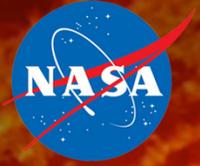


National Aeronautics and Space Administration



Heliophysics

Space Weather Enterprise Forum
June 4, 2013
Victoria Elsbernd, Heliophysics Division
Acting Director, NASA Headquarters

Heliophysics Objectives and Programs

Strategic Objective: Understand the sun and its interactions with Earth and the solar system



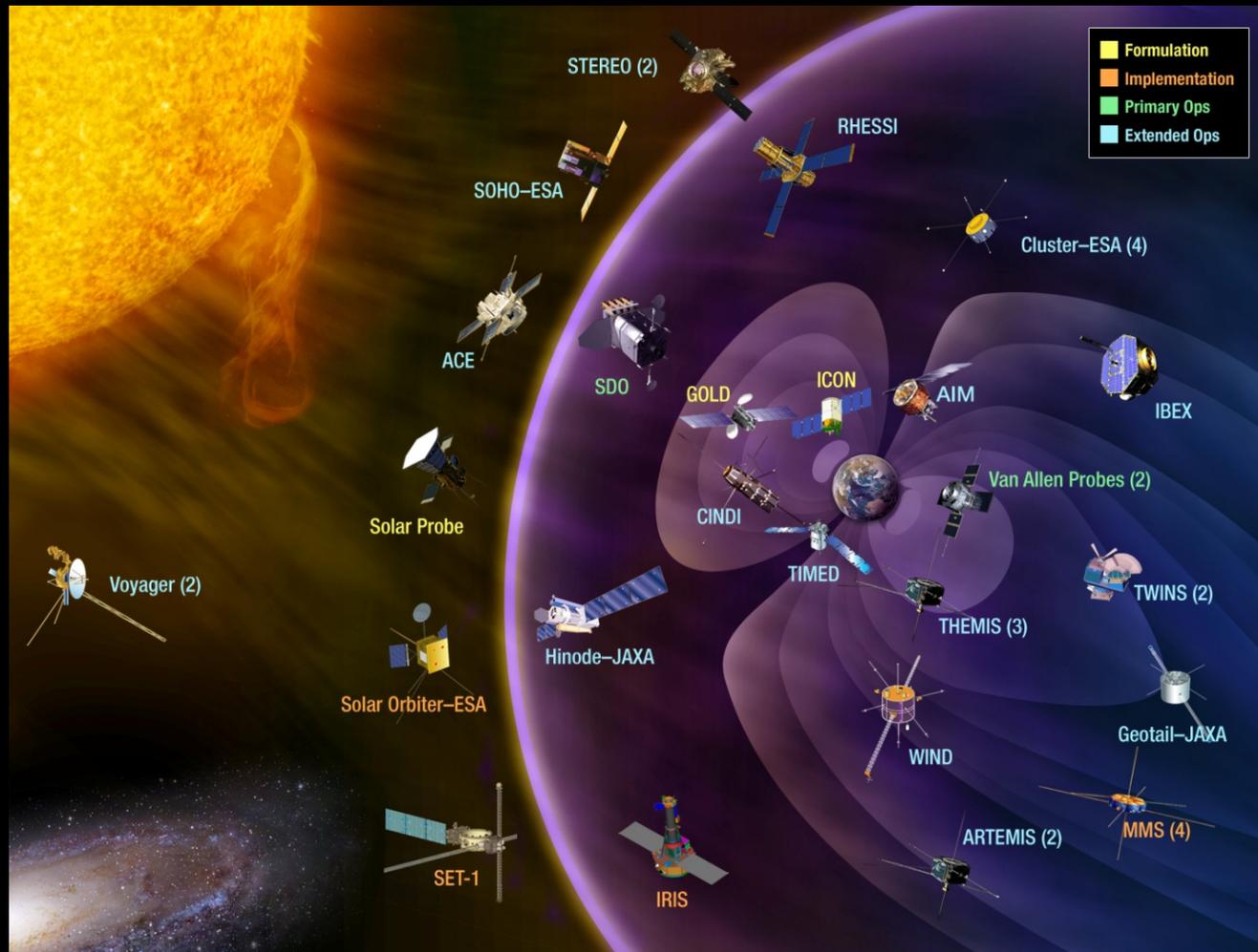
Heliophysics seeks to answer the following fundamental questions:

- What causes the Sun to vary?
- How do the geospace, planetary space environments and the heliosphere respond?
- What are the impacts on humanity?



