

National Aeronautics and Space Administration
Goddard Space Flight Center

Missions/Projects - Sciences and Exploration Directorate (600)

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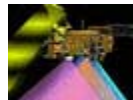
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Active Cavity Radiometer Irradiance Monitor

ACRIMSAT is the latest in a series of long-term solar-monitoring missions, utilizing the proven Active Cavity Radiometer Irradiance Monitor III (ACRIM III) instrument.



Aqua - Latin for water

Aqua, Latin for water, is a NASA Earth Science satellite mission named for the large amount of information that the mission will be collecting about the Earth's water cycle.



Autonomous Nanotechnology Swarm

The Autonomic NanoTechnology Swarm (ANTS) is a generic mission architecture consisting of miniaturized, autonomous, self-similar, reconfigurable, addressable components forming structures. The components/structures have wide spatial distribution and multi-level organization.



ACE Cosmic Ray Isotope Spectrometer (CRIS)

The Cosmic Ray Isotope Spectrometer (CRIS) will measure the abundances of galactic cosmic ray isotopes.



ACE Solar Isotope Spectrometer (SIS)

The Solar Isotope Spectrometer provides isotopically resolved measurements of the elements from lithium to zinc over the energy range 10 - 100 MeV/nucleon. The SIS detector system consists of two identical telescopes composed of stacks of large-area solid-state detectors.



Active Sensing of CO2 Emissions over Nights, Days, and Seasons

The ASCENDS mission will make global atmospheric column carbon dioxide (CO2) measurements without a seasonal, latitudinal, or diurnal bias. The mission will also measure ambient air pressure and temperature. The measurements made by ASCENDS will allow the mission to: 1) quantify global spatial distributions of atmospheric CO2 on scales of weather models in the 2010-2020 era; 2) quantify the current global spatial distribution of terrestrial and oceanic sources and sinks of CO2 on 1° x 1° grids at weekly resolution; and 3) provide a scientific basis for future projections of CO2 sources and sinks through data-driven enhancements of Earth system process modeling.



Advanced Composition Explorer

The Advanced Composition Explorer (ACE) is an Explorer mission that studies particles arriving from the Sun, interstellar, and galactic sources to contribute to our understanding of the formation and evolution of the solar system as well as the astrophysical processes involved.

Advanced Earth Observing Satellite

The Advanced Earth Observing Satellite (ADEOS), Japanese name MIDORI, was the first

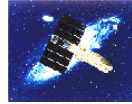


international space platform dedicated to Earth environmental research. It was developed and managed by the National Space Development Agency of Japan (NASDA). The TOMS (Total Ozone Mapping Spectrometer) instrument, along with NSCAT (a NASA spectrometer designed to study wind speed and direction) were the major US components of the platform. ADEOS launched on August 17, 1996 (at 01:53 UT) into a Sun-synchronous sub-recurrent orbit of an altitude of approximately 830 km by an H-II launch vehicle from the Tanegashima Space Center.



Advanced Earth Observing Satellite - SeaWinds

The ADEOS II mission was an international satellite mission led by the Japan Aerospace Exploration Agency (JAXA) - formerly the National Space Development Agency (NASDA) of Japan - with U.S. (NASA) and French Centre Nationale d'Etudes Spatiales (CNES) participation. Midori-II is the Japanese name for the mission.



Advanced Satellite for Cosmology and Astrophysics

The Advanced Satellite for Cosmology and Astrophysics, ASCA, is Japan's fourth cosmic X-ray astronomy mission, and the second for which the United States is providing part of the scientific payload. The satellite was successfully launched on February 20, 1993.



Aeronomy of Ice in the Mesosphere

The AIM satellite mission is designed to explore Polar Mesospheric Clouds (PMCs), also called noctilucent clouds, to find out why they form and why they are changing.



Aerosol - Cloud - Ecosystems

The objectives of the ACE mission are to study aerosol and cloud types and properties and measure ocean productivity in the surface ocean layers. Data from ACE will improve climate models and air-quality forecasts and will be used in the prediction of climate change.



Aerosol RObotic NETwork

The program provides a long-term, continuous and readily accessible public domain database of aerosol optical, microphysical and radiative properties for aerosol research and characterization, validation of satellite retrievals, and synergism with other databases. The network imposes standardization of instruments, calibration, processing and distribution.



Airborne Cloud Physics Lidar

The Cloud Physics Lidar is an airborne lidar system designed specifically for studying clouds and aerosols using the ER-2 High Altitude Aircraft. Because the ER-2 typically flies at 65,000 feet (20 km), its instruments are above 94% of the earth's atmosphere, thereby allowing ER-2 instruments to function as spaceborne instrument simulators. The Cloud Physics Lidar provides a unique tool for atmospheric profiling and is sufficiently small and low cost to include in multiple instrument missions.



Aquarius

Aquarius is a focused satellite mission to measure global Sea Surface Salinity (SSS).



Arctic Research of the Composition of the Troposphere from Aircraft and Satellites

The Arctic is undergoing significant environmental changes related to global climate change. Now, NASA is extensively studying the role of air pollution in this climate-sensitive region as part of the ARCTAS field campaign, the largest airborne experiment ever to do so.



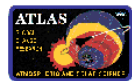
Astro-H

The Astro-H mission objectives are to: trace the growth history of the largest structures in the Universe provide insights into the behavior of material in extreme gravitational fields determine the spin of black holes and the equation of state of neutron stars trace shock acceleration structures in clusters of galaxies and SNRs investigate the detailed physics of jets.



Astrobiology Analytical Laboratory

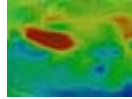
The Astrobiology Analytical Laboratory is dedicated to the study of organic compounds derived from Stardust and future sample return missions, meteorites, lab simulations of Mars, interstellar, proto-planetary, and cometary ices and grains, and instrument development.



ATLAS Series

ATLAS-1, the first of the ATLAS series of Shuttle flights, was an important part of the long-term, coordinated research that made up NASA's Mission to Planet Earth. Two ATLAS-1 instruments, ACR and SUSIM, had direct counterparts aboard UARS, while other instruments aboard each mission were closely related. Repeated flights of the ATLAS instruments, which

were carefully calibrated before and after each flight, allowed for long-term calibration of UARS instruments.



Aura - Latin for breeze

A mission researches the composition, chemistry, and dynamics of Earth's atmosphere as well as study the ozone, air quality, and climate.



Broad Band X-ray Telescope

The Broad Band X-ray Telescope (BBXRT) was flown on the space shuttle Columbia (STS-35) as part of the ASTRO-1 payload. It was designed and built at the Laboratory for High Energy Astrophysics at NASA/GSFC. BBXRT was the first focusing X-ray telescope operating over a broad energy range 0.3-12 keV with a moderate energy resolution (90 eV at 1 keV and 150eV at 6 keV).



Cassini

The objective of the RPWS investigation is to study radio and plasma waves in the vicinity of Saturn and during the flight to Saturn. This objective includes studies of radio emissions, plasma waves, lightning, dust impacts, plasma densities and temperatures, and plasma density fluctuations.

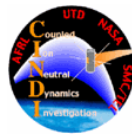
Crustal Dynamics Data Information System

The Crustal Dynamics Data Information System (CDDIS) supports data archiving and distribution activities for the space geodesy and geodynamics community. The main objectives of the system are to store space geodesy and geodynamics related data products in a central data bank, to maintain information about the archival of these data, and to disseminate these data and information in a timely manner to NASA investigators and cooperating institutions.



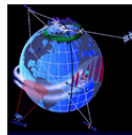
Compton Gamma Ray Observatory

Compton had four instruments that covered an unprecedented six decades of the electromagnetic spectrum, from 30 keV to 30 GeV. In order of increasing spectral energy coverage, these instruments were the Burst And Transient Source Experiment (BATSE), the Oriented Scintillation Spectrometer Experiment (OSSE), the Imaging Compton Telescope (COMPTEL), and the Energetic Gamma Ray Experiment Telescope (EGRET). For each of the instruments, an improvement in sensitivity of better than a factor of ten was realized over previous missions.



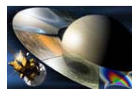
C/NOFS Coupled Ion Neutral Dynamic Investigation (CINDI)

CINDI involves two instruments on the C/NOFS satellite that measure the concentration and kinetic energy of the ions and neutral particles in space as the satellite passes through them. This information will be used in building models to understand the various structures in the ionosphere, such as plasma depletions and associated turbulence in the nightside, low-latitude ionosphere. These structures can interfere with radio signals between Earth and spacecraft in orbit, thus causing errors in tracking and loss of communication.



