



CCMC Workshop  
January 25, 2010  
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NASA HQ



# NASA's Strategic Goals

## **U.S. Space Exploration Policy**

To advance U.S. scientific, security, and economic interests through a robust space exploration program

## **NASA's Mission**

To pioneer the future in space exploration, scientific discovery, and aeronautics research

## **Strategic Goals in SMD's 4 Major Science Areas**

- Study Earth from space to advance scientific understanding and meet societal needs. (Earth Science)
- Understand the Sun and its effects on Earth and the solar system. (Heliophysics)
- Advance scientific knowledge of the origin and history of the solar system, the potential for life elsewhere, and the hazards and resources present as humans explore space. (Planetary Science)
- Discover the origin, structure, evolution, and destiny of the universe, and search for Earth-like planets. (Astrophysics)

# Strategic Missions

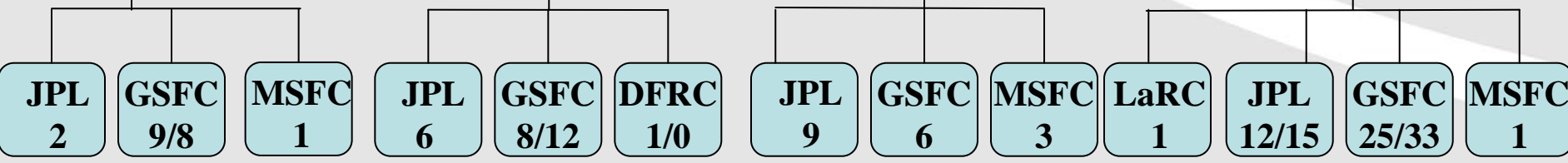
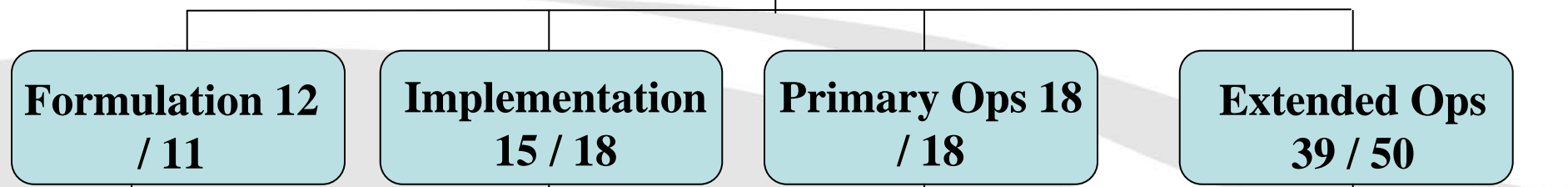


- **Missions prioritized by NRC decadal surveys; often multi-decade projects**
- **Lead Center assigned to manage each project**
- **International partner contributions negotiated by NASA Headquarters**
- **Science requirements set by community-based Science Definition Team**
- **Instrument investigations selected by AO**
- **Often have competitive opportunities for broadened community participation**
  - Science teams
  - Participating scientists
  - Interdisciplinary scientists
  - Data analysis funding

- **Basic and applied research**
  - All areas of SMD science
  - Data analysis, field campaigns, theory, computing, basic technology, mission concepts, etc.
  - Complete suborbital investigations using sounding rockets, scientific balloons, airborne campaigns
- **Emphasizes NASA relevance**
  - Must further NASA's strategic goals and objectives in science
  - Must require use of space
  - Distinguishes NASA from NSF, DOE, etc.
- **Common mechanisms**
  - Competitive grants via ROSES
  - Open to universities, industry, NASA Centers, other Government agencies
- **Yearly investment totals about \$600 million**