NASA's Heliophysics Research Missions

A FLEET OF SPACECRAFT DESIGNED TO UNDERSTAND THE SUN AND ITS INTERACTIONS WITH EARTH AND THE SOLAR SYSTEM



Heliophysics has 18 operating missions: Voyager, Geotail, Wind, **SOHO**, **ACE**, Cluster, TIMED, RHESSI, TWINS, Hinode, **STEREO**, THEMIS, AIM, CINDI, IBEX, **SDO**, ARTEMIS, **Van Allen Probes**

7 missions are in development: IRIS, SET, MMS, SOC, SPP, ICON and GOLD.

Missions in red have space weather utility.

NASA Roles & Responsibilities

Unified National Space Weather Capability (UNSWC)

- The NASA mission is to drive advances in science, technology, and exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of the Earth
- Specific to space weather, NASA formulates and implements a national research program for understanding the Sun and its interactions with the Earth and the Solar System.
- NASA develops on a reimbursable basis operational space weather satellites on behalf of NASA's interagency partners; and provides leadership and management of space weather operations related to human space exploration; and is responsible for providing information for the safe and efficient operation of NASA's robotic and human missions.

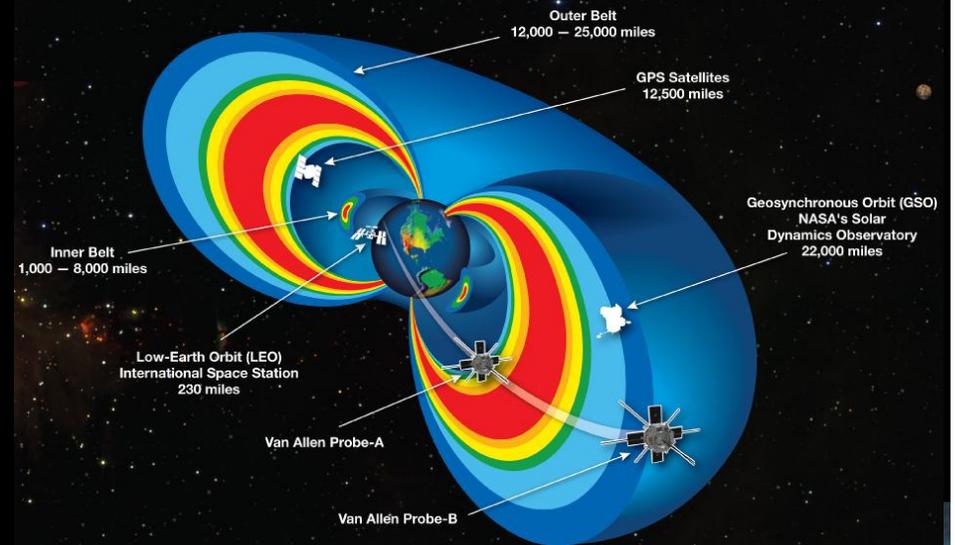
Heliophysics Research

- Heliophysics research provides Theory, Data, and Modeling development services to national space weather efforts including the Community Coordinated Modeling Center (CCMC), a multi-agency partnership to enable, support and perform the research and development for next-generation space science and space weather models.