C/NOFS Vector Electric Field Instrument (VEFI)

VEFI measures direct current (DC) electric fields, which cause the bulk plasma motion that drives the ionospheric plasma to be unstable. Additionally, it measures the quasi-DC electric fields within the plasma density depletions to reveal the motions of the depletions relative to the background ionosphere. VEFI also measures the vector AC electric field, which characterizes the ionospheric disturbances associated with spread-F irregularities.



Cassini Dual Technique Magnetometer (MAG)

The Dual Technique Magnetometer (MAG), instruments onboard the Cassini spacecraft, is a Direct Sensing Instrument that measures the strength and direction of the magnetic field around Saturn.



Cassini Plasma Spectrometer (CAPS)

The Cassini Plasma Spectrometer (CAPS) measures the energy and electrical charge of particles such as electrons and protons that the instrument encounters.



Challenging Mini-Satellite Payload

During its mission, CHAMP generated simultaneously highly precise gravity and magnetic field measurements for the first time. These measurements have allowed scientists to detect the spatial variations of both fields as well as their variability with time. The CHAMP mission opened a new era in geopotential research with: 1) mapping of the Earth's global long to medium wavelength gravity field and temporal variations; 2) mapping of the Earth's global magnetic field and temporal variations and; 3) atmosphere/ionosphere sounding. As a result,



CHAMP data has applications in global climate studies, oceanography, weather forecasting, disaster research, navigation, geophysics, geodesy, and solar terrestrial physics.

Climate Absolute Radiance and Refractivity Observatory

The Climate Absolute Radiance and Refractivity Observatory (CLARREO) mission has been recommended in the NRC Decadal Survey as a key component of the future climate observing system. NASA and NOAA share responsibility for CLARREO.



Cloud Radar System

Cloud Radar System (CRS) The CRS is a 94 GHz (W-band; 3 mm wavelength) Doppler radar developed for autonomous operation in the NASA ER-2 high-altitude aircraft and for ground-based operation. It will provide high-resolution profiles of reflectivity and Doppler velocity in clouds and it has important applications to atmospheric remote sensing studies. The CRS was designed to fly with the Cloud Lidar System (CLS), in the tail cone of an ER-2 superpod. There are two basic modes of operation of the CRS: 1) ER-2 with reflectivity, Doppler, and linear-depolarization measurements, and 2) ground-based with full polarimetric capability.



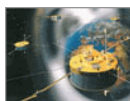
Cloud Satellite

CloudSat's cloud-profiling radar is 1,000 times more sensitive than typical weather radar and can detect clouds and distinguish between cloud particles and precipitation.



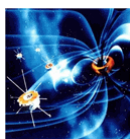
Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation

CALIPSO will provide the next generation of climate observations, drastically improving our ability to predict climate change and to study the air we breathe.



Cluster

The Cluster mission is an in-situ investigation of the Earth's magnetosphere using four identical spacecraft simultaneously.



Cluster Plasma Electron And Current Experiment (PEACE)

A Plasma Electron And Current Experiment instrument can measure the three dimensional velocity distribution of electrons in a space plasma, for an energy range from a few electronvolts to about 30 kiloelectronvolts. A PEACE instrument is flying on each of the four Cluster II spacecraft, which were launched in the summer of 2000.



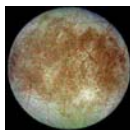
Community Coordinated Modeling Center (CCMC)

The CCMC is a multi-agency partnership to enable, support and perform the research and development for next-generation space science and space weather models.



Composite Infrared Spectrometer

The Composite Infrared Spectrometer (CIRS) is an instrument on the Cassini spacecraft, now orbiting Saturn. CIRS observes infrared spectra of Saturn, and its satellites and rings. The CIRS scientific team studies the temperature structure, dynamics and composition of the atmosphere of Saturn and Titan. The team also studies the thermal structure of Saturn's rings, and the nature of and warm structures on icy satellites such as Enceladus. CIRS is sensitive to wavelengths from 7 to 1000 micrometers, using several different detectors. The full CIRS scientific team is international in scope, with Co-Investigators located in the U.S., England, France, Germany and Italy. Michael Flasar is the Principal Investigator.



Cosmic Ice Laboratory

Our research group specializes in studying the spectra, the chemistry, and the physical properties of ices relevant to comets, icy satellites and planets, and the coatings of dust grains in the interstellar medium.



Costa Rica-Aura Validation Experiment

The Costa Rica Aura Validation Experiment (CR-AVE) is a mission designed to explore the tropical upper troposphere and lower stratosphere (UTLS) and to provide information for comparison to satellite observations. The tropical region between 30 N and 30 S comprises half of the Earth's surface, yet is relatively unsampled in comparison to the mid-latitude of the Northern Hemisphere. In addition, observations above typical aircraft altitudes (40,000 feet or 12 km) are even less frequent, making the tropical upper troposphere and lower stratosphere one of the most sparsely sampled regions of our atmosphere.

Deformation, Ecosystem Structure and Dynamics of Ice

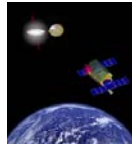
Surface deformation is linked directly to earthquakes, volcanic eruptions, and landslides.



Observations of surface deformation are used to forecast the likelihood of earthquakes occurring as a function of location, as well as predicting both the place and time that volcanic eruptions and landslides are likely. Global observations of surface deformation will lead to advances in earthquake science. Improved time-dependent probabilities will benefit the health and safety of the public by decreasing the exposure to tectonic hazards. Monitoring surface deformation is also important for improving the safety and efficiency of hydrocarbon extraction, managing ground water resources, and, in the future, CO2 sequestration management.

Direct Readout Laboratory

The Direct Readout Laboratory disseminates technology and information to acquire and utilize Direct Broadcast satellite data.



Energetic X-ray Imaging Survey Telescope

image and temporally resolve the entire sky every two 95-minute orbits, detecting extremely faint high energy X-ray sources in an energy range (5-600 keV) that is poorly explored but particularly important for the discovery and study of black holes. With its unparalleled sensitivity at hard X-ray energies, EXIST will allow the study of black holes on all size scales, with masses ranging from a few to more than one billion times the mass of the Sun.



Earth Observing -1

As the first New Millennium Program Earth Observing Mission, EO-1 has validated advanced land imaging and unique spacecraft technologies.



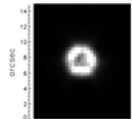
Earth Science Data Systems Working Groups

The Earth Science Data Systems Working Groups were chartered as a part of the Strategic Evolution of Earth Science Enterprise Data Systems (SEEDS) formulation team report. The purpose of SEEDS was to establish a framework for distributed data management to maximize availability and utility of Earth Science Enterprise products, leverage community expertise, ideas, and capabilities; and improve overall effectiveness of ESE-funded systems and services. The Working Groups were initially a part of the Research, Education and Applications Solutions Network (REASoN) projects, and later were included in the Advancing Collaborative Connections for Earth System Science (ACCESS) program and the Making Earth Science Data Records for Use in Research Environments (MEaSUREs) program. The web site provides basic information about the awards and provides applications to track their progress and report metrics.



Earth Systematic Missions

The Earth Systematic Missions (ESM) Program includes a broad range of multi-disciplinary science investigations aimed at developing a scientific understanding of the Earth system and its response to natural and human-induced forces. Understanding these forces will help in determining how to mitigate them, appropriately and where possible, to avoid climate changes.



Extrasolar Planet Observations and Characterization

The Extrasolar Planet Observations and Characterization (EPOCh) investigation is a scientific component of the EPOXI mission. EPOXI re-uses the Deep Impact flyby spacecraft to observe transiting extrasolar planets, and the Earth-as-an-extrasolar planet, while enroute to a 2010 encounter with comet Hartley-2. EPOCh uses the High Resolution Imager (HRI) with its CCD camera to produce very precise photometry of giant extrasolar planets that transit nearby bright stars. Since the HRI is defocused (see Figure 1), EPOCh is able to collect many stellar photons per exposure without saturating the detector, and thus produce very precise photometry of transits. The EPOCh team is using these data to refine the physical properties of the giant planets, search for rings and moons that may orbit them, and search for smaller planets in these systems, down to the size of Earth.



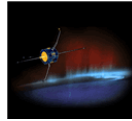
Extreme Ultraviolet Normal Incidence Spectrograph (EUNIS)

The Extreme Ultraviolet Normal Incidence Spectrograph (EUNIS) sounding rocket instrument is an extreme ultraviolet solar spectrometer with high efficiency and high spectral resolution.