# Total Missions / Spacecraft

## 84 / 97



- |               |                       |              |                 |             |                   |                 |              |                     |                |                     |                 |                |
|---------------|-----------------------|--------------|-----------------|-------------|-------------------|-----------------|--------------|---------------------|----------------|---------------------|-----------------|----------------|
| <b>NuSTAR</b> | <b>LDCM</b>           | <b>LADEE</b> | <b>WISE</b>     | <b>JWST</b> | <b>SOFIA(1/0)</b> | <i>Herschel</i> | <b>Fermi</b> | <i>Hinode</i>       | <b>CALIPSO</b> | <b>GALEX</b>        | <b>HST</b>      | <b>Chandra</b> |
| SMAP          | GPM                   |              | ST-7            | GOES-P      |                   | <i>Planck</i>   | Aura         | <b>MESSENGER</b>    |                | Cloudsat            | <i>Suzaku</i>   |                |
|               | GPM LIO               |              | <i>Aquarius</i> | Glory       |                   | <i>Spitzer</i>  | TWINS-A      | <i>New Horizons</i> |                | ACRIMsat            | <i>Integral</i> |                |
|               | <b>BARREL (1/0)</b>   |              | <b>MSL</b>      | NPP         |                   | <b>Kepler</b>   | CINDI        |                     |                | GRACE (2)           | <b>RXTE</b>     |                |
|               | <b>IRIS</b>           |              | <b>JUNO</b>     | SDO         |                   | OSTM            | TWINS-B      |                     |                | Jason-1             | <b>WMAP</b>     |                |
|               | <i>Solar Orbiter</i>  |              | <b>GRAIL</b>    | SET-1       |                   | <i>Rosetta</i>  | IBEX         |                     |                | QuikSCAT            | <b>XMM</b>      |                |
|               | <b>GEMS</b>           |              |                 | RBSP (2)    |                   | <b>DAWN</b>     |              |                     |                | Voyager (2)         | <b>SWIFT</b>    |                |
|               | <i>Astro H (NEXT)</i> |              |                 | MMS (4)     |                   | <b>EPOXI*</b>   |              |                     |                | <i>Mars Express</i> | Aqua            |                |
|               | <b>MAVEN</b>          |              |                 |             |                   | <b>NEXT*</b>    |              |                     |                | <i>Mars Odyssey</i> | SORCE           |                |
|               |                       |              |                 |             |                   |                 |              |                     |                | <b>MER (2)</b>      | EO-1            |                |
|               |                       |              |                 |             |                   |                 |              |                     |                | <i>Cassini</i>      | ICESat          |                |
|               |                       |              |                 |             |                   |                 |              |                     |                | <b>MRO</b>          | Terra           |                |

