

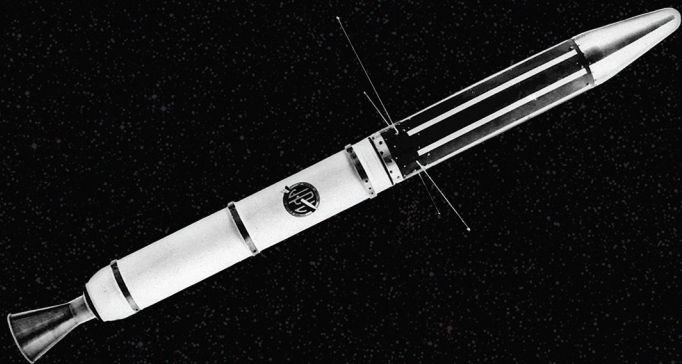
National Aeronautics and Space Administration

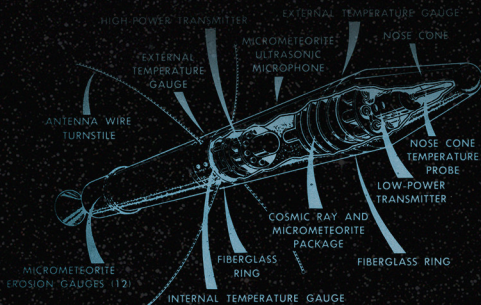


# Explorer 1

# 60 Years

of Earth Observations



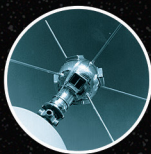


## Explorer 1

Launched Jan. 31, 1958, Explorer 1 was the first U.S. satellite and discovered the Van Allen Radiation Belts.

# 1950s

60 Years of Earth Observations



## Vanguard 1

The second U.S. and first solar-powered satellite, Vanguard 1 tested launch capabilities and spacecraft systems.





## TIROS 1

The first U.S. weather satellite, Television Infrared Observation Satellite 1, demonstrated accurate weather forecasts were possible based on data gathered from space.

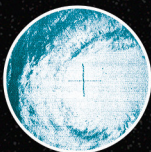
# 1960s

60 Years of Earth Observations



## Echo 1

The "satelloon" – a long-term, high-altitude balloon – was the first satellite to enable two-way, live communications by reflecting radio and radar signals.



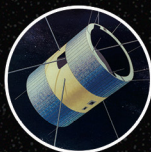
## TIROS 3

TIROS 3 captured the first image of a hurricane from space, Hurricane Esther, supplementing ground-based and aircraft observations.



## Nimbus 1

The first of seven Nimbus missions that provided weather, environmental and atmospheric observations over 30 years, Nimbus 1 returned the first global images of clouds and large weather systems.



## ATS 1

The first of six Applications Technology Satellite missions designed to test satellite technologies, ATS 1 captured the first full-disk images of Earth from geosynchronous orbit.



## GOES-1

The Geostationary Operational Environmental Satellite program began in 1975 as a joint effort of NASA and the National Oceanic and Atmospheric Administration (NOAA).



## SAM 1

Conducted on the Apollo-Soyuz Test Project, the Stratospheric Aerosol Measurement experiment marked the first time atmospheric aerosol measurements were taken from space.



## Seasat

Seasat was the first satellite specifically designed to test sensors to better understand Earth's ocean.



## Nimbus 7

The last of its series, Nimbus 7 marked the beginning of space-based Earth System Science – looking at the planet as an interconnected system.



# 1970s

60 Years of Earth Observations



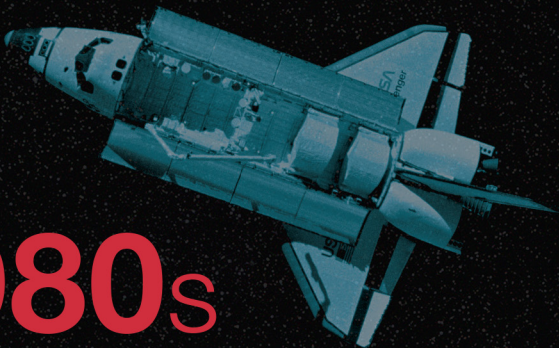
## Landsat-1

Landsat-1, originally designated Earth Resources Technology Satellite 1, was the first in an ongoing series of NASA/U.S. Geological Survey (USGS) satellites that have monitored Earth's land masses for over 45 years.