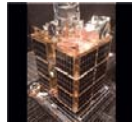
Fermi Gamma-ray Space Telescope

Fermi has the ability to detect gamma rays in a range of energies from thousands to hundreds of billions of times more energetic than the light visible to the human eye. Radiation of such a magnitude can only be generated under the most extreme conditions; therefore Fermi will focus on studying the most energetic objects and phenomena in the Universe.



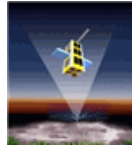
Fast Auroral Snapshot Explorer (FAST)

FAST's primary objective is to study the microphysics of space plasma and the accelerated particles that cause the aurora.



FASTSat Thermospheric Temperature Imager (TTI)

The Thermospheric Temperature Imager (TTI) is one of three instruments on the FASTSat spacecraft.



Firefly

Firefly will determine the source of Terrestrial Gamma-ray Flashes (TGFs), and will determine the extent to which TGFs are associated with energetic electrons that can escape the atmosphere to populate the inner radiation belt.

Future Exploration Science Working Group

FESWG (Future Exploration Science Working Group) is a committee of Goddard scientists and engineers promoting the exchange of information about current meetings and proposal and teaming opportunities related to future NASA exploration efforts.



Galaxy Evolution Explorer

GALEX observes galaxies in ultraviolet light. These observations tell scientists how galaxies, the basic structures of our Universe, evolve and change. GALEX also probes the causes of star formation during a period when most of the stars and elements we see today had their origins.



Geoscience Laser Altimeter System

The Geoscience Laser Altimeter System (GLAS) instrument on ICESat will determine the distance from the satellite to the Earth's surface and to intervening clouds and aerosols. It will do this by precisely measuring the time it takes for a short pulse of laser light to travel to the reflecting object and return to the satellite. Although surveyors routinely use laser methods, the challenge for ICESat is to perform the measurement 40 times a second from a platform moving 26,000 km (16,000 mi) per hour. In addition, ICESat will be 600 km above the Earth and the precise locations of the satellite in space and the laser beam on the surface below must be determined at the same time.



Geostationary Coastal and Air Pollution Events

The objectives of the GEO-CAPE mission are to 1) identify human versus natural sources of aerosols and ozone precursors; 2) study the dynamics of coastal ecosystems, river plumes, and tidal fronts; 3) observe air pollution transport in North, Central, and South America; 4) predict the tracks of oil spills, fires, and releases from natural disasters; 5) detect and track waterborne hazardous materials; 6) measure coastal health; and 7) facilitate forecasts of air quality.



Geostationary Operational Environmental Satellite - R

The Geostationary Operational Environmental Satellite-R Series (GOES-R) program, a collaborative development and acquisition effort between NOAA and NASA, is a key element of the National Oceanic and Atmospheric Administration's (NOAA's) operations. The GOES-R series of satellites will be comprised of improved spacecraft and instrument technologies, which will result in more timely and accurate weather forecasts, and improve support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The first launch of the GOES-R series satellite is scheduled for FY2015.



Geostationary Operational Environmental Satellites

GOES is a series of satellites that provide a constant vigil for the atmospheric "triggers" for severe weather conditions such as tornadoes and hurricanes. GOES-O, the second spacecraft in the GOES-NOP Series of satellites, launched June 27, 2009, at 6:51 p.m. from Cape Canaveral Air Force Station in Florida.



Geotail

The Geotail mission measures global energy flow and transformation in the magnetotail to increase understanding of fundamental magnetospheric processes, including the physics of the magnetopause, the plasma sheet, and reconnection and neutral line formation.

Global Change Master Directory



GCMD enables users to locate and obtain access to Earth science data sets and services relevant to global change and Earth science research. The GCMD database holds more than 25,000 descriptions of Earth science data sets and services covering all aspects of Earth and environmental sciences. One can use the search box or select from the available keywords to search for data and services. We encourage your participation in writing and maintaining the information in our databases. You will find authoring tools to assist you. In addition, subscription services are available to notify you of new entries. The Committee on Earth Observation Satellites (CEOS) International Directory Network (IDN) Interoperability Forum is available to discuss content and database issues.

Global Precipitation Measurement

The GPM mission is one of the next generation of satellite-based Earth science missions that will study global precipitation (rain, snow, ice).



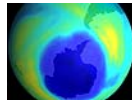
Glory

Glory will help increase our understanding of the Earth's Energy Balance. Glory is a low Earth orbit (LEO) scientific research satellite designed to achieve two major goals: (1) Collect data on the properties of aerosols, including black carbon, in the Earth's atmosphere and climate system. It will enable a greater understanding of the seasonal variability of aerosol properties; and (2) Collect data on solar irradiance for the long-term effects on the Earth climate record. Understanding whether the temperature increase and climate changes are by-products of natural events or whether the changes are caused by man-made sources is of primary importance.



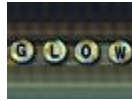
Goddard Cumulus Ensemble

The Goddard Cumulus Ensemble (GCE) model, a cloud resolving model (CRM), has been developed and improved at NASA Goddard Space Flight Center over the past two decades. The development and main features of the GCE model were published in Tao and Simpson (1993) and Tao et al. (2003b). A review of the applications of the GCE model to develop a better understanding of precipitation processes can be found in Simpson and Tao (1993) and Tao (2003). The 3D version of the GCE model is typically run using 256 x 256 up to 1024 x 1024 horizontal grid points at 1-2 km resolution or better. An MPI version of the GCE model was recently developed (Juang et al. 2006). It is well documented and easy to modify and improve. It is also flexible enough to run on many different platforms using any number of CPUs.



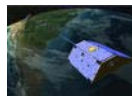
Goddard Earth Science Data and Information Science Center

We are one of eight NASA Science Mission Directorate (SMD) DAACs that offer Earth science data, information, and services to research scientists, applications scientists, applications users, and students. The GES DISC is the home (archive) of Precipitation, Atmospheric Chemistry and Dynamics, and information, as well as data and information from other related disciplines. The GES DISC is located at Goddard Space Flight Center, in Greenbelt, Maryland.



Goddard Lidar Observatory for Wind

It is a mobile Doppler lidar system based on double edge direct detection technology. It consists of a molecular system at 355nm and an aerosol system at 1064nm.



Gravity Recovery and Climate Experiment

Twin satellites launched in March 2002, are making detailed measurements of Earth's gravity field which will lead to discoveries about gravity and Earth's natural systems.



Hubble Space Telescope

One of NASA's "Great Observatories", Hubble uses excellent pointing precision, powerful optics, and state-of-the-art instruments to provide stunning views of the Universe that cannot be made using ground-based telescopes or other satellites.



Hierarchical Image Segmentation

The Hierarchical Image Segmentation project develops software to partition imagery data into hierarchically related sections or regions.

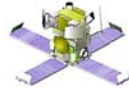


High End Computer Network (HECN)

The High End Computer Network (HECN) Team supplies and maintains high performance networks for GSFC users that require advanced network capabilities, along with conducting advanced network technology research and development.

High Energy Transient Explorer

The HETE-2 program is an international collaboration to help unravel the mystery of Gamma-



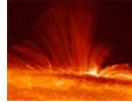
Ray Bursts (GRBs). The primary goal of HETE-2 is to determine the origin and nature of cosmic gamma-ray bursts (GRBs) by simultaneous observation of soft and medium X-rays and gamma-rays to provide precise localization of GRB's and identification of counterparts to these explosions. HETE-2 was launched on October 9, 2000 and declared fully operational on February 6, 2001.

Hinode



Hinode's three year mission is to explore the magnetic fields of the Sun, resulting in an improved understanding of the mechanisms that power the solar atmosphere and drive solar eruptions.

Hinode Extreme-ultraviolet Imaging Spectrometer (EIS)



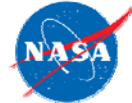
EIS will provide monochromatic images of the transition region and corona at high cadence using a slit. High spectral resolution images can be obtained by rastering with a slit.



Holographic Airborne Rotating Lidar Instrument Experiment

The HARLIE transceiver is based on a volume phase holographic optical elements (HOE) made in dichromated gelatin (DCG) sandwiched between 2 layers of high quality float glass. It demonstrates the practical application of this technology to a compact scanning lidar system at 1064 nm wavelength. The HOE has the ability to withstand moderately high laser power and energy loading and is of sufficient optical quality for most direct detection systems, and overall efficiency rivaling conventional receivers. Its size and weight are approximately half of similar performing scanning systems using reflective optics.

Hyperspectral Infrared Imager



The objectives of the HypIRI mission are to 1) study the processes that indicate volcanic eruption; 2) analyze the nutrients and water status of vegetation; 3) examine soil type and health; 4) use spectra to identify locations of natural sources; 5) study deforestation and changes in vegetation type; 6) provide early warning of droughts; 7) improve exploration for natural resources; and 8) forecast likelihood of volcanic eruptions and landslides.