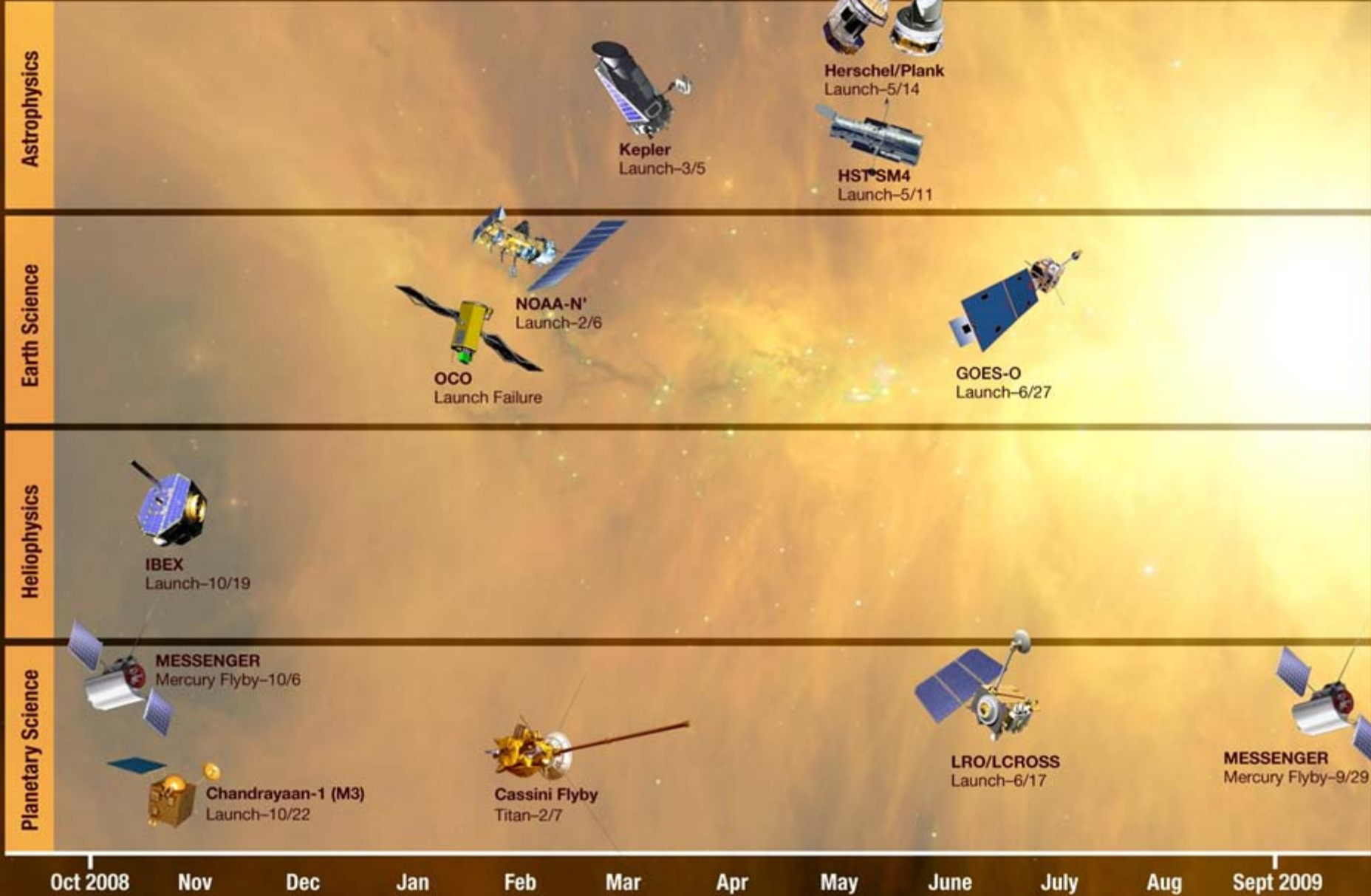
***In concept development:***  
**JDEM, SIM-Lite, LISA, Con-X, Mars 2016/ExoMars, ILN, OPF, ICESat-II, Solar Probe +**

**RHESSI SOHO**  
**TIMED TRACE**  
**WIND ACE**  
**GEOTAIL**

- STEREO (2)  
 AIM 5  
 Cluster-2 (4)

HST-SM4, SOFIA and BARREL are mission projects but do not add spacecraft  
*Italics* = US instruments on foreign mission  
 X / Y = # of missions / # of spacecraft  
 \* New missions for Deep Impact and Stardust, respectively  
 ~ Operated by USGS

