The Spitzer Legacy Program

Lessons Learned

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Spitzer Legacy Principles

Fundamental Principles of (Spitzer) Legacy Science Program

Large coherent science investigations, not reproducible by any reasonable number or combination of smaller GO programs

Programs whose scientific data, upon archiving, are of general and lasting importance to the *broad community*

All raw and pipeline-processed data enter the public domain immediately, thereby enabling timely and effective opportunities for follow-on observations and for archival research

(From prelaunch legacy program guidelines – remains valid now)

A Little Bit of History

- Spitzer Legacy Projects originally created when lifetime was expected to be ~2.5 yrs
  - *Intended to address the concern of delivering adequate archival data to allow substantial research to be carried out beyond lifetime of cryo mission*
- Allowed substantial projects to be conducted by community groups
  - *Not limited to PI teams*
- Prelaunch Legacy Call
  - *3000 hrs (½ yr) of observing time allocated*
  - *6 projects selected - 3 galactic, 3 extragalactic*
    - C2D, FEPS, GLIMPSE, SINGS, SWIRE, GOODS
    - Projects well funded to allow teams to develop processing pipelines, turn data around rapidly & deliver “enhanced data products” back to SSC for distribution to community

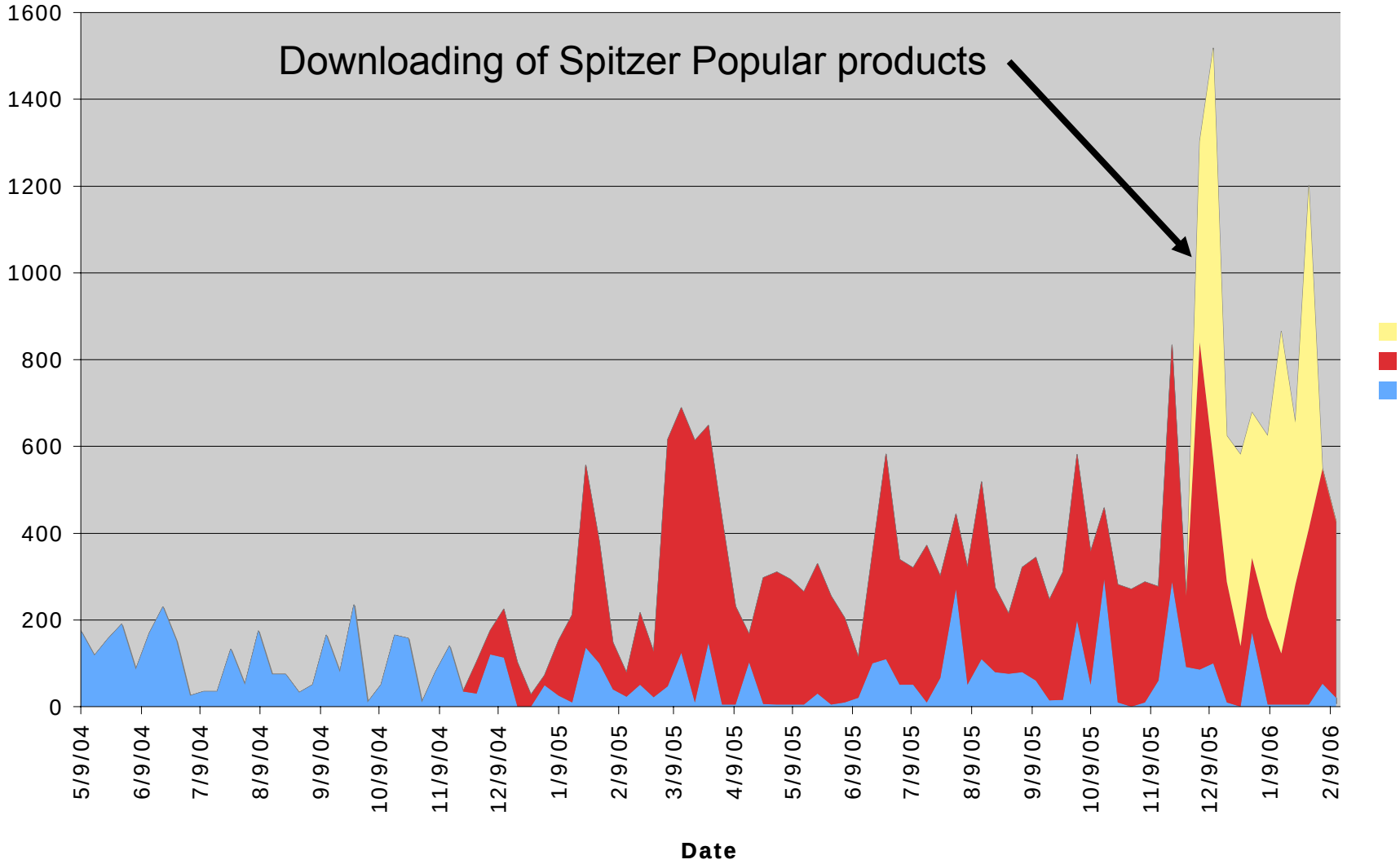
More History – Original Legacy Projects

- Delivering Data to / from Teams
  - *Early in mission we provided test observations to Legacy teams for them to validate their observing strategies, data processing pipelines*
  - *Data delivered to Legacy teams as beta testers of Spitzer SSC pipelines*
  - *Teams began delivering data products back to SSC ~1 yr after first observations, have continued to deliver products on ~6 month centers*
    - SSC verifies formats, serves data to astronomical community through IRSA
- Ancillary Data Aspects
  - *Spitzer had arrangement with NOAO for observing time to be awarded on NOAO telescopes as part of Legacy projects*
  - *Teams gathered other data as part of projects*
    - Major component in selection
    - Delivery of ancillary data to community (through SSC or separate Web site) was important part of pact between team and community