Major Recent Accomplishments – Science

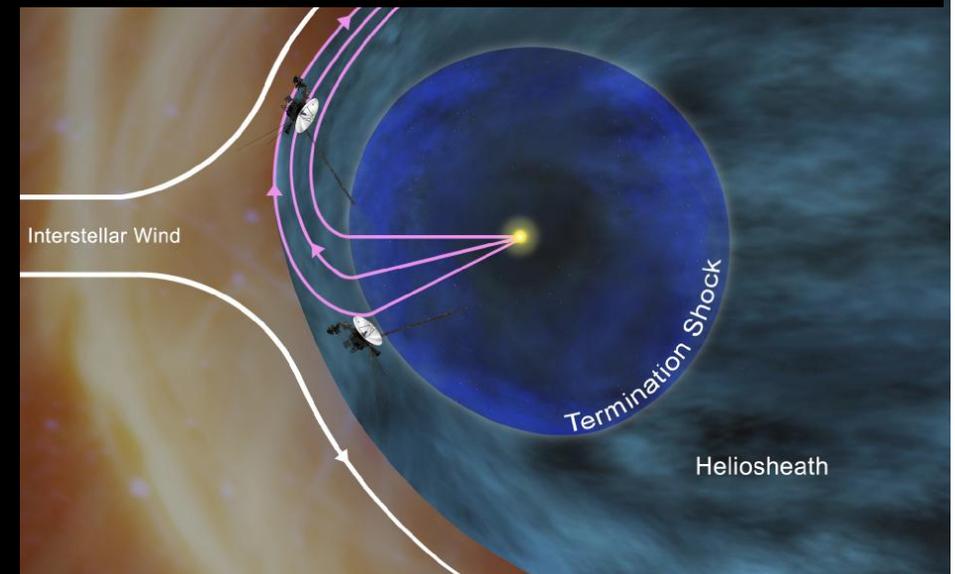
NASA's Van Allen Probes Reveal a New Radiation Belt Around Earth

NASA's Van Allen Probes mission has discovered a previously unknown third radiation belt around Earth, revealing the existence of unexpected structures and processes within these hazardous regions of space.



NASA Voyager 1 Probe Encounters New Region in Deep Space

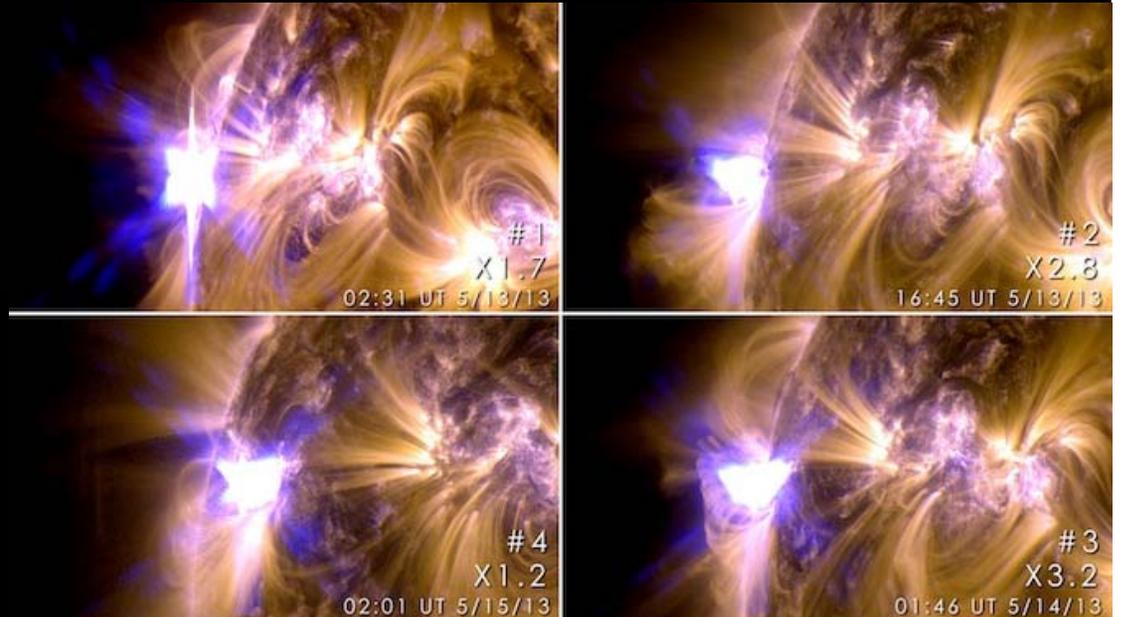
NASA's Voyager 1 spacecraft has entered a new region at the far reaches of our solar system that scientists feel is the final area the spacecraft has to cross before reaching interstellar space.