## ERBS

The Earth Radiation Budget Satellite investigated the Sun-Earth connection and was instrumental in determining how natural and human activities affect the planet's radiation balance and ozone layer.



# 1980s

60 Years of Earth Observations



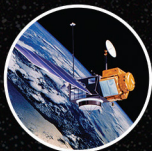
## OSTA-1

The first Space Shuttle scientific payload, Office of Space and Terrestrial Applications 1, performed remote sensing of Earth's atmosphere, oceans and land resources.



## TDRS-1

The Tracking and Data Relay Satellite 1 was the first in an ongoing series of satellites that form a space-based data communications network.



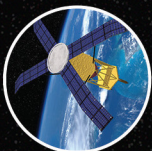
## TOPEX/Poseidon

A NASA/CNES collaboration, TOPEX/Poseidon delivered the first highly accurate sea surface height measurements.



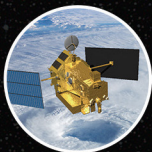
## UARS

The Upper Atmosphere Research Satellite was the first satellite dedicated to stratospheric science.



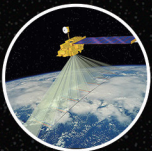
## SeaWiFS

The Sea-viewing Wide Field-of-view Sensor collected the first global ocean biological data, providing observations about life on Earth.



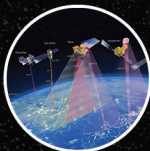
## TRMM

The precipitation radar on the Tropical Rainfall Measuring Mission was the first spaceborne instrument to provide 3D maps of storm structure.



## Terra

The flagship satellite of NASA's Earth Observing System, Terra's five instruments provide a comprehensive look at Earth System Science.



## A-Train

NASA and international partners operate multiple Earth-observing satellites orbiting together in the Afternoon Constellation, including Aqua, Aura, CloudSat and CALIPSO.



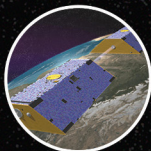
## SRTM

Flown aboard Space Shuttle *Endeavour*, the Shuttle Radar Topography Mission produced the first near-global data set of land elevations.



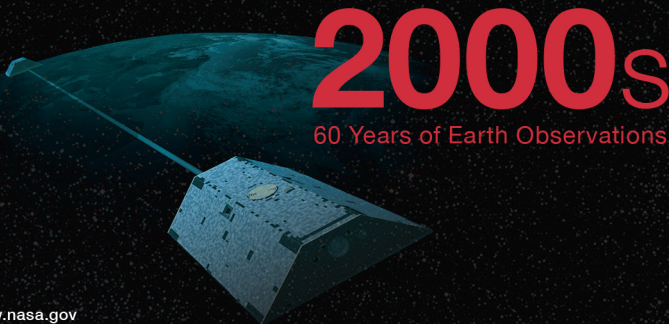
## ICESat

The Ice, Cloud and land Elevation Satellite was the first mission to use laser-ranging (lidar) for continuous observations of the surface elevation of the Antarctic and Greenland ice sheets.



## GRACE

A joint NASA/German Aerospace Centre (DLR) mission, the Gravity Recovery and Climate Experiment tracked the continuous movement of liquid water, ice and solid ground for more than 15 years.



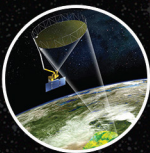
# 2000s

60 Years of Earth Observations



## OCO-2

The Orbiting Carbon Observatory 2 is NASA's first spacecraft dedicated to studying atmospheric carbon dioxide. It orbits as part of the A-Train constellation.



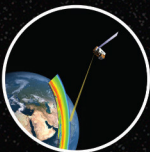
## SMAP

The Soil Moisture Active Passive mission is NASA's first to measure the amount of water in the top layer of soil and its freeze/thaw state.



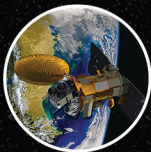
## GPM

The Global Precipitation Measurement mission is an international network of satellites, including the NASA/JAXA Core Observatory, that provides global observations of rain and snow.



## Suomi NPP

The NASA/NOAA/DOD Suomi National Polar Orbiting Partnership satellite was developed to both collect a wide-range of land, ocean and atmospheric data and address operational weather forecasting.



## Aquarius

NASA and Argentina's space agency (CONAE) operated the first dedicated sea surface salinity satellite instrument as part of the SAC-D mission.



## CYGNSS

Small spacecraft and satellites, such as the Cyclone Global Navigation Satellite System, advance scientific and human exploration, reduce cost and expand access to space.

# 2010s

60 Years of Earth Observations