Yet More History

- Doing Science with Legacy Data
  - *Legacy Teams well funded to do science as well as deliver data*
    - Recognition that motivation is doing the science
    - Attracted outstanding teams to participate
    - Best way to understand the quality of the data is to use it to do science
  - *Community usage of Legacy data*
    - Best metric so far is volume of “popular products”

Data Archive - Gb / Week



Post Launch Legacy Selection

- In Cycle 1 & 2 (post launch Spitzer Calls for Proposals) no Legacy projects were solicited
- In both TACs projects were selected that shared the attributes of Legacy projects
  - *No instructions to select such projects*
  - *TACs were motivated by perceived value to community of such large, coherent datasets collected and made available on a non-proprietary basis to the astronomical community*

    => TACS LIKE LEGACY PROJECTS
  - *Cycle 2 TAC told us to codify this next time around*
  - *In Cycle 3 we explicitly called for Legacy projects*
    - Substantial demand for such projects
    - TAC looked carefully at content of data, asked is this really legacy data
    - 4/5 large projects selected (>200 hrs) were legacy projects
  - *In Cycle 2 &3 combined ~3500 hrs allocated to Legacy projects*
    - ~30% of time available
    - ~50% of time allocated to medium & large projects (legacy or not)

The Post Launch Legacy Projects

- Cycle 1
  - *Taurus Map (IRAC, MIPS) – D. Padgett**
  - *Imaging of LIRGS in Local Universe (IRAC, MIPS) – J. Mazzarella*
- Cycle 2
  - *SAGE (MIPS, IRAC Imaging of LMC) – M. Meixner*
  - *SCosmos (IRAC, MIPS Imaging of COSMOS Field) – D. Sanders**
  - *MIPSGAL (24, 70um Imaging of GLIMPSE area) – S. Carey**
  - *GLIMPSE 2 (IRAC coverage of inner 20 deg of galaxy) – E. Churchwell*
  - *GEMS (IRAC imaging of extended area around CDF-S) – van Dokkum*
- Cycle 3
  - *CDFS & Ext. Groth Strip (MIPS Deep) – Dickinson*
  - *GLIMPSE 3-d (IRAC imaging – gal. structure) – R. Benjamin*
  - *Gould's Belt (IRAC, MIPS imaging) – L. Allen*
  - *Spectroscopic Survey of LIRGS – L. Armus*
  - *Spitzer Sloan Galex Spectroscopic Survey – D. Schiminovich*

  **continuation in cycle 3*

There's a message here – TACs like imaging surveys as Legacy projects much more than spectroscopic surveys

What's in it for Team?

- Advantages for Successful Teams
  - *Science definition of large amount of Spitzer observing time*
  - *Resources to do science while processing data for delivery back to SSC*
  - *Opportunity to provide scientific leadership in important areas*
- Disadvantages for Successful Team
  - *Real commitment to do "community service"*
  - *While the team is processing data for delivery, others can grab public data and do science*

What's in it for Community?

- Advantages for Science Community
  - *Important projects executed with opportunity to do research with well characterized datasets*
  - *Raw data immediately available for eager users*
  - *No commitment of time to create datasets*
- Disadvantages for community
  - *Someone else gets to define, execute project*
  - *Funding for doing the work goes to executing team*
    - There is Spitzer archival research funding

Summary of Spitzer Legacy Program

- Spitzer Legacy program is successful
  - *Addresses important science objectives*
  - *Provides substantial data for archival research for astronomical community,*
  - *Enables superb science by PI & archival user teams*

Lessons I've Learned

- Large project ≠ Legacy project & visa versa
  - *Understanding what the program goals are is essential as a starting point for embarking on such an effort*
    - Why are you doing it?
      - *What are the objectives for the science community?*
      - *What are the objectives for the selected investigators?*
  - *If not done right, could lead to major disappointments*
- Science is not a socialist enterprise
  - *For Legacy programs to work there must be clear, tangible benefits for outstanding scientists to participate*
    - Don't rely on the altruistic nature of our colleagues
    - Provide strong science opportunities (lots of telescope time, $)
  - *There must be clear, tangible benefits for science community to give up major resources (Telescope time, $) to individual groups*
    - No proprietary data is essential
    - Projects must provide data that is of substantially broader utility than the science interests of the executing group
    - Providing useful, higher level data products gives community reason to allow big chunks of telescope time to be carved out
- Legacy programs don't come for free
  - *Need to be properly funded to succeed*