International Gamma-Ray Astrophysics Laboratory

INTEGRAL provides a new insight into the most violent and exotic objects of the Universe and helps us to understand processes such as the formation of new chemical elements.

Environments of extreme temperature and density, near the event-horizons of black holes, are a major topic of study with INTEGRAL.



InFOCUS: International Focusing Optics Collaboration for micro-Crab Sensitivity

InFOCUS is a balloon-borne instrument incorporating recent breakthroughs in focusing optics and detectors to achieve order of magnitude improvements in both hard X-ray sensitivity (~100 uCrabs in 12 hours, 20 uC for LDB) and imaging resolution (~1 arcmin), with high resolution spectroscopy (~2 keV FWHM).



Ice Cloud and Land Elevation Mission

The ICESat mission will provide multi-year elevation data regarding ice sheet mass balance as well as cloud property information, especially for stratospheric clouds common over polar areas.



Ice, Cloud, and Land Elevation Satellite

ICESat (Ice, Cloud, and Land Elevation Satellite) is the benchmark Earth Observing System mission for measuring ice sheet mass balance, cloud and aerosol heights, as well as land topography and vegetation characteristics. The ICESat mission is providing multi-year elevation data needed to determine ice sheet mass balance as well as cloud property information, especially for stratospheric clouds which are common over polar areas. It is also gathering topography and vegetation data around the globe, in addition to the polar-specific coverage over the Greenland and Antarctic ice sheets.



IceBridge

IceBridge, a six-year NASA mission, is the largest airborne survey of Earth's polar ice ever flown. It will yield an unprecedented three-dimensional view of Arctic and Antarctic ice sheets, ice shelves and sea ice. These flights will provide a yearly, multi-instrument look at the behavior of the rapidly changing features of the Greenland and Antarctic ice.

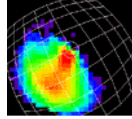


IMAGE Low Energy Neutral Atom (LENA)

LENA's instrument studied a particular particle population known as ionospheric outflow. These charged particles are confined and guided by magnetic field lines.

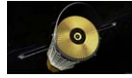
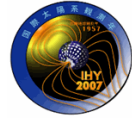
Imager for Magnetopause-to-Aurora Global Exploration (IMAGE)

IMAGE was the first satellite mission dedicated to imaging the Earth's magnetosphere, the region of space controlled by the Earth's magnetic field and containing extremely tenuous plasmas of both solar and terrestrial origin.



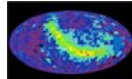
International Heliophysical Year (IHY)

International Heliophysical Year (IHY) is comprised of a joint program that targets activities which stimulate Space and Earth Science activities in developing nations, such as the establishment of ground-based instrument arrays and research programs.



International X-ray Observatory

a joint effort of NASA, ESA, and JAXA? combines a large X-ray mirror with powerful new instrumentation that will explore the high energy Universe. Launch is planned for 2021.



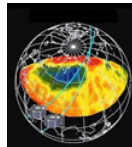
Interstellar Boundary Explorer (IBEX)

IBEX's sole science objective is to discover the global interaction between the solar wind and the interstellar medium. IBEX achieves this objective by taking a set of global energetic neutral atom (ENA) images.



Invasive Species Forecasting System

The Invasive Species Forecasting System, a partnership between NASA and the U.S. Geological Survey, is a tool for detecting and responding to invasive species on Department of Interior and adjacent lands.



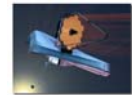
Ionosphere-Troposphere Storm Probes (I-TSP)

The mission is to study distributions of ionospheric and thermospheric densities, geomagnetic disturbances, and ionospheric irregularities. This mission relates to the Sun and solar storms in that it studies the effects of solar storms on geospace



JUNOMAG

The JUNO magnetic fields investigation will provide measurements of the Jovian magnetic field over a wide dynamic range. The fundamental objectives of this investigation are to map the magnetic field, determine the dynamics of Jupiter's interior, and determine the three-dimensional structure of the polar magnetosphere and its auroras.



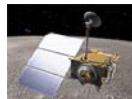
James Webb Space Telescope

The James Webb Space Telescope (JWST) is a large, infrared-optimized space telescope, scheduled for launch in 2014. JWST will find the first galaxies that formed in the early Universe, connecting the Big Bang to our own Milky Way Galaxy. JWST will peer through dusty clouds to see stars forming planetary systems, connecting the Milky Way to our own Solar System. JWST's instruments will be designed to work primarily in the infrared range of the electromagnetic spectrum, with some capability in the visible range.



Jason

Jason-1 is the first follow-on to the highly successful TOPEX/Poseidon mission that measured ocean surface topography.



Lunar Reconnaissance Orbiter

The Lunar Reconnaissance Orbiter is an unmanned mission to create the comprehensive atlas of the moon's features and resources necessary to design and build a lunar outpost. LRO focuses on the selection of safe landing sites, identification of lunar resources and the study of how lunar radiation will affect humans.



Land Satellite

The Landsat Program is a series of Earth-observing satellite missions jointly managed by NASA and the U.S. Geological Survey.



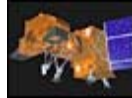
Land Satellite 1

The first Earth-observing satellite to be launched with the express intent to study and monitor our planet's landmasses. To perform the monitoring, Landsat 1 carried two instruments: a camera system built by the Radio Corporation of America (RCA) called the Return Beam Vidicon (RBV), and the Multispectral Scanner System (MSS) built by General Electric.



Land Satellite 2

Landsat 2 was launched on January 22, 1975, two and a half years after Landsat 1. The second Landsat was still considered an experimental project and was operated by NASA.



Land Satellite 7

Landsat 7 is a U.S. satellite used to acquire remotely sensed images of the Earth's land surface and surrounding coastal regions. This site features Landsat 7 data characteristics, science and education applications, technical documentation, program policy, and history. It is maintained by the Landsat 7 Project Science Office at the NASA Goddard Space Flight Center in Greenbelt, MD. Images acquired by Landsat satellites were used to produce the first composite multi-spectral mosaic of the 48 contiguous United States. Landsat imagery has provided critically important information for monitoring agricultural productivity, water resources, urban growth, deforestation, and natural change due to fires and insect infestations. The data have also been used successfully for mineral exploration, to measure forest cover at the state level, and to monitor strip mining and strip mine reclamation.



Landsat Data Continuity Mission

The Landsat Data Continuity Mission (LDCM) is the future of Landsat satellites. It will continue to obtain valuable data and imagery to be used in agriculture, education, business, science, and government.



Landsat Image Mosaic of Antarctica

The "Faces of Antarctica" Website uses the new, first-ever, high-resolution Landsat Image Mosaic of Antarctica (LIMA) to familiarize the public with this remote continent, its vast ice sheet, and why what happens there matters to us all. "Faces of Antarctica" emphasizes our themes that exploration and research are both human endeavors, that satellite imagery captures the face of the continent, and that this face is changing.



Laser Interferometer Space Antenna

a joint NASA-ESA project to develop and operate a space-based gravitational wave detector sensitive at frequencies between 0.03 mHz and 0.1 Hz. LISA detects gravitational-wave induced strains in space-time by measuring changes of the separation between fiducial masses in three spacecraft 5 million kilometers apart.

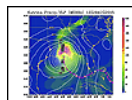


Living With a Star (LWS)

The Living With a Star (LWS) program emphasizes the science necessary to understand those aspects of the Sun and the Earth's space environment that affect life and society.

Lunar Data Node

The Lunar Data Node was formed at the NSSDC under the auspices of the PDS Geosciences Node to recover Apollo data, much of which is on old media or in obsolete formats, convert it into usable forms, and make it available online to researchers and mission planners. We are currently restoring data from surface and orbital instruments on Apollos 12, 14, 15, 16, and 17.



Modern Era Retrospective-analysis for Research and Applications

MERRA is a NASA reanalysis for the satellite era using a major new version of the Goddard Earth Observing System Data Assimilation System Version 5 (GEOS-5). The Project focuses on historical analyses of the hydrological cycle on a broad range of weather and climate time scales and places the NASA EOS suite of observations in a climate context.



Mercury Surface, Space Environment, Geochemistry, and Ranging

A NASA Discovery mission to conduct the first orbital study of the innermost planet.



Magnetospheric Multiscale Satellites (MMS)

The goal of the MMS mission is to understand the microphysics of magnetic reconnection by determining the kinetic processes responsible for the initiation and evolution of magnetic reconnection.