# SMD Missions Current/Past 12 Months



# SMD Missions Next 12 Months

Astrophysics



**WISE**  
Launch-NET Dec



**SOFIA Early Science**  
Launch-NET March

Earth Science



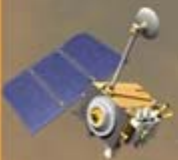
**Aquarius**  
Launch-NET May

Heliophysics



**SDO**  
Launch-NET Feb

Planetary Science



**LRO/LCROSS**  
Impact-10/9

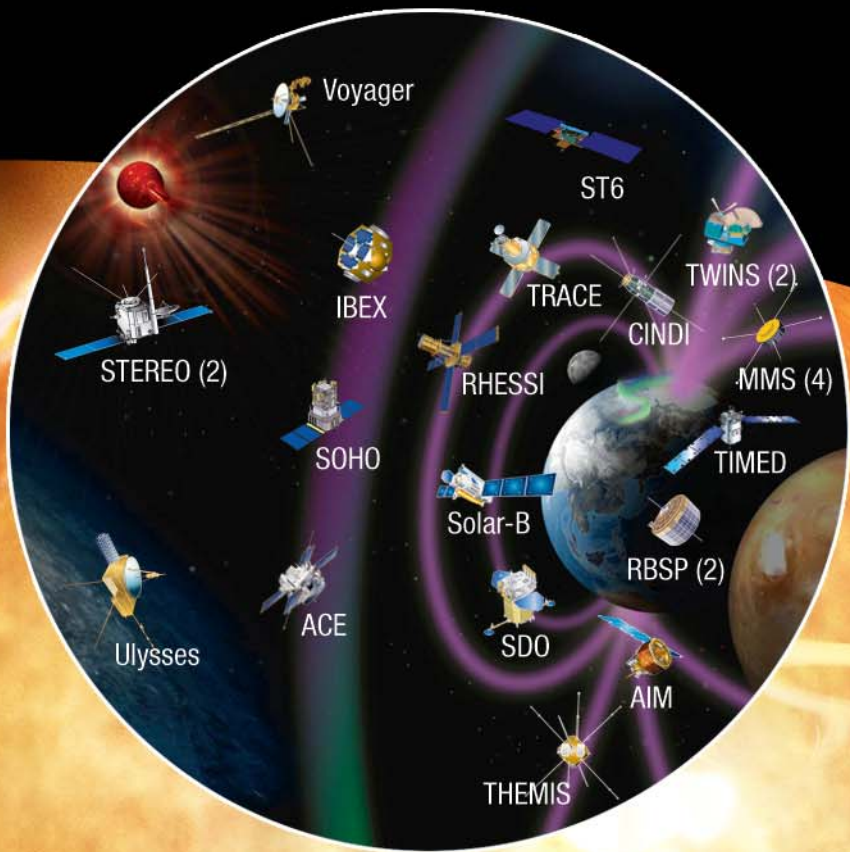
Oct 2009    Nov    Dec    Jan    Feb    Mar    Apr    May    June    July    Aug    Sept 2010

