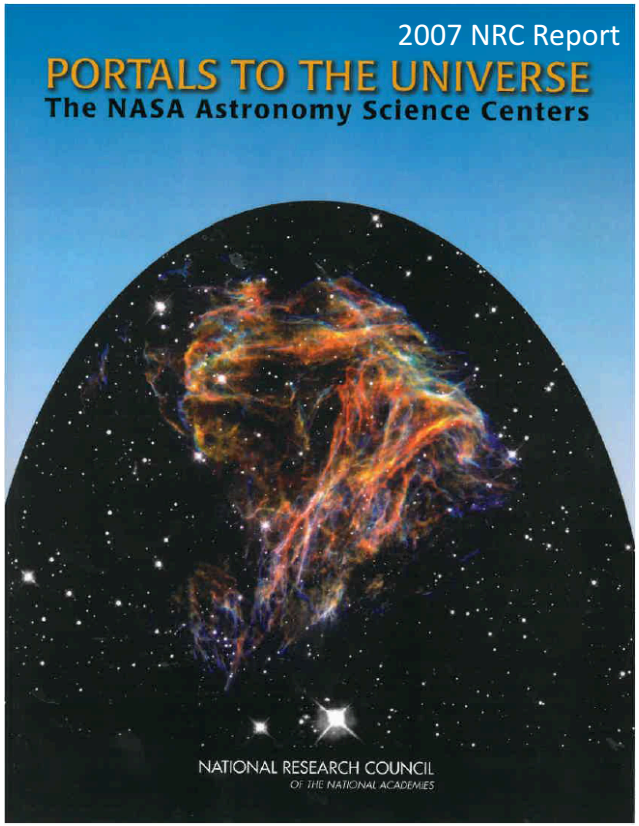
"NASA has regarded data handling and archiving as an integral part of space missions."

"This support now provides the major return on the considerable investment the agency made… over the past 20 years."

What is a "Sustainable Archive"?

- Provides data discovery and analysis tools.
- Contains high-quality, reliable data.
- Provides simple and useful tools to a broad community.
- Provides user support to the novice as well as to the power user.
- Adapts and evolves in response to community input.

"Facilitates new science."



Successful Archives Bottom Line

1. Enables new science

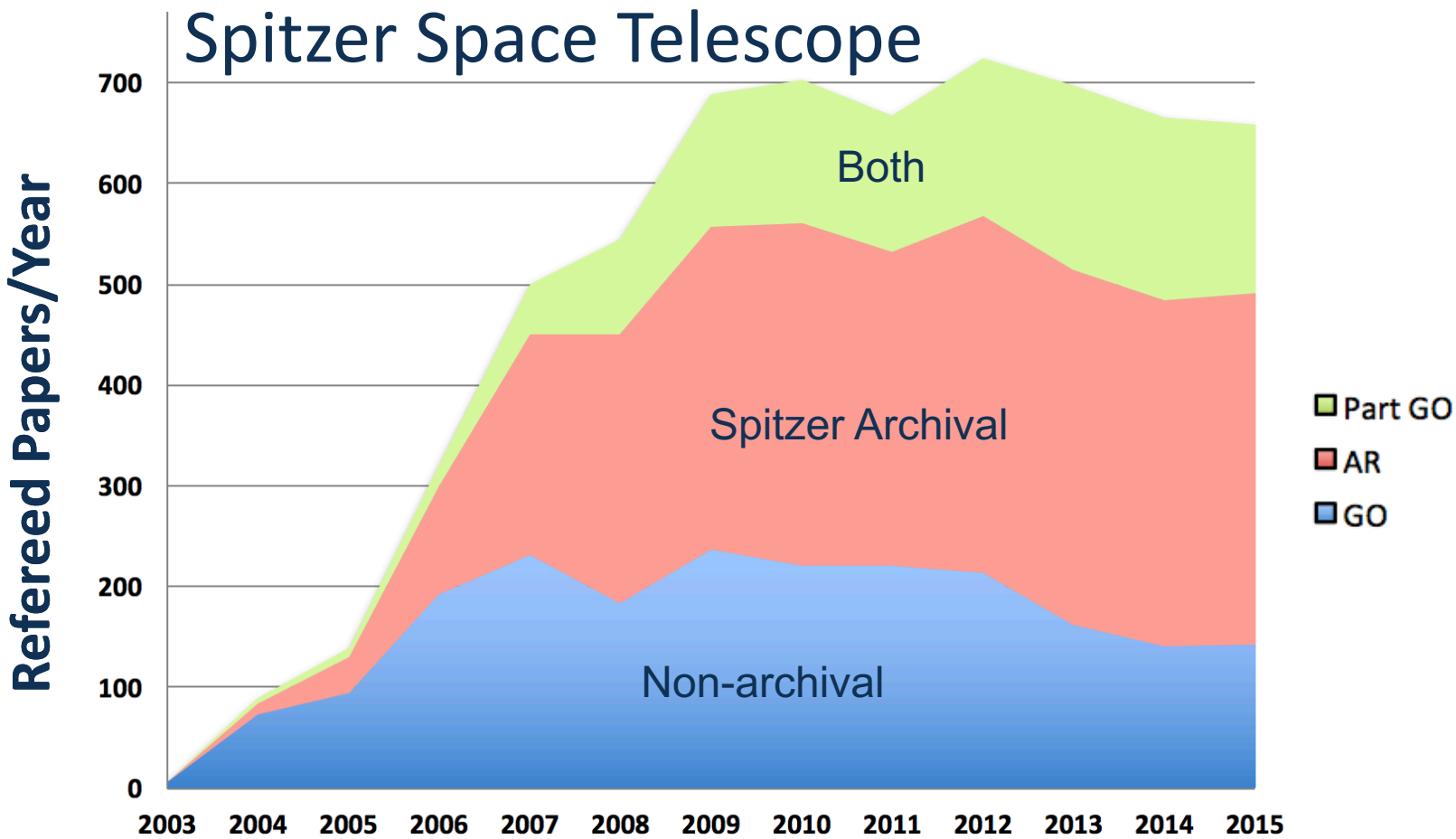
2. High-quality data has a very long shelf-life

