Galaxy Evolution Explorer
Postcards from a PM

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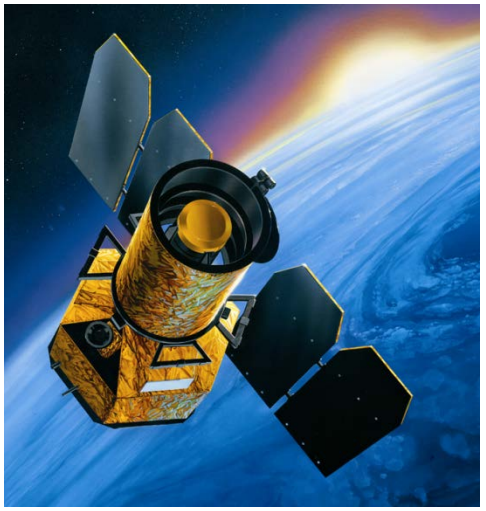
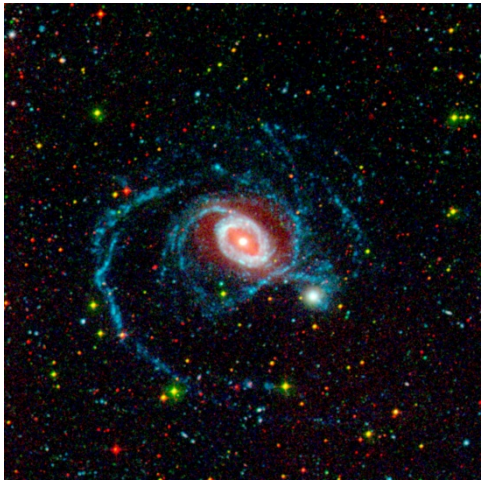
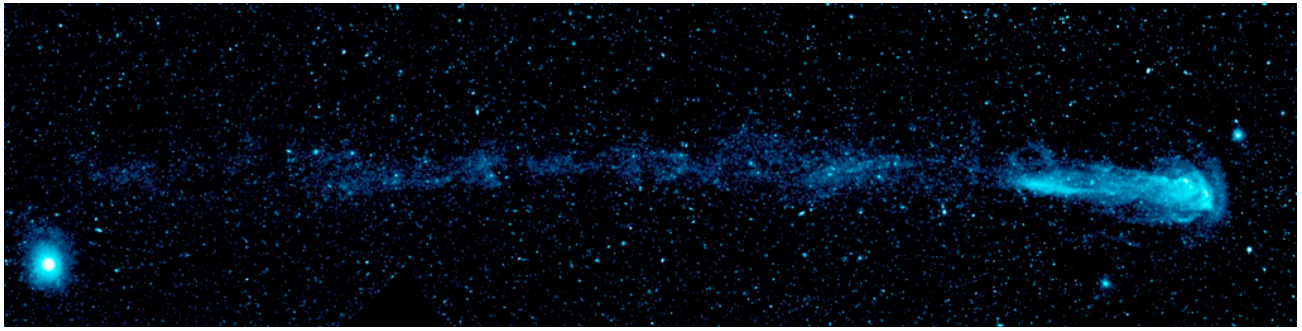
Small Missions Can Produce Remarkable Science

- Galaxy Evolution Explorer is a space telescope that performed the first wide-area ultraviolet imaging and spectroscopic surveys of the heavens
- Primary mission: map the history of star formation over 80% of the age of the Universe
- Developed in six years for $72M (sans rocket)
- Launched 28 Mar 2003 on a 28 month mission
- Flew largest detectors of their kind







Small Missions Present Special Challenges and Opportunities

- Small ≠ Easy
  - *Difficulty = Challenge/Resources*
  - *Requires vigilance to remain focused and avoid requirements creep*
- Small does mean there is no place to hide
  - *Reserves smaller in absolute terms*
  - *More susceptible to forces beyond Project's control*
  - *Demand A-Team players (remove low performers quickly)*
  - *Staff with broadband individuals; use specialists as needed*
  - *Premium on proactive problem solving*
- Small offers some advantages
  - *PM is closer to technical work*
  - *PM has better visibility across the whole activity*
  - *Can more easily fly under the bureaucratic radar*

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Postcards from a PM

- Five things to get right during formulation
  1. *Organization*
     - Strong individuals & institutions with clear authority and accountability
     - PI/PM relationship must be strong and trusting
     - Project Systems Engineer must be broadband and understand science req.
  2. *Work Breakdown Structure (WBS)*
     - Product oriented with clear deliverables and responsibility assignments
  3. *Requirements*
     - Be realistic, keeping requirements focused, achievable, and verifiable
     - Need ample performance margins and useful descopes
  4. *Schedule*
     - Protect key deliverables with ample funded schedule reserve (FSR)
     - Understand key dependencies and critical path
  5. *Budget*
     - Have ample cost reserves (separate from FSR)
     - Profile conservatively (especially with reserves)

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Postcards from a PM

- Five things to get right during <u>implementation</u>
  1. *Management Controls*
     - Have good metrics to show performance against plan
     - Manage to life cycle cost and recommend descopes to PI if needed
  2. *Risk Management*
     - Sweep for risks across the team but triage them to manageable size
  3. *Systems Engineering*
     - Always have a baseline and resist make-better changes
     - Verify by test if possible and be sure test data is thoroughly reviewed
  4. *Communication and Reviews*
     - Keep team and stakeholders informed
     - Record agreements and decisions in writing
     - Reward those who identify mistakes; celebrate successes
     - Emphasize penetrating peer-to-peer reviews; avoid PowerPoint parades
  5. *Safety & Mission Assurance (SMA)*
     - Find cost effective ways to meet the intent of SMA requirements

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Postcards from a PM

- Things to keep in mind:
  - *Some members of the science team are good engineers; use them!*
  - *Scaling existing technology is often riskier than it appears*
  - *Inheritance and reuse are usually exaggerated*
  - *Descopes are often invoked too late*
  - *"Every box needs a mother, or it becomes one"*
  - *Risk acceptance of stakeholders diminishes monotonically over time*
  - *It's difficult to buy down risk after the fact*
  - *If performance can't be verified by test it should be verified by more than one analytical approach; beware of test-like-you-fly exceptions*
  - *Ensure that subsystem Cogs and scientists review test data*
  - *Get to the root cause of anomalies*
  - *Pay attention to validation as well as verification*
  - *Make decisions in a timely manner*
  - *When in doubt take the path of least regret*