# Heliophysics

**How and why does the Sun vary?**

**How do the Earth and planetary systems respond?**

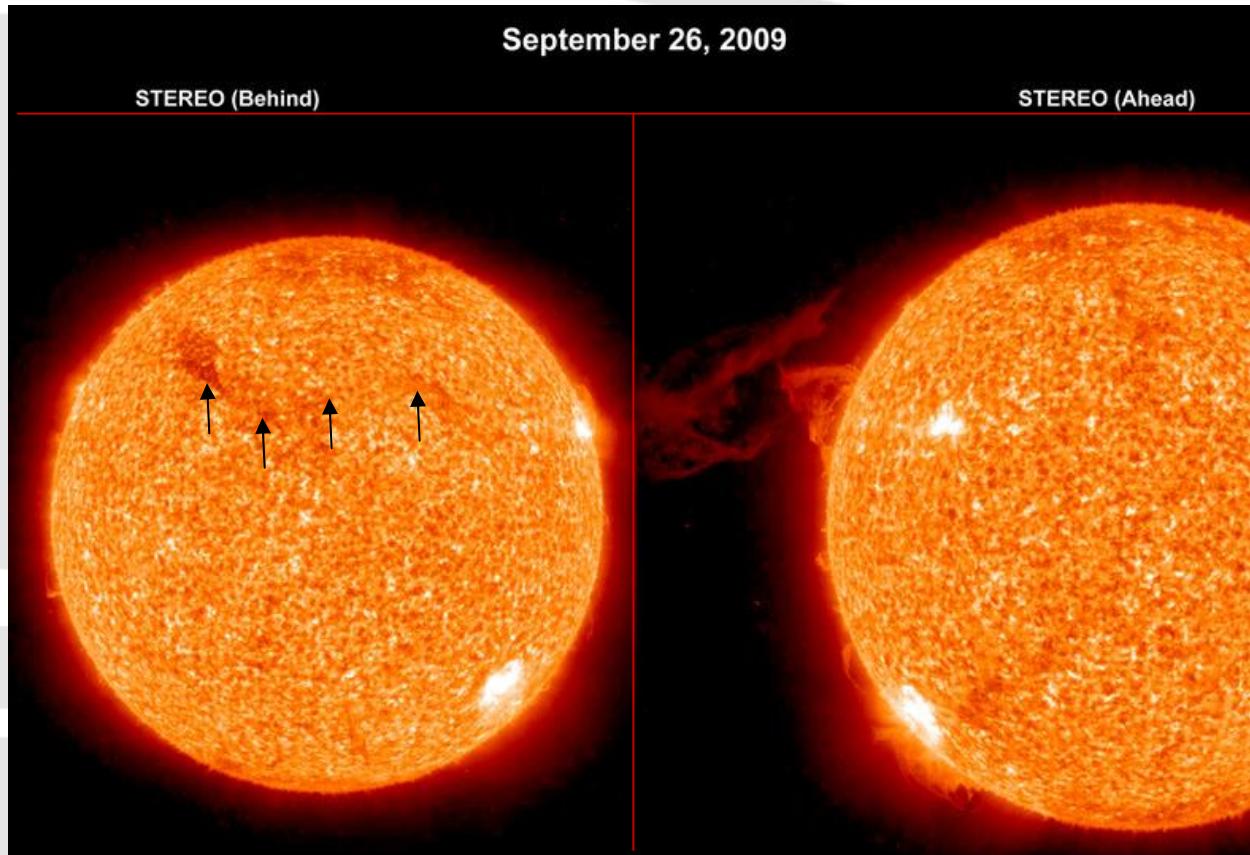
**What are the impacts on humanity?**







# STEREO Observes Large Solar Prominence



*From the "Behind" spacecraft, the long filament, darker than the Sun's surface, can be seen rising up and then breaking away, spreading out above most of the Sun's surface.*

*As seen from the "Ahead" spacecraft, the filament is seen in profile and so is called a prominence.*

Image: STEREO, NASA

The twin STEREO spacecraft, now almost 120 degrees apart, captured this large and dramatic prominence eruption over a 30-hour period on Sept. 26-27, 2009. Prominences, called filaments when they are viewed against the surface of the Sun, are clouds of cooler gas suspended above the Sun's surface by magnetic fields. This is one of the **first times** that a prominence has been sufficiently large that **both spacecraft** have been able to observe it for hours on end.