Activity Continues on the Sun

SDO captured two kinds of solar activities observed in extreme ultraviolet light in less than 12 hours on May 8-9, 2013

SDO captures first four X-class flares of 2013 on May 12-14



Heliophysics Program 2013-2018

Solar Terrestrial Probes

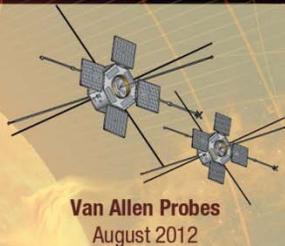


Magnetospheric Multiscale (MMS)
March 2015



STP #5

Living With a Star



Van Allen Probes
August 2012



Space Environment Testbeds (SET)
Mid-2015



Solar Orbiter Collaboration (with ESA)
January 2017



Solar Probe Plus
July 2018

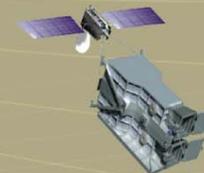
Explorers



Interface Region Imaging Spectrograph (IRIS)
June 2013

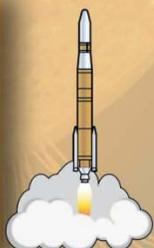


Ionospheric Connection Explorer (ICON)
2017



Global-scale Observations of the Limb and Disk (GOLD)
2017

Research Program



HYPE - TBD
FORTISS - May 2013
CIBER - June 2013
RockOn - June 2013

DayDynamo - June 2013
VERIS - July 2013
MOSES - August 2013
RAISE - September 2013

