Science Planning for a Limited Lifetime Mission
- Spitzer Experience

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Introduction

• Spitzer had a 2.5 year prime mission lifetime requirement, goal of 5 years (lasted 5.5)

• Spitzer had no precursor ‘finder charts’ at the sensitivity levels it would reach

• typical science cycle too long for a 2.5 year mission

propose → observe → analyze → publish → interpret → repeat
How to Maximize Science?

• Legacy Science Program

• First Look Survey

• Second-Look Observations
• Select large, public programs to execute early in the mission

• Require data products to be returned to the archive

• Criteria for competitive peer review
  – Large, coherent projects, not reproducible by any reasonable number of combination of smaller GO programs
  – General and lasting importance to the broad astronomical community with the Spitzer observational data yielding a substantial and coherent database
  – Data public domain immediately upon processing and validation, thereby enabling timely follow-up
• 6 programs, 3160 hours selected in November 2000
  – Launch scheduled for 2001 when call for proposals issued, actual 2003

• Executed in first year of the mission
  – Half of the data in first year was non-proprietary

• Legacy programs solicited in Cycles 2-5
  – Continued with zero proprietary period and return of enhanced data products

• Legacy enhanced data products are some of the most popular data available in the archive
  – Same experience HST has with deep fields and Treasury programs
First Look Survey (FLS) was designed to provide data to the community that characterized the Spitzer sky

100 hours of Director’s Discretionary Time
- 3 components: extragalactic, galactic, asteroids
- Observations and field selection based on community input workshops
- Execution and data reduction done by the SSC

First observations executed in nominal operations
- After 60-day In-Orbit Check-out, 30-day Science Verification phases
- Early Release Observations primarily executed during IOC and SV
Second-Look Observations

- Spitzer cryogenic mission proposals allowed the inclusion of ‘second-look’ targets
  - Defined as something you could predict but you did not know the target positions
  - Used frequently with imaging surveys that proposed second-look spectroscopic observations
  - Did not have to wait for the next cycle to do spectroscopy on all of your targets
Other Observing Programs

- All other General and Guaranteed Time Observer programs had nominal one-year proprietary periods

- Many large programs waived the proprietary period (Legacy programs always zero)

- DDT programs have default zero proprietary period
  - Can request a maximum of 90-days
Warm Mission

- > 75% of the time awarded to > 500 hour programs
  - Default zero proprietary period, can request 90 days

- All other programs have default one-year proprietary periods
  - Many large (> 100 hour programs) waive the proprietary period or ask for a shorter period (90-180 days)
Landscape in 2003

- HST, Chandra, XMM operating
- GALEX launched in April
- Spitzer launched in August
- SWIFT, Fermi, Kepler, WISE, Herschel, Planck coming in the future
- JWST approved and planned for 2011 launch
• HST?, Chandra?, TESS operating

• HST, Spitzer, Chandra, Kepler, etc. will have provided substantial initial target lists for JWST

• At launch, JWST data reduction pipelines, tools, etc., should be much more mature leading to a faster turnaround in data observation-to-publication
The Spitzer project implemented innovative programs to provide data to the community early in the mission to maximize the overall science return.

Typical time period from observation to publication is 2-3 years, regardless of the proprietary period.

Need creative policies to address the conflicting drivers, provide reward to GTOs, get data out early and prime the follow-up cycle to accelerate and maximize the science.