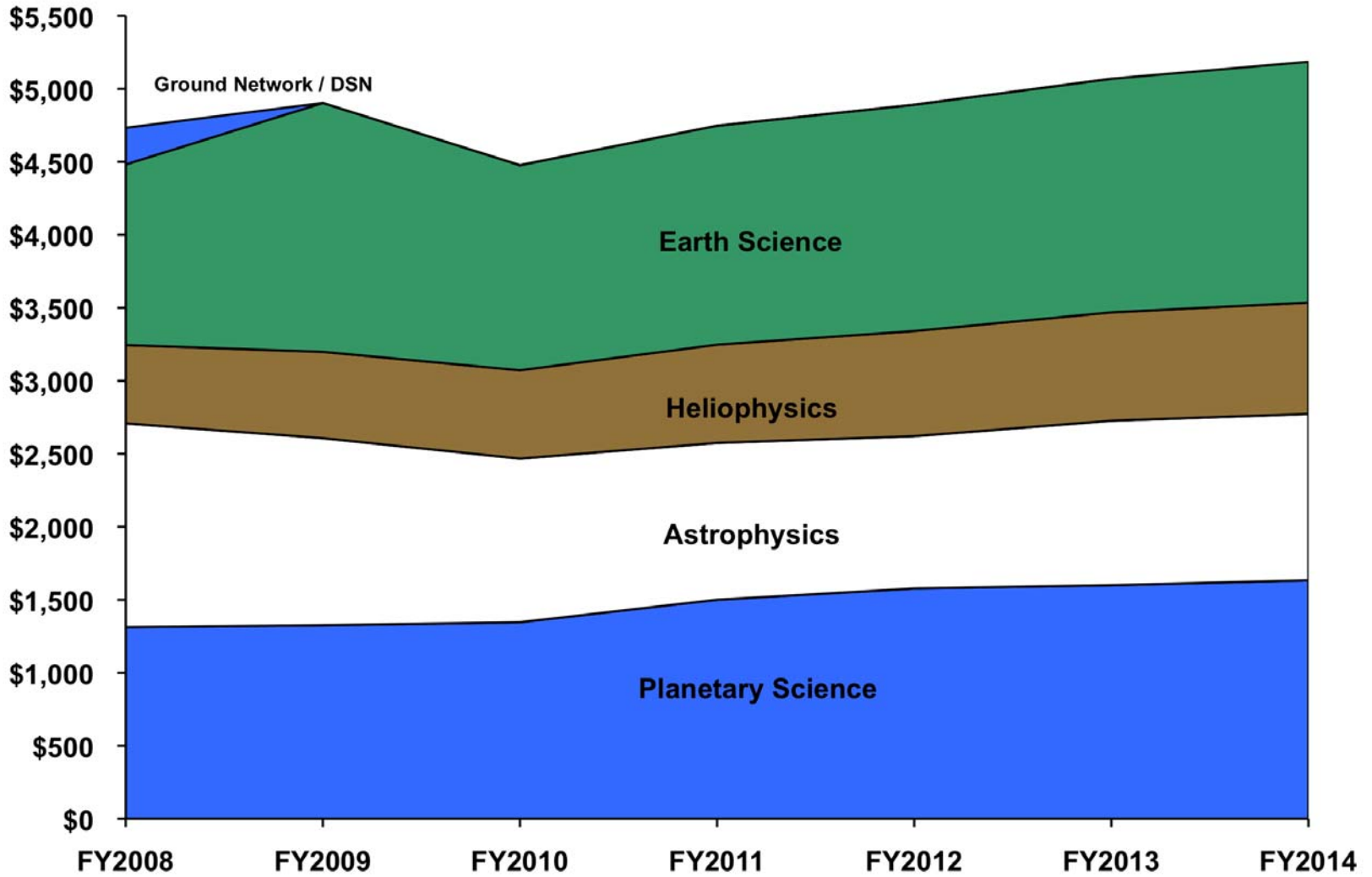
**This is one of the most spectacular events that the STEREO mission has observed!**



# NASA FY10 Budget Overview

	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
<b>Science</b>	<b><u>\$4,733.2</u></b>	<b><u>\$4,903.0</u></b>	<b><u>\$4,477.2</u></b>	<b><u>\$4,747.4</u></b>	<b><u>\$4,890.9</u></b>	<b><u>\$5,069.0</u></b>	<b><u>\$5,185.4</u></b>
Earth Science	\$1,237.4	\$1,704.6	\$1,405.0	\$1,500.0	\$1,550.0	\$1,600.0	\$1,650.0
Planetary Science	\$1,312.6	\$1,325.6	\$1,346.2	\$1,500.6	\$1,577.7	\$1,600.0	\$1,633.2
Astrophysics	\$1,395.6	\$1,281.2	\$1,120.9	\$1,074.1	\$1,042.7	\$1,126.3	\$1,139.6
Heliophysics	\$536.4	\$591.6	\$605.0	\$672.6	\$720.5	\$742.7	\$762.6
Ground Network / DSN	\$251.2						
* FY2009 is Enacted Budget. Does not reflect current planning.							