3. Services, tools and expertise expand science opportunities

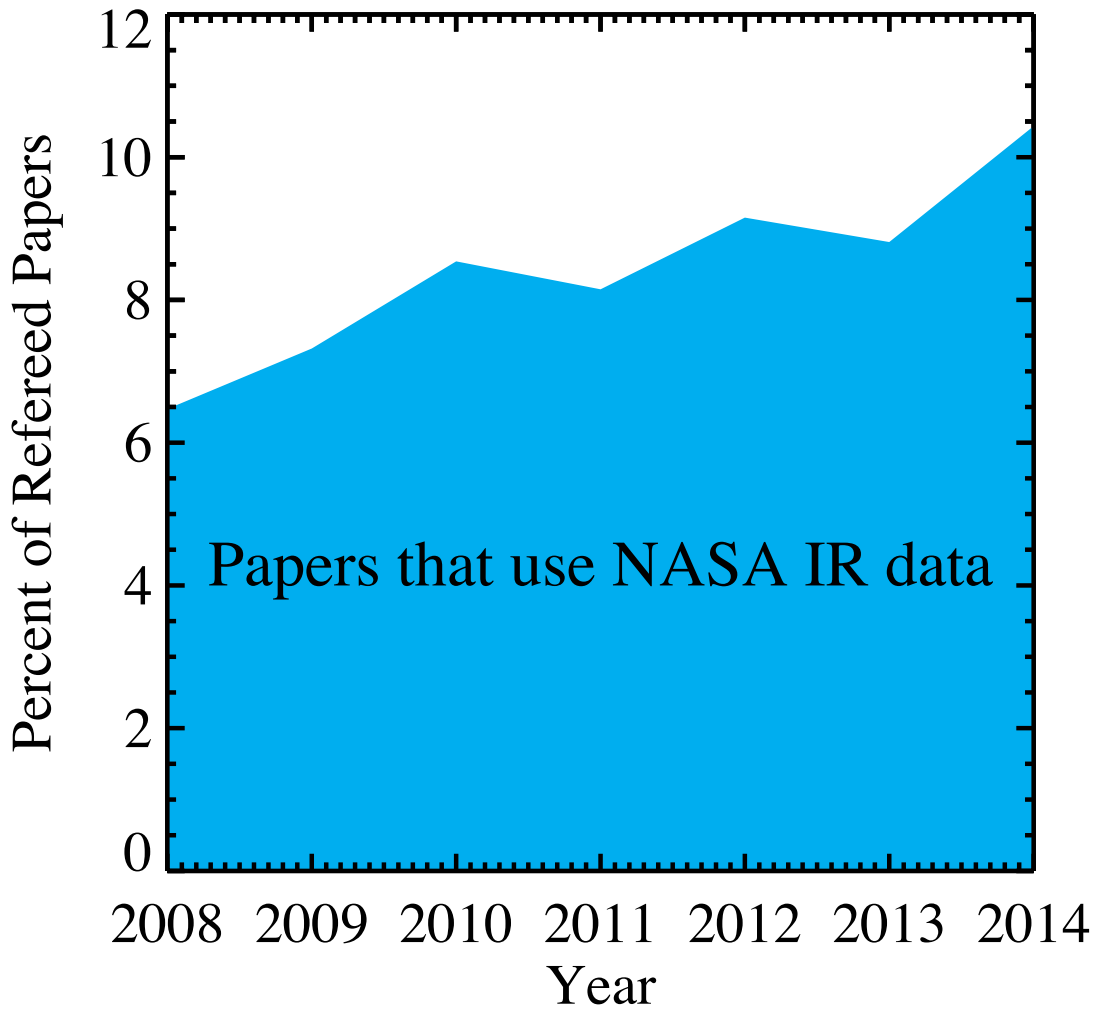
1. Enabling New Science

Frontier Fields

Doubling Observatory Scientific Output



Refereed Papers Utilizing NASA Data at IRSA



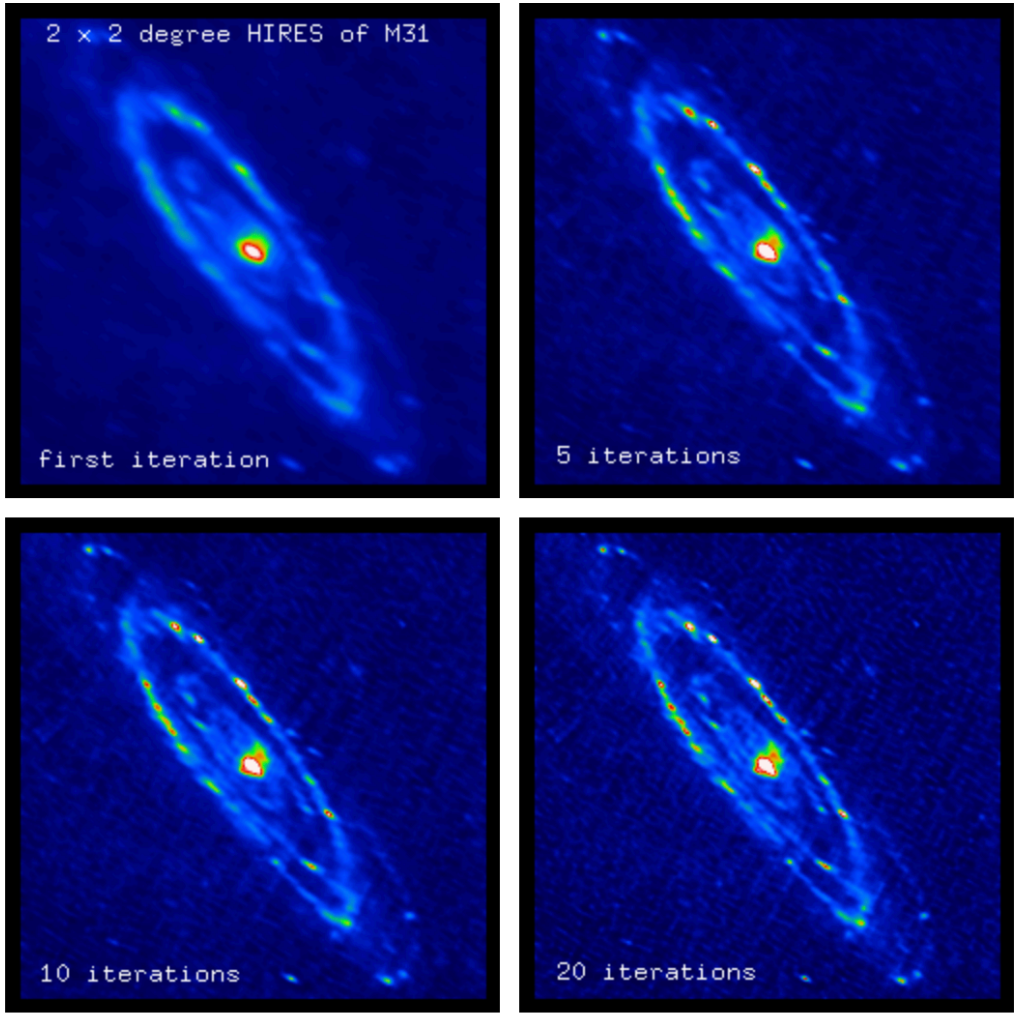
Long Term Value of Data

http://irsa.ipac.caltech.edu/IRASdocs/hires_over.html

IRAS launch – 1983
Spitzer launch – 2003
Planck launch – 2009

HIRES processing tool for IRAS data needed to be updated to support Spitzer science, then used for Planck

Relevant timescale is decades, not years.



Services, Tools & Expertise

From *Portals to the Universe: The NASA Astronomy Science Centers* (NRC Report, 2007)

"Successful research using archival data sets is dependent on the resident expertise and corporate memory that resides at the science centers."

Successful Archives

- ✓ Enable new science
  - NASA Astrophysics archives are leaders in enabling astrophysics archival research, at increasingly large scales
- ✓ High-quality data has a long shelf-life
  - Science discoveries are waiting in the archives that were never imagined or expected by the mission or even program PIs
- ✓ Services, tools and expertise expand science opportunities
  - Increasing data volume and diversity are supporting new, more complex use cases; new challenges responding to science-driven resource demands