Spacelab, Science, and Human Space Flight – Retrospective Observations

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Spacelab Scenario – 1970’s to 1980’s

• Nixon administration approved Shuttle, but…
• ESA agreed to participate – two agendas (sales and experience)
• Early expectations for:
  – flight rate vs. later realities
  – utilization practices vs. later realities
  – flight program start vs. later realities
• Learning how to use Spacelab
  – Too much, too early?
  – Finding the balance between force fitting and exploiting
• Finding the balance between protecting the infrastructure and flying experiments
  – Helping the PI be successful vs. protecting the “system” from the PI
• Funding the infrastructure vs funding the “payoff”
Spacelab in the Smithsonian
Shuttle Radar Laboratory

- Spaceborne Imaging Radar – A (SIR-A) on STS-2  Nov, 1981
- SIR-B on STS-41G  Oct, 1984
- SIR-C / X-SAR on STS-59 and STS-68  April/Oct, 1994
- Shuttle Topography Radar Mission (SRTM) on STS-99  Feb, 2000
Shuttle Imaging Radar-A (SIR-A), 1981

SIR-A image of Sudanese desert superimposed on visual image showing buried river channels
Shuttle Imaging Radar-C / X-band Synthetic Aperture Radar (SIR-C/X-SAR)

Flew on two shuttle flights in 1994

Forest cover and geology of Lozere Department, France with Gorges du Tarn. Composite of two X-band images from different seasons.

Death Valley, California
Shuttle Radar Topography Mission (SRTM)

- Mapped 80% of Earth
- 30 m horizontal data points
- 10 m vertical accuracy

3-dimensional SRTM view of Los Angeles (with Landsat data) showing San Andreas fault

SRTM image of Yucatan showing Chicxulub Crater, site of K-T extinction impact

Landsat image showing Merida
SRTM Outboard Antenna in the Smithsonian
SRTM Global Production

- Map showing topographic data generated by the SRTM mission.
  1.5 tera points of topographic reference elements
So What Do We Learn From This?

- Early expectations can be misleading
- Those who are successful using the elements of Human Space Flight Systems:
  - Understand the systems technically and socially
  - Develop systems that:
    - Are maximally self-reliant
    - Leverage and respect the presence of humans
    - Leverage the capabilities of the HSF transportation Infrastructure
- Exploiting the HSF capabilities requires timing, tenacity and agility
  - Let the systems mature before dipping in too deeply
  - Most elements are highly schedule and functionally interdependent
- Potential for payoff is huge