

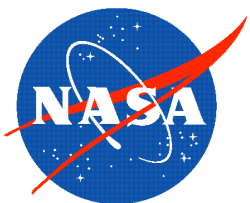
## *NASA Balloon Program*

# **NASA Balloon Working Group**

June 30, 2003

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820/Balloon Program Office  
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757-824-1453

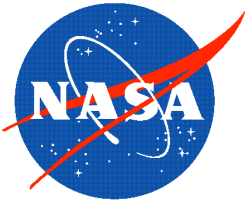




## NASA Balloon Program

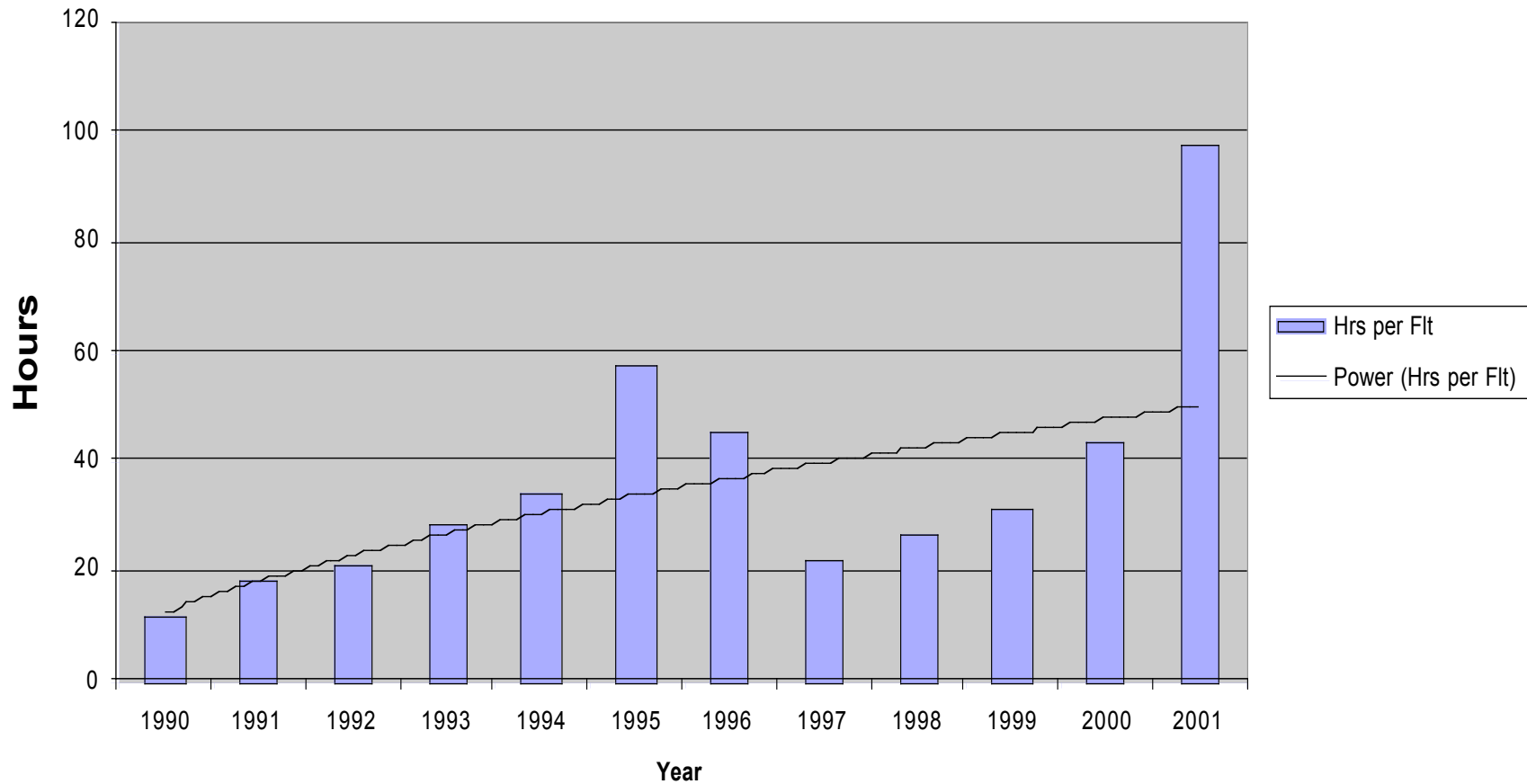
# Annual Number of Balloon Missions By Science Disciplines