Mercury Surface, Space Environment, Geochemistry and Ranging (MESSENGER)

The Mercury Surface, Space Environment, Geochemistry and Ranging (MESSENGER) mission is the first spacecraft to flyby Mercury since Mariner 10 and will be the first spacecraft



to move into a stationary orbit around Mercury.



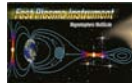
Micro-pulse Lidar Network

The NASA Micro-Pulse Lidar Network (MPLNET) is a federated network of Micro-Pulse Lidar (MPL) systems designed to measure aerosol and cloud vertical structure continuously, day and night, over long time periods required to contribute to climate change studies and provide ground validation for satellite sensors in the Earth Observing System (EOS) and related aerosol modeling efforts. Most MPLNET sites are co-located with sites in the NASA Aerosol Robotic Network (AERONET). These joint super sites provide both column and vertically resolved aerosol and cloud data, such as: optical depth, single scatter albedo, size distribution, aerosol and cloud heights, planetary boundary layer (PBL) structure and evolution, and profiles of extinction and backscatter.



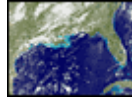
Minority University-SPace Interdisciplinary Network (MU-SPIN)

The Minority University-SPace Interdisciplinary Network (MU-SPIN) fosters partnerships and trains the next generation of NASA's minority scientists and engineers.



MMS Fast Plasma Investigation (FPI)

The Fast Plasma Investigation (FPI) instrument is part of the SMART Hot Plasma instrument onboard the MMS satellite. It will provide 3D distributions of total ions and electrons independent of the spin rate.



Moderate Resolution Imaging Spectroradiometer

The MODIS Rapid Response system has been developed to provide rapid access to MODIS data globally, with initial emphasis on 250m color composite imagery and active fire data. The experience gained during the Montana fires of 2000, when the MODIS team was asked to provide active fire information to the U.S. Forest Service (USFS), has led to the improvement and automation of several of the steps involved in MODIS rapid data provision. Imagery and data are now being provided to a number of users such as the USFS Remote Sensing Applications Center (RSAC), the National Interagency Fire Center (NIFC), the U.N. Global Fire Monitoring Center, and NASA's Earth Observatory. Incremental improvements are planned both for the user interface and the selection of products available from this site.



Moderate Resolution Imaging Spectroradiometer Snow/Ice

The Moderate Resolution Imaging Spectroradiometer (MODIS) is a 36-channel visible to thermal-infrared sensor that was first launched as part of the Earth Observing System (EOS) Terra payload on 18 December 1999. A second MODIS was launched as part of the payload on the Aqua satellite on May 4, 2002. A variety of snow and ice products is produced from the MODIS sensors, and the products are available at a variety of spatial and temporal resolutions. The MODIS snow product suite begins with a 500-m resolution, 2330-km swath snow-cover map which is then gridded to a sinusoidal grid. The sequence proceeds to climate-modeling grid (CMG) products on a latitude/longitude (cylindrical equidistant projection). Most of the products are archived at the National Snow and Ice Data Center (NSIDC) in Boulder, CO.



Multi-scale Modeling Framework

The Goddard Multi-scale Modeling Framework (MMF) is based on the coupling of the two-dimensional Goddard Cumulus Ensemble Model (GCE) and the finite-volume GCM (fvGCM). The MMF, which replaces cloud parameterizations with a cloud resolving model (CRM), is a very promising approach in climate modeling. It provides a way to couple low-resolution and high-resolution model physics in an unified framework. The embedded CRMs can explicitly simulate cloud dynamical and physical processes and provide cloud properties and statistics that match the scale of high-resolution satellite observations.



National Space Science Data Center

The NSSDC provides master catalogs, data standards, and other information services. It oversees the preservation of NASA space science data for the next generation of researchers. The Center ensures access to existing and future NASA space science archives.



NASA African Monsoon Multidisciplinary Analyses

This mission was based in the Cape Verde Islands, 350 miles off the coast of Senegal in west Africa. Commenced in August 2006, NASA scientists employed surface observation networks and aircraft to characterize the evolution and structure of African Easterly Waves (AEWs) and Mesoscale Convective Systems over continental western Africa, and their associated impacts on regional water and energy budgets.

NASA Center for Computational Sciences

The NASA Center for Computational Sciences (NCCS) is one of the world's most powerful



supercomputer and data storage centers. It supports NASA missions and programs as well as university communities on a national basis, enabling Earth and space sciences research through computational modeling by providing access to state-of-the-art high-performance computing, leading-edge mass storage technologies, high-speed networking, and High Performance Computing expertise.

NASA Ocean Biology Processing Group

NASA's Ocean Biology Processing Group supports the collection, processing, calibration, validation, archive and distribution of ocean-related products from a number of missions which are supported within the framework and facilities of the current NASA Ocean Data Processing System (ODPS) which has been successfully supporting operational, satellite-based remote-sensing missions since 1996. The group's capabilities continue to evolve and expand to meet the demands and challenges of future missions. Missions, data sets and activities currently supported or in development include: SeaWiFS : 1997 - present, MODIS (Terra and Aqua) : 2000 - present, MERIS (US Coastal Waters) Feb 2009 - present , CZCS / Nimbus-7 : 1978 - 1986, OCTS / ADEOS-I : 1996 - 1997, Glory data system prototype : 2010 launch, Aquarius / SAC-D : Late 2010 launch, VIIRS / NPP : January 2011 launch, Community Processing & Analysis Software SeaDAS (1991- present)



NASA's HEASARC

The High Energy Astrophysics Science Archive Research Center (HEASARC) is the primary archive for NASA missions dealing with extremely energetic phenomena, from black holes to the Big Bang. Having recently merged with the Legacy Archive for Microwave Background Data Analysis (LAMBDA), it includes data obtained by NASA's high-energy astronomy missions from the extreme ultraviolet through gamma-ray bands, along with missions that study the relic cosmic microwave background.



National Polar-Orbiting Operational Environmental Satellite System

The National Polar-Orbiting Operational Environmental Satellite System (NPOESS) will provide long-term systematic measurements of key environmental variables beginning about 2009. The NPP mission collects and distributes remotely-sensed land, ocean, and atmospheric data to the meteorological and global climate change communities as the responsibility for these measurements transitions from existing Earth-observing missions such as Aqua, Terra and Aura, to the NPOESS. It will provide atmospheric and sea surface temperatures, humidity sounding, land and ocean biological productivity, and cloud and aerosol properties.

New Horizons spacecraft

On January 19, 2006, the New Horizons spacecraft lifted off from Kennedy Space Center aboard an Atlas V launch vehicle. It quickly became the fastest spacecraft to reach the moon and head out into the solar system on its journey to Pluto and then beyond to the Kuiper Belt. On Feb. 28, 2007, New Horizons had a close flyby of Jupiter, using the giant planet for a gravity assist. Lab personnel were involved in the planning and analysis of science observations of Jupiter using the New Horizons cameras and also the Hubble Space Telescope and NASA's IRTF in support of the flyby. More recently, New Horizons passed the orbit of Saturn on June 8, 2008 (too distant for a gravity assist or observations) and is en route to a Pluto encounter in July 2015.



NOAA Environmental Satellites

NOAA-N Prime is the latest in a series of polar-orbiting satellites collecting information to improve weather prediction and climate research across the globe.



Nuclear Spectroscopic Telescope Array

NuSTAR is a pathfinder mission that will open the high energy X-ray sky for sensitive study for the first time.



Nucleation & Dust Chemistry Laboratory

Our research group is part of the Astrochemistry Laboratory in the Solar System Exploration Division at NASA's Goddard Space Flight Center. We specialize in studies of grains and grain analogues of relevance to planets, comets, the interstellar medium, and other extraterrestrial environments.



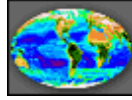
Ocean Surface Topography Mission

OSTM measures sea surface height by using radar altimeter mounted on a low-Earth observing satellite called Jason-2



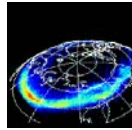
OceanColor

Recent topics and imagery of interest to the OceanColor community.



Orbview-2

The satellite also called SeaStar was launched in 1997 by ORBIMAGE, OrbView-2 collects color imagery of the Earth's entire land and ocean surfaces on a daily basis. Commercial fishing vessels use OrbView-2 data for detecting oceanographic conditions used to create fishing maps. The satellite also provides broad-area coverage in 2,800 kilometer-wide swaths, which are routinely used in naval operations, environmental monitoring, and global crop assessment applications.



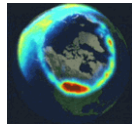
POLAR

Polar mission provided multi-wavelength imaging of the aurora, measuring the entry of plasma into the polar magnetosphere and the geomagnetic tail, the flow of plasma to and from the ionosphere, and the deposition of particle energy in the ionosphere and upper atmosphere.