VESPR - November 2013
ACCESS - January 2014
CHESS - April 2014
DFS - May 2014

SUNRISE II - June 2013/Sweden
GRIPS - September 2013/New Mexico

BARREL #2 - January 2014/Antarctica

Ongoing

Heliophysics Missions
Astrophysics Missions
Planetary Missions

2012

2013

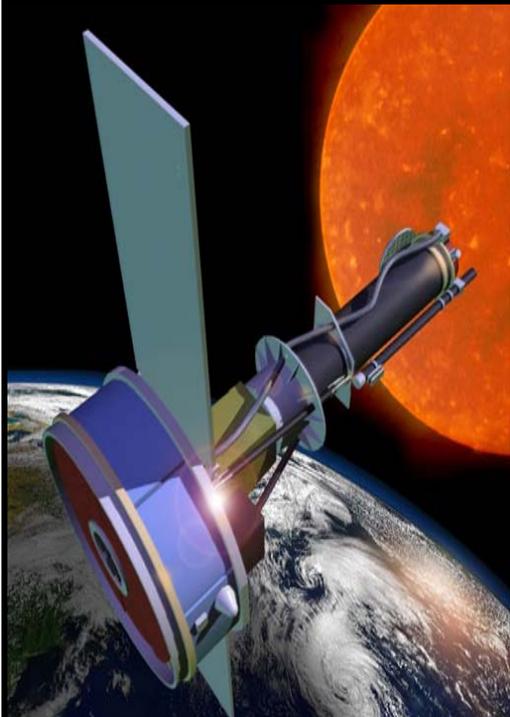
2014

2015

2016

2017

2018



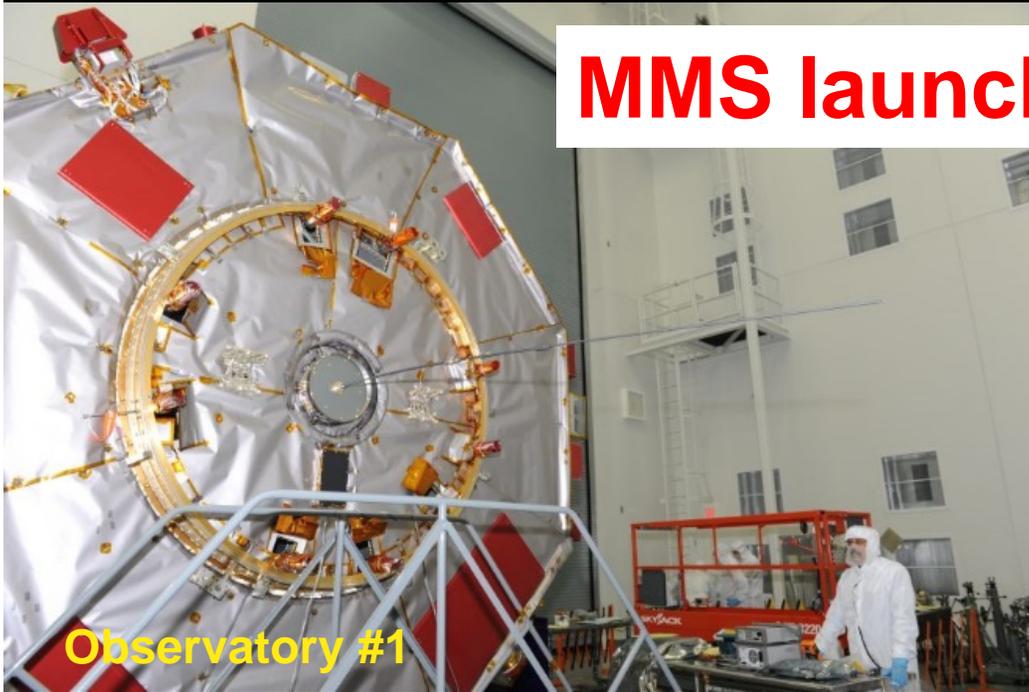
Next Launch: Interface Region Imaging Spectrograph (IRIS)

“A Small EXplorer mission to understand how the solar atmosphere is energized”