Discipline	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02
IR/Sub-mm Astrophysics	2	3	2	4	4	2	2	1	2	2
Particle Astrophysics	4	6	6	3	6	7	5	7	4	4
High Energy Astrophysics	4	4	2	8	3	4	2	4	3	0
Geospace Sciences	8	3	0	0	0	0	3	0	0	0
Solar & Heliosphere	3	2	0	2	1	1	0	1	0	3
Special Projects	0	0	3	2	5	2	2	2	2	3
Test Flight	4	1	2	1	2	3	2	3	4	2
Upper Atmosphere Research	9	3	1	5	5	6	0	6	0	0
<b>Year Total</b>	<b>34</b>	<b>22</b>	<b>16</b>	<b>25</b>	<b>26</b>	<b>25</b>	<b>16</b>	<b>24</b>	<b>15</b>	<b>14</b>

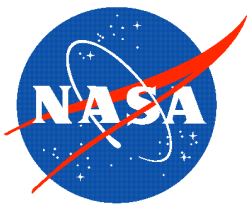


# NASA Balloon Program

## Average Hours Per Flight (Calendar Year)





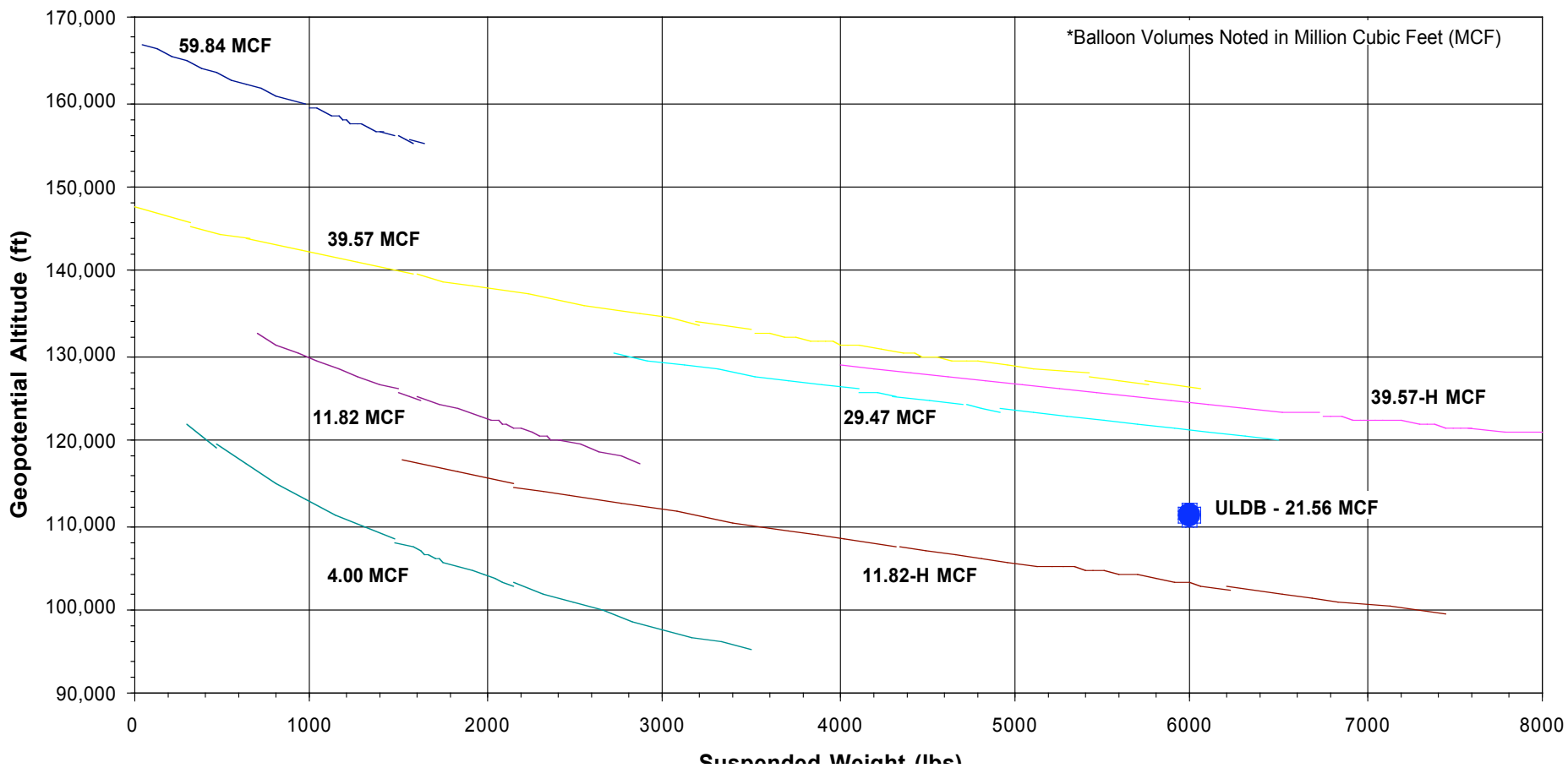


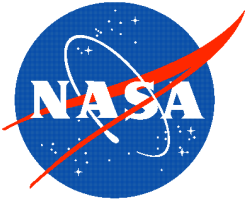
# NASA Balloon Program

## Balloon Load Altitude Curves

### Suspended Load vs. Altitude Capabilities

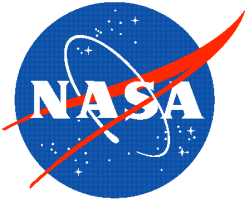
Based on 1962 Standard Atmosphere





## *NASA Balloon Program*

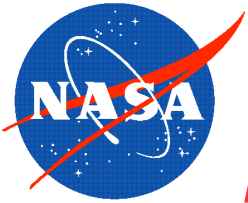
# *Program Enhancements*



## ***NASA Balloon Program***

### ***Enhancements***

- **Flight safety criteria**
  - Being standardized across test ranges
  - New CE values/approvals defined
  - Balloons, in particular adopting a more “real time” approach to missions
- **Auto-chute cutaway**