POLAR Electric Field Instrument (EFI)

The Electric Field Instrument (EFI) measures the vector electric field and thermal electron density along the Polar orbit.



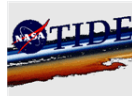
Polar HYDRA

HYDRA (Hot Plasma Analyzer) is a collection of electrostatic analyzers designed for high resolution observations of electron and ion velocity distributions in the earth's polar magnetosphere.



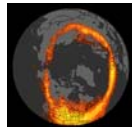
Polar Operational Environmental Satellite

POES is a cooperative effort between NASA and the National Oceanic and Atmospheric Administration (NOAA), the United Kingdom and France.



POLAR Thermal Ion Dynamics Experiment (TIDE)

The Thermal Ion Dynamics Experiment (TIDE) and Plasma Source Instrument (PSI) have been developed in response to the requirements of the ISTEP Program for three-dimensional plasma composition measurements capable of tracking the outflow of ionospheric plasma throughout the magnetosphere.



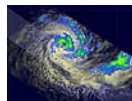
POLAR Visible Imaging System (VIS)

Visible Imaging System (VIS) is one of the instrument onboard the POLAR satellite.



Polar, Wind, Geotail (PWG)

Polar, Wind and Geotail program is a part of the International Solar-Terrestrial Physics (ISTP) Science initiative, combining resources and scientific communities to obtain coordinated, simultaneous investigations of the Sun-Earth space environment over an extended period of time.



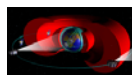
Precipitation Processing System/TRMM Science Data and Information System

The Tropical Rainfall Measuring Mission (TRMM) has its own unique Precipitation Processing System (PPS) to process information from the satellite. PPS analyzes TRMM rainfall data as well as data from other Precipitation based missions and also provides validation from nearly a dozen TRMM ground radar sites.



Quick Scatterometer

The Quick Scatterometer, or QuikScat, replaces the NASA Scatterometer (NSCAT) instrument on Japan's Midori satellite.



Radiation Belt Storm Probes

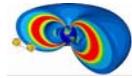
The LWS Geospace program will launch two spacecraft, the Radiation Belt Storm Probes, to discover the fundamental physics underlying the source, loss, and transport processes that



govern the radiation belts.

Radar Satellite

Canada's Radarsat is a radar satellite featuring variable resolution, and different view angles at a number of preset positions. This sophisticated remote sensing satellite is a Canadian-led project involving the United States. It will carry a Synthetic Aperture Radar (SAR), a powerful microwave instrument that can transmit and receive signals to "see" through clouds and darkness, obtaining detailed images of the Earth. This will provide significant advantages in viewing under conditions that preclude observation by aircraft or optical satellites. RADARSAT collects data on resource management, ice, ocean and environmental monitoring and Arctic and off-shore surveillance. RADARSAT also supports fishing, shipping, oil exploration, offshore drilling and ocean research. The RADARSAT provides complete global coverage with the flexibility to support specific requirements.



Radiation Belt Storm Probes (RBSP)

The Radiation Belt Storm Probes Mission, part of NASA's Living With a Star program, will provide unprecedented insight into the physical dynamics of the radiation belts and give scientists the data they need to make predictions of changes in this critical region of space.



Raman Airborne Spectroscopic Lidar

RASL was developed under the first NASA Instrument Incubator program. The first laboratory measurements with RASL were taken in September 2002. It is now being configured for aircraft flight. It is the first airborne lidar system to offer the combined measurements of water vapor mixing ratio, aerosol scattering ratio, aerosol backscattering coefficient, aerosol depolarization and liquid water mixing ratio.



Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESI)

The primary scientific objective of RHESI is to study the processes that take place in the solar atmosphere during a flare.



Roentgen Satellite

The Roentgen Satellite, ROSAT, a Germany/US/UK collaboration, was launched on June 1, 1990 and operated for almost 9 years. The first 6 months of the mission were dedicated to the all sky-survey (using the Position Sensitive Proportional Counter detector), followed by the pointed phase. The survey obtained by ROSAT was the first X-ray and XUV all-sky survey using an imaging telescope with an X-ray sensitivity of about a factor of 1000 better than that of UHURU. During the pointed phase ROSAT made deep observations of a wide variety of objects.



Rossi X-ray Timing Explorer

RXTE observes the fast-moving, high-energy worlds of black holes, neutron stars, X-ray pulsars and bursts of X-rays that light up the sky and then disappear forever. For RXTE, the trick to observing these kinds of objects is all in the timing -- an ability to observe changes in X-ray brightness that occur in a mere thousandths of a second, or over several years.



Solar Terrestrial Relations Observatory (STEREO)

The STEREO mission traces the flow of energy and matter from the sun to Earth with two identically equipped spacecraft to provide revolutionary 3-D imaging of coronal mass ejections (CMEs).



Swift

Swift's goal is to solve the gamma-ray burst mystery. Do they signal the birth of a black hole in a massive stellar explosion? Are they the product of the collision of two neutron stars? Within seconds of detecting a burst, Swift relays a burst's location to ground stations, allowing both ground-based and space-based telescopes around the world the opportunity to observe the burst's afterglow.



SCANNING RAMAN LIDAR

The SRL makes use of Raman scattering in the atmosphere to measure various atmospheric properties. This permits the study and improved understanding of mesoscale dynamics, warm and cold clouds and aerosols.



Science On a Sphere

This mesmerizing visualization system developed by the National Oceanic and Atmospheric Administration (NOAA) uses computers and video projectors to display animated data on the outside of a suspended, 6-foot diameter, white sphere. Four strategically placed projectors work in unison to coat the sphere with data such as '3-D surface of the earth and Nighttime Lights,' 'moon and Mars' and 'X-Ray Sun.' Maurice Henderson and system administrators, Pankaj Jaiswal and Kevin Miller, have contributed their time and expertise to the deployment of Science on a Sphere at Goddard's Visitor Center.



Sea-viewing Wide Field-of-view Sensor

The purpose of the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) Project is to provide quantitative data on global ocean bio-optical properties to the Earth science community. Subtle changes in ocean color signify various types and quantities of marine phytoplankton (microscopic marine plants), the knowledge of which has both scientific and practical applications. The SeaWiFS Project will develop and operate a research data system that will process, calibrate, validate, archive and distribute data received from an Earth-orbiting ocean color sensor. A detailed description of the objectives, organization and operations as well as the current status of the SeaWiFS Project is available.



SeaStar Spacecraft

The SeaStar satellite carries the SeaWiFS instrument which is designed to monitor the color of the world's oceans.



SED Virtual Machine Environment (SEDVME)

The SED Virtual Machine Environment (SEDVME) centrally hosts and manages web server and data applications for Code 600.



SED Web Services

The SED Web Services Group provides comprehensive support for the Sciences and Exploration Directorate's web presence.



Shuttle Radar Topography Mission

The Shuttle Radar Topography Mission (SRTM) obtained elevation data on a near-global scale to generate the most complete high-resolution digital topographic database of Earth. SRTM consisted of a specially modified radar system that flew onboard the Space Shuttle Endeavour during an 11-day mission in February of 2000. SRTM collected an unprecedented 8.6 Terabytes of interferometric C-band Synthetic Aperture Radar (SAR) data (equivalent to about 14,317 CDs). This data will be processed to produce a rectified terrain-corrected mosaic of approximately 80% of the Earth's land surface topography (between 60 degrees North and 56 degrees South latitude) at 30-meter resolution. This will be the most accurate and complete topographic map of Earth's surface that has ever been assembled.



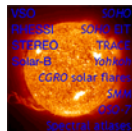
Soil Moisture Active-Passive Mission

SMAP will provide global observations of soil moisture and freeze/thaw state, together termed the hydrosphere state. SMAP hydrosphere state measurements will be used to enhance understanding of the processes that link the water, energy and carbon cycles, and to extend the capability of weather and climate prediction models. SMAP data will be used to quantify net carbon flux in boreal landscapes and to develop improved flood and drought prediction capabilities. SMAP has been recommended by the National Research Council (NRC) Earth Science Decadal Survey Panel for launch in the 2010-2013 time frame.



Solar and Heliospheric Observatory (SoHO)

The Solar and Heliospheric Observatory was designed to study the internal structure of the sun, its extensive outer atmosphere and the origin of the solar wind.



Solar Data Analysis Center (SDAC)

Solar Data Analysis Center (SDAC) provides resources for solar imagery and related solar-terrestrial observations.