# SMD FY2010 Budget by Science Theme



# Heliophysics Program Content




	FY09	FY10	FY11	FY12	FY13	FY14
<b>FY10 President Submit</b>	<b>591.6</b>	<b>605.0</b>	<b>672.6</b>	<b>720.5</b>	<b>742.7</b>	<b>762.6</b>
<b>Living with a Star</b>	<b>238.6</b>	<b>212.2</b>	<b>204.6</b>	<b>208.7</b>	<b>230.0</b>	<b>236.6</b>
SDO	20.8	34.1	20.2	18.6	16.3	15.6
RBSP	154.4	137.1	127.9	105.1	22.0	17.3
Science / Testbeds	23.6	20.9	21.4	21.0	21.6	22.1
Solar Probe Plus	18.0	4.0	16.6	36.7	57.8	81.3
Solar Orbiter Collaboration	6.3	8.8	10.7	20.4	91.2	78.2
BARREL / Future / Management	15.5	7.3	7.7	6.9	21.2	22.0
<b>Solar Terrestrial Probes</b>	<b>123.1</b>	<b>143.0</b>	<b>169.1</b>	<b>170.6</b>	<b>160.8</b>	<b>164.3</b>
MMS	94.6	118.6	149.3	148.8	137.5	143.8
STEREO, Hinode	25.5	23.1	18.0	18.0	18.0	18.4
Future / Management	2.9	1.3	1.8	3.8	5.3	2.1
<b>Heliophysics Explorers</b>	<b>31.4</b>	<b>69.4</b>	<b>119.7</b>	<b>158.1</b>	<b>161.3</b>	<b>167.4</b>
IBEX	9.5	6.9	4.5	4.0	4.0	4.0
GOLD	0.5	0.5	10.6	10.9	6.7	0.9
AIM / THEMIS / TWINS / CINDI	8.4	13.5	13.1	12.0	10.0	9.1
Future / Management	13.1	48.5	91.5	131.2	140.6	153.4
<b>Heliophysics Research</b>	<b>195.9</b>	<b>178.6</b>	<b>178.1</b>	<b>183.1</b>	<b>190.6</b>	<b>194.3</b>
R&A	31.0	35.4	38.4	39.1	40.1	41.1
Operating Missions / Data / Modeling	75.2	66.7	65.1	67.9	71.8	72.8
Sounding Rockets	45.1	47.3	48.9	49.7	51.8	53.0
Research Range	32.3	19.2	18.6	19.2	19.6	20.1
GSFC Building / SMD Administrative	12.2	10.1	7.1	7.2	7.3	7.4
<b>New Millenium</b>	<b>2.7</b>	<b>1.8</b>	<b>1.1</b>			


# Program Assessment




(\*) Extended Mission End Dates subject to upcoming Senior Reviews

Mission	Launch	Phase	Extension to (*)	July	Aug	Sept	Oct	Remarks
Geotail	7/24/92	Extended	9/30/2010					
TRACE	4/01/98	Extended	10/1/2009					
STEREO	10/25/06	Extended	9/30/ 2012					EoPM review held 11/24.
THEMIS	2/17/07	Extended	9/30/2012					EoPM review held 11/19.
AIM	4/25/07	Extended	9/30/ 2012					EoPM review held 11/17.
Hinode	9/23/06	Extended	9/30/ 2012					EoPM review scheduled for 1/11/2010.
Cluster	7/16/00	Extended	9/30/2010					
ACE	8/27/97	Extended	9/30/2012					RTSW beacon off 11/24; recovered 11/25.
RHESSI	2/05/02	Extended	9/30/ 2012					
SOHO	12/02/95	Extended	9/30/2012					
TIMED	12/07/01	Extended	9/30/2012					Safehold 12/1 due to moon in ST; recovered 12/4.
Voyager 1 + 2	8/20/77	Extended	9/30/ 2012					
TWINS A + B	6/06 & 3/08	Prime	5/20/2010					
CINDI:C/NOFS	4/16/08	Prime	8/01/2010					
IBEX	10/19/08	Prime	10/19/2010					
Wind	11/01/94	Extended	9/30/2012					
(*) Extended mission end dates subject to upcoming Senior Reviews								

 Mission proceeding to meet science requirements

 Area of concern - possible reduction in capability

 Significant problem - possible or probable loss of mission