  - Has been undergoing flight testing for past 2 yrs
  - 2 flight tests to be flown “hot”
  - Pending results, will go “operational”



# NASA Balloon Program

## Extended Observation Times : TIGER 2001

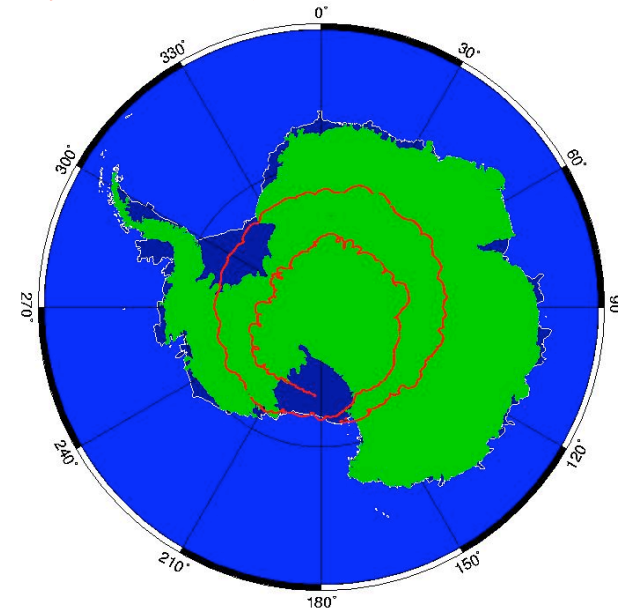


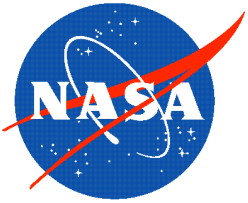
TIGER ready to launch 12/20/01 (31 days, 20 hrs)

McMurdo, Antarctica

### Science

- Elemental composition of cosmic rays  
 $Z = 10$  to  $40$
- First  $Z > 30$  measurement with resolution and statistics to resolve rarer odd- $Z$  elements
- Relative abundances distinguish between source of CR nuclei in sputtering off of accelerated interstellar grains vs. in stellar atmospheres around  $10,000$  °K.





## **NASA Balloon Program**

### ***The “Big 60” – A New NASA Balloon***

**The “Big 60”, a 60 million cubic foot balloon, was designed and built in response to a science need to reach a higher altitude than obtainable with current NASA standard balloons. The thin co-extruded film used was a spin-off from the ULDB development.**

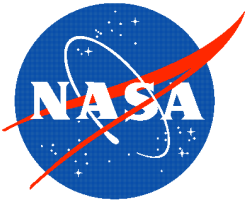
#### **Flight Specifications**

**Launch Site: Lynn Lake, CA**  
**Launch Date: 8-26-02**  
**Float Altitude: 160.3 kft (GPS)**  
**Flight Time: 22 h, 22m**  
**Suspended Wt: 1546 lbs**  
**Science Wt: 452 lbs**