Solar Dynamics Observatory (SDO)

The Solar Dynamics Observatory will further our understanding of the sun's influence on Earth and near-Earth space by studying the solar atmosphere on small scales of space and time, and in many wavelengths simultaneously.

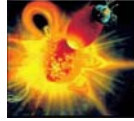


Solar Orbiter

Solar Orbiter will provide close-up views of the Sun's polar regions and its back-side and will tune its orbit to the direction of the Sun's rotation as to allow the spacecraft to observe one specific area for much longer than currently possible.

Solar Probe PLUS

Solar Probe+ will be an extraordinary and historic mission, exploring what is arguably the last region of the solar system to be visited by a spacecraft, the Sun's outer atmosphere or corona



as it extends out into space.



Solar Radiation and Climate Experiment

A NASA-sponsored satellite mission that will provide state-of-the-art measurements of incoming x-ray, ultraviolet, visible, near-infrared, and total solar radiation.



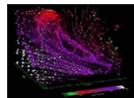
Solar Sentinels

The Solar Sentinels mission consists of four identical spinning spacecraft that observe the energetic particle environment and solar wind structures in the inner heliosphere, near the ecliptic plane.



Sounding Rockets

For over 40 years the Sounding Rocket Program has provided critical scientific, technical, and educational contributions to the nation's space program and is one of the most robust, versatile, and cost-effective flight programs at NASA.



Space Physics Data Facility (SPDF)

The SPDF is a project of the Heliospheric Science Division (HSD) at NASA's Goddard Space Flight Center. SPDF consists of web-based services for survey and high resolution data and trajectories.



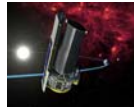
Space Telescope Imaging Spectrograph

STIS provides medium and high spectral resolution imaging in the ultraviolet and visible wavelength bands.



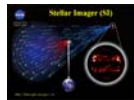
Spaceborne Imaging Radar-C

Spaceborne Imaging Radar-C/X-Band Synthetic Aperture Radar (SIR-C/X-SAR), part of NASA's Mission to Planet Earth, was a joint U.S.-German-Italian project that studied changes to our global environment. The instrument was flown aboard two of the space shuttle Endeavour's missions, STS-59 from April 9-20, 1994 and STS-68 from September 30-October 11, 1994.



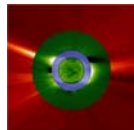
Spitzer Space Telescope

The Spitzer Space Telescope (formerly SIRTf, the Space Infrared Telescope Facility) was launched into space by a Delta rocket from Cape Canaveral, Florida on 25 August 2003. During its mission, Spitzer obtains images and spectra by detecting the infrared energy, or heat, radiated by objects in space between wavelengths of 3 and 180 microns (1 micron is one-millionth of a meter). Most of this infrared radiation is blocked by the Earth's atmosphere and cannot be observed from the ground.



Stellar Imager

A Space-Based UV/Optical Interferometer (UVOI) with over 200x the resolution of HST



STEREO COR1

The Cor1 coronagraphs are part of the Sun Earth Connection Coronal and Heliospheric Investigation (SECCHI) package onboard the twin STEREO spacecrafts.



STEREO In-situ Measurements of Particles and CME Transients (IMPACT)

IMPACT is one of the STEREO mission's four measurement packages whose principal objective is to understand the origin and consequences of coronal mass ejections (CME's).



Stratospheric Aerosol and Gas Experiment

The Stratospheric Aerosol and Gas Experiment (SAGE III) was the EOS component of the Russian Meteor-3M mission. SAGE III provided accurate, long-term measurements of ozone, aerosols, water vapor, and other key parameters of Earth's atmosphere. Due to a power



supply system failure, communication with the satellite was lost on March 6, 2006 and the SAGE III and Meteor-3M missions were terminated.

Stratospheric Observatory for Infrared Astronomy

SOFIA is a 2.5-meter telescope for infrared to far-infrared astrophysics carried aboard a Boeing 747-SP aircraft. GSFC is responsible for the SAFIRE instrument.



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Super Trans-Iron Galactic Element Recorder (Super-Tiger)

Super Trans-Iron Galactic Element Recorder (Super-Tiger) is a large-area instrument for measurement of the abundances of elements of atomic number Z in the interval $30 \leq Z \leq 42$; with an unprecedented combination of individual-element resolution and statistical precision and will make exploratory measurements through $Z=56$.



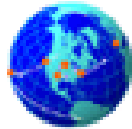
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Surface Water Ocean Topography

SWOT is being developed by an international group of hydrologists and oceanographers to provide a better understanding of the world's oceans and its terrestrial surface waters. It will give scientists their first comprehensive view of Earth's freshwater bodies from space and much more detailed measurements of the ocean surface than ever before.



Surface-sensing Measurements for Atmospheric Radiative Transfer/Chemical, Optical, & Microphysical Measurements of In-situ Troposphere

Surface-sensing Measurements for Atmospheric Radiative Transfer (SMART)-Chemical, Optical, & Microphysical Measurements of In-situ Troposphere (COMMIT) is a suite of instruments that take measurements (both in-situ and by remote sensing) to characterize, as completely as possible, the atmosphere at a given location. SMART and COMMIT are both mobile, which allows them to be sent to locations that exhibit interesting atmospheric phenomena and to participate in coordinated measurement campaigns.



Suzaku

Suzaku (formerly Astro-E2) is Japan's fifth X-ray Astronomy mission. It was developed at the Institute of Space and Astronautical Science of Japan Aerospace Exploration Agency (ISAS/JAXA), Japan, in collaboration with U.S. (NASA/GSFC, MIT) and Japanese institutions, and launched on 2005 July 10. Suzaku is the recovery mission for ASTRO-E, which did not achieve orbit during launch in February 2000.



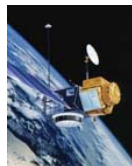
Terra

The Terra (formerly called EOS AM-1) satellite is the flagship of NASA's Earth Science Missions. Terra is the first EOS (Earth Observing System) platform and provides global data on the state of the atmosphere, land, and oceans, as well as their interactions with solar radiation and with one another.



Terrestrial Planet Finder

A series of two missions to detect and characterize earth-like planets around nearby stars.



The Ocean Topography Experiment POSEIDON

TOPEX/Poseidon monitored global ocean circulation, improved global climate predictions, and tracked El Niño conditions and ocean eddies. After over 62,000 orbits, the satellite has ceased operations. TOPEX/Poseidon remains in orbit 830 miles above the Earth, posing no threat to the planet.



Theory and Observation Group

The Theory and Observation Group is part of the Astrochemistry Laboratory in the Solar System Exploration Division at NASA's Goddard Space Flight Center. We specialize in developing theoretical models for the formation and destruction of molecules in comets, the interstellar medium, and other extraterrestrial environments. We also are active in using radio telescopes to study the chemistry of these same regions of the galaxy.

Thermosphere Ionosphere Mesosphere Energetics and Dynamics (TIMED)



The TIMED (Thermosphere Ionosphere Mesosphere Energetics and Dynamics) mission is studying the influences of the Sun and humans on the least explored and understood region of Earth's atmosphere - the Mesosphere and Lower Thermosphere/ Ionosphere (MLTI).



Time History of Events and Macroscale Interactions during Substorms (THEMIS)

The THEMIS satellites help scientists answer questions about changes in aurora, commonly called the Northern Lights or the Southern Lights, depending on their location.



Tomographic Experiment using Radiative Recombinative Ionospheric EUV and Radio Sources

The Tomographic Experiment using Radiative Recombinative Ionospheric EUV and Radio Sources (TERRIERS) mission was a very small "University-class" explorer intended to study a number of ionospheric and thermospheric phenomena, and test the utility of long-term solar EUV (extreme ultraviolet) irradiance measurements. Shortly after launch, the spacecraft failed to properly orient its solar panels towards the Sun and ran out of battery power.

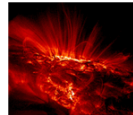


Total Ozone Mapping Spectrometer-Earth Probe

The Total Ozone Mapping Spectrometer, launched onboard an Earth Probe Satellite (TOMS-EP), continued NASA's long-term daily mapping of the global distribution of the Earth's atmospheric ozone. TOMS-EP made high-resolution measurements of the total column amount of ozone from space. These measurements began when the instrument was aboard NASA's Nimbus-7 satellite (1978) and the Russian Meteor-3 satellite (1994).

TRACE

The Transition Region and Coronal Explorer (TRACE) explores the three-dimensional magnetic structures of the sun's photosphere. It also examines both the geometry and dynamics of the upper solar atmosphere, called the transition region and corona.



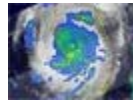
Transition Region And Coronal Explorer (TRACE)

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Tropical Composition, Cloud and Climate Coupling

The TC4 study will tackle challenging questions about Earth's ozone layer and climate using coordinated observations from satellites and high-flying NASA airplanes.