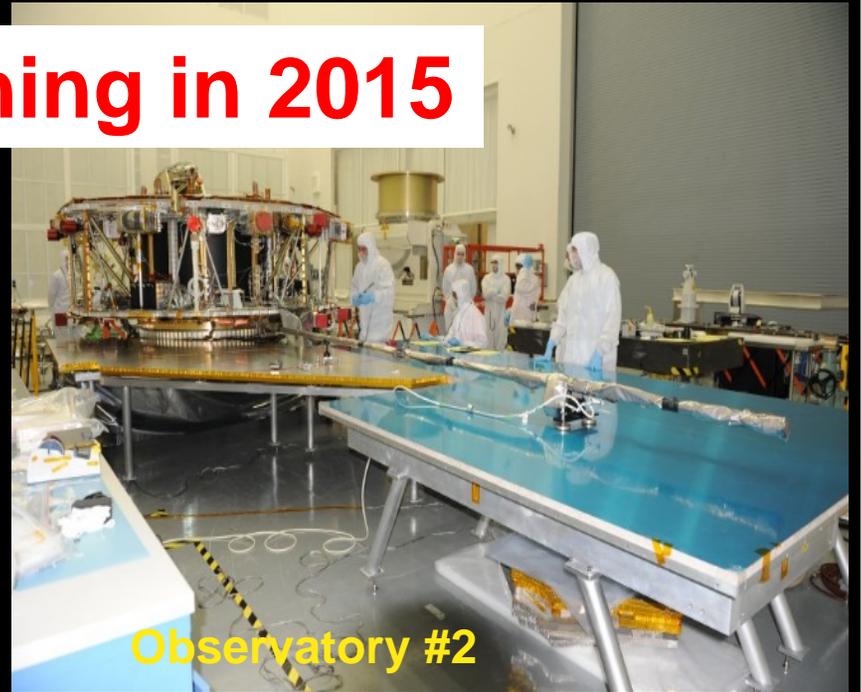
<http://iris.lmsal.com/>



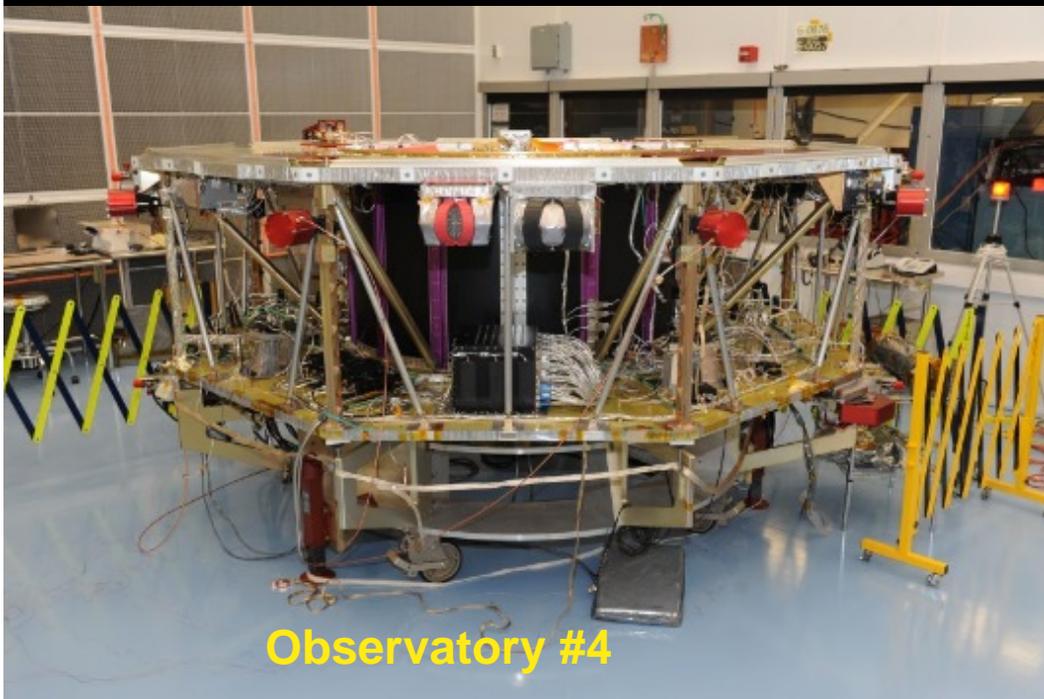
MMS launching in 2015



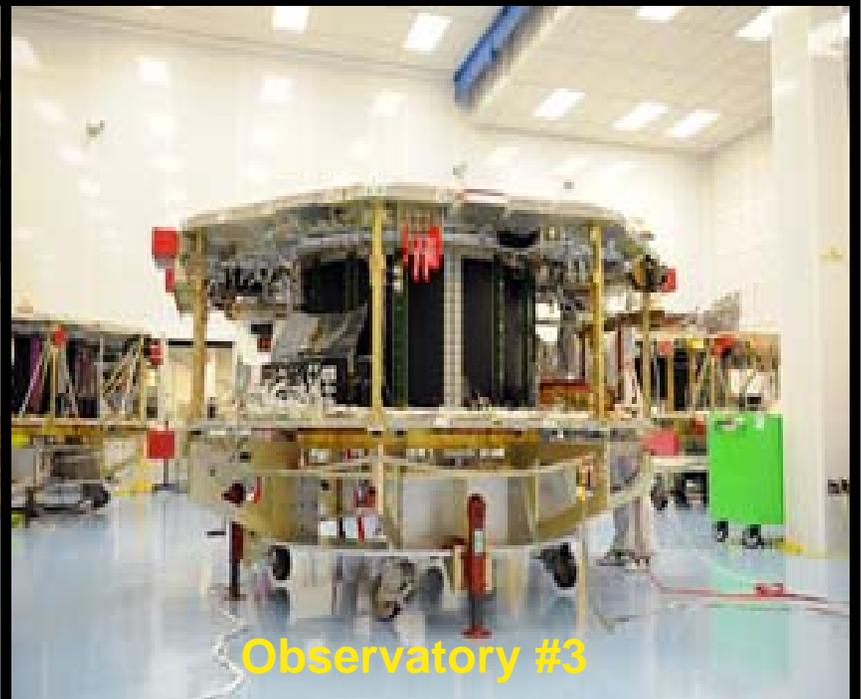
Observatory #1



Observatory #2



Observatory #4



Observatory #3