#### **Balloon Specifications**

**Volume: 1.69 MCM (59.84 MCF)**  
**Gore Length: 228.6 m (750.14 ft)**  
**# of Gores: 202**  
**Shell: 10 \_m (0.4 mil)**  
**Cap: 13 \_m x 2 (0.52 mil x 2)**  
**Balloon Wt: 1248.3 kg (2752 lbs)**

***Opens a new capability for the soft x-ray and ultra-violet astronomy community***

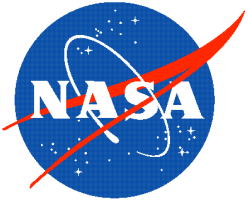


## **NASA Balloon Program** ***New Polar/Antarctica Launch Vehicle***

- New Antarctica launch vehicle.
- Shipped this past winter & ready for Dec. 2003.
- Increased launch capability. (2038 kgs suspended payload increased to 3623 kgs.)



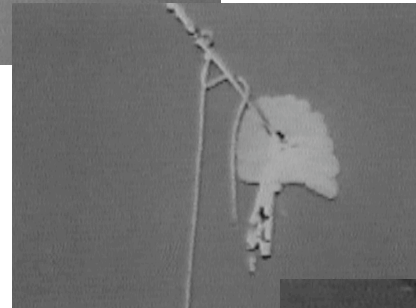
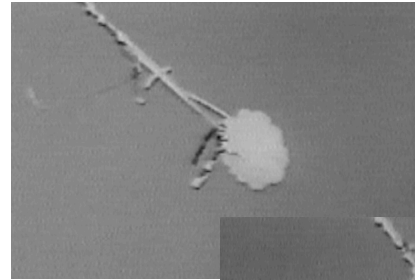


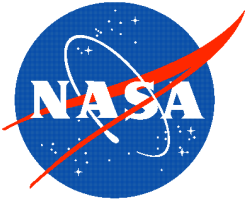


## *NASA Balloon Program*

### *Planetary Balloon Technology*

- Three Stratospheric deployment and inflation tests of prototype Mars balloons were conducted from Hawaii in June 2002.
- **First successful** Mars class balloon (pumpkin) stratospheric deployment & inflation test



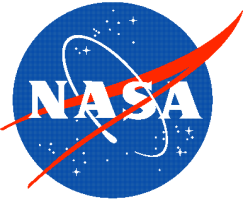


## ***NASA Balloon Program***

### ***Programmatic Issues:***

- **Antarctic facilities budgetary impact**
- **NPG 8621.1a flight program impact**
- **ULDB Vehicle development impact (will be discussed separately)**

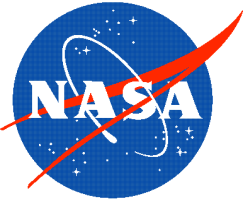




## ***NASA Balloon Program***

### ***Antarctica Facilities Budget Impact***

- Major impact: Antarctic facilities (\$3M-\$5M)
  - 3-option plan submitted to HQ
  - Option 1: \$5M total from w/in guideline in FY'04
  - Option 2: \$5M from w/in guideline scheduled over 3 yrs (FY'04-FY'06)
  - Option 3: FY 04 augmentation (\$5M) w/ \$1M/yr payback (FY'04-FY'08)

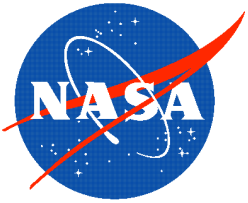


## **NASA Balloon Program**

### **Antarctica Facilities Budget Impact (cont'd)**

#### ➤ Impacts

- Option 1: cancellation of all FY 04 flight activity except 2 flights in Antarctica or 8 conventional flights conducted from Palestine, TX or Fort Sumner, NM & cancellation of most of technology development.
- Option 2: cancellation of 2 remote campaigns/yr for 3 yrs, or cancellation of 6-8 conventional flts/yr; possible increase of construction costs, possible loss of Antarctic flights for 2 yrs, reduced technology development.
- Option 3: cancellation of 1 remote campaign/yr or cancellation of 3-5 conventional flts/yr & reduced technology development over the duration of the pay back



## **NASA Balloon Program**

### ***Impact of NPG 8621.1A (Mishap Reporting, Investigating, & Recordkeeping)***

- Exemption for Balloons & Sounding Rockets Programs *removed* for mission losses/property damage
- Types
  - A: >\$1M
  - B: \$250K-\$1M
  - C: \$25K-\$250K
  - D: \$1K-\$25K
- Possible Impacts
  - May have to form an investigation for nearly every mission
  - May change the way we do business
  - Additional staff impacts
  - Possible schedule delays