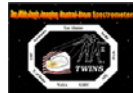
Tropical Rainfall Measuring Mission

TRMM is a joint mission between NASA and the Japan Aerospace Exploration Agency designed to monitor and study tropical rainfall.



Twin Rockets to Investigate Cusp Electrodynamics (TRICE)

The TRICE mission's scientific goals were aimed at distinguishing between signatures of pulsed reconnection versus those of steady reconnection, as well as investigating ionospheric cusp electrodynamics.



Two Wide-Angle Imaging Neutral-Atom Spectrometers (TWINS)

TWINS stereoscopically images the magnetosphere and the charge exchange energetic neutral atoms (ENAs) over a broad energy range (~1-100?keV) by using two identical instruments on two widely spaced high-altitude, high-inclination spacecraft.

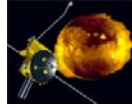


Ulysses Unified Radio and Plasma Wave Experiment

The URAP experiment provides electric field measurements from "DC" to 1 MHz and magnetic field measurements from 0.22 to 450 Hz. These bandwidths permit the study of radio emissions from solar ejecta, interplanetary transients, and planetary magnetospheres and of in situ plasma waves associated with interplanetary shocks, coronal mass ejections, and other transients. The radio observations provide an important remote diagnostic of solar flares and shocks. The plasma wave observations are critical to the understanding of instabilities that exist throughout the interplanetary medium (IPM). Furthermore, analyses of the URAP data permit deriving fundamental characteristics of the solar wind, such as electron density and temperature.

Ulysses

Ulysses mission science objectives were to investigate, as a function of heliographic latitude, the properties of the solar wind, the structure of the Sun/wind interface, the heliospheric

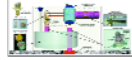


magnetic field, solar radio bursts and plasma waves, solar X-rays, solar and galactic cosmic rays, and both interstellar and interplanetary neutral gas and dust.



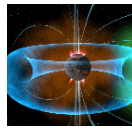
Upper Atmosphere Research Satellite

After a 14-year deployment on a mission to collect data on Earth's atmosphere and its interactions with the Sun, NASA's Upper Atmosphere Research Satellite (UARS) ceased operations on December 12, 2005. Launched from the Space Shuttle Discovery on September 15, 1991, the seven-ton spacecraft orbited the Earth more than 78,000 times, using 10 onboard scientific instruments to collect data on a variety of chemicals, including carbon dioxide, ozone, chlorine, methane, nitrogen oxides and chlorofluorocarbons.



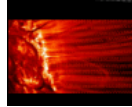
Volatile Analysis by Pyrolysis of Regolith

VAPoR (Volatile Analysis by Pyrolysis of Regolith) is a miniature version of the Sample Analysis at Mars (SAM) instrument that is flying on the 2009 Mars Science Laboratory (MSL). The suitcase-size instrument will investigate the volatile content of lunar regolith, determine the abundance of water and other volatiles, and help to establish their origin (terrestrial, lunar, solar, or exogenous).



Virtual Energetic Particle Observatory (VEPO)

The Virtual Energetic Particle Observatory (VEPO) serves the heliophysics data user community as a focus group component operating within the domain of the Virtual Heliospheric Observatory (VHO) for improved discovery, access, understandability, and usability of energetic particle data products from selected spacecraft and sub-orbital instruments within the VEPO Data Source Environment.



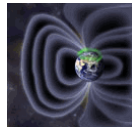
Virtual Heliospheric Observatory (VHO)

The Virtual Heliospheric Observatory (VHO) is being creates a single point of uniform discovery, access, and use of heliospheric (VHO) data.



Virtual Ionospheric Thermospheric Mesospheric Observatory (VITMO)

The Virtual Observatory for the Ionosphere Thermosphere Mesosphere Community (VITMO) is being implemented at JHU/APL and provides data covering the Ionosphere Thermosphere Mesosphere (ITM).



Virtual Magnetospheric Observatory (VMO)

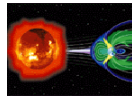
The Virtual Magnetospheric Observatory (VMO) is being creates a single point of uniform discovery, access, and use of magnetospheric (VMO) data.



Virtual Solar Observatory

Virtual Solar Observatory (VSO)

The Virtual Solar Observatory (VSO) is a software system linking together distributed archives of solar data into a unified whole, along with data search and analysis tools.



Virtual Space Physics Observatory (VSPO)

The Virtual Space Physics Observatory (VSPO) is an evolving system for making data easily available from all missions relevant to the global problem of the effects of solar particles and fields on the Earth. The VSPO is one of several efforts towards the Living With A Star Data Environment (LWSDE).



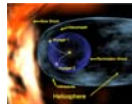
Virtual Wave Observatory (VWO)

The goal of the Virtual Wave Observatory (VWO) is to make Heliophysics plasma wave and radiation data search-able, understandable and usable by the Heliophysics community.



Voyager Cosmic Ray Subsystem (CRS)

The Voyager Cosmic Ray Subsystem (CRS) is designed to exploit to the fullest practical degree the proposed trajectories of Voyager-1 and -2. The significance of these measurements will be greatly enhanced by concurrent measurements with similar particle telescopes on satellites such as the Pioneers, IMPs, and similar series in near-earth orbits.



Voyager Magnetometer Experiment (MAG)

The Voyager magnetometers are now a key component of the Voyager Interstellar Mission, collecting measurements of magnetic fields far from the Sun.



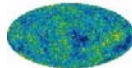
Weather and Research Forecast

The WRF is a next-generation mesoscale forecast model and assimilation system that will be used to advance the understanding and the prediction of mesoscale precipitation systems. It consists of four primary subsystems, (1) WRF Standard Initialization (WRFSI), (2) WRF Variational Data assimilation system (WRF-Var), (3) Advanced Research WRF (ARW) dynamic solver, (4) Numerous physics packages contributed by research community. The WRF model will be used for a wide range of applications, from idealized research to operational forecasting, with an emphasis on horizontal grid sizes in the range of 1-10 km. WRF can resolve the small-scale weather features such as front, localized convection, hurricane core, and topographic effect much better than the global model.



Wide Field Camera 3

With a "panchromatic" grasp of light extending from the ultraviolet through the visible and into the infrared, WFC3 is an extremely powerful imaging instrument, extending Hubble's capabilities by seeing deeper into the universe. WFC3 was installed in the Hubble Space Telescope during Servicing Mission 4.



Wilkinson Microwave Anisotropy Probe

WMAP has made a map of the temperature fluctuations of the Cosmic Microwave Background radiation with much higher resolution, sensitivity, and accuracy than COBE. The new information contained in these finer fluctuations sheds light on several key questions in cosmology including the structure and physical parameters of the universe.



WIND

Wind's goals are to study the magnetosphere and ionosphere and investigate basic plasma processes occurring in the near-Earth solar wind.



Wind Magnetic Field Investigation (MFI)

Magnetic Field Investigation (MFI) instrument, onboard the WIND spacecraft, was based on the magnetometers previously developed for the Voyager, ISPM, GIOTTO, and Mars Observer missions which represent state-of-the-art instruments with unparalleled performance.



WIND Solar Wind Experiment (SWE)

The Solar Wind Experiment (SWE) will measure ions and electrons in the solar wind and the foreshock regions (particles whose energies are in the kiloelectronvolt range).



WIND WAVES (WAVES)

The WAVES instrument, onboard the WIND spacecraft, will provide comprehensive measurements of the radio and plasma wave phenomena which occur in the solar wind upstream of the Earth's magnetosphere and in key regions of the magnetosphere.



X-Ray & Gamma Ray Detector Laboratory

Our research group is part of the Astrochemistry Laboratory in the Solar System Exploration Division at NASA's Goddard Space Flight Center. We specialize in the design, construction, testing, and application of new detection systems for high-energy particles.



X-ray Multi-Mirror

XMM-Newton can reveal the details of the creation of elements by probing the amount of oxygen, silicon, iron, and other elements in stars, supernova remnants, galaxies, and clusters of galaxies. XMM-Newton's sensitive measurements will help scientists explain how gases are heated to extraordinary energies in the corona of a star, and how cosmic ray particles are accelerated in young supernova remnants.



Year of Tropical Convection (YOTC)

YOTC, a joint activity of the World Climate Research Programme (WCRP) and World Weather Research Programme (WWRP)/THORPEX is year of coordinated observing, modeling, and forecasting with a focus on organized tropical convection, its prediction, and predictability.



NASA Official: Dr. Michelle L. Thaller

Curator: Karen Smale