

**Spacecraft Descriptions (Atmosphere/Climate relevant)
by Charles Jackman**

EOS-Aqua Earth Observing System Aqua

Agency: NASA (United States)

Website: <http://aqua.nasa.gov/>

Goal: Earth Observing System (EOS) Aqua 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, including evaporation from the oceans, water vapor in the atmosphere, clouds, precipitation, soil moisture, sea ice, land ice, and snow cover on the land and ice. Additional variables also being measured by Aqua include radiative energy fluxes, aerosols, vegetation cover on the land, phytoplankton and dissolved organic matter in the oceans, and air, land, and water temperatures. The satellite is making critical contributions to the monitoring of terrestrial and marine ecosystem dynamics. Aqua is the second in a series of major Earth observing satellites to study the environment and climate change and is part of NASA's Earth Science Enterprise.

Measurements:

Earth Science: Measure atmospheric water vapor content, rainfall, cloud parameters (liquid water content, ice indication, temperature, pressure), temperature (atmospheric, sea surface, land surface), radiative fluxes (reflected, emitted), trace gases (ozone, carbon dioxide, carbon monoxide, methane), aerosols, vegetation parameters (cover, productivity, leaf area index, burn scars, etc.), land parameters (cover type, cover change, snow cover, surface soil moisture, etc.), ocean parameters (chlorophyll fluorescence, primary productivity, absorption coefficients, sea ice content, etc.).

Orbit: Altitude to be 705 km, inclination 98.2 degrees.

Status: Launched on May 24, 2002. Fully operational.

EOS-Aura Earth Observing System Aura

Agency: NASA (United States)

Website: <http://aura.gsfc.nasa.gov/>

Goal: Earth Observing System (EOS) Aura is a NASA mission to study the Earth's ozone, air quality and climate. This mission is designed exclusively to conduct research on the composition, chemistry and dynamics of the Earth's upper and lower atmosphere employing multiple instruments on a single satellite. EOS Aura is the third in a series of

major Earth observing satellites to study the environment and climate change and is part of NASA's Earth Science Enterprise.

Measurements:

Earth Science: Measure stratospheric and tropospheric ozone and chemical compounds found in the atmosphere that affect ozone chemistry and processes. Measure temperature, stratospheric clouds, cloud parameters (pressure, coverage), and aerosols.

Orbit: Altitude to be 705 km, inclination 98.2 degrees.

Status: To be launched on July 10, 2004.

EOS-Terra Earth Observing System Terra

Agency: NASA (United States)

Website: <http://eos-am.nasa.gov/>

Goal: Earth Observing System (EOS) Terra is a NASA Earth Science satellite mission named for the large amount of information that the mission will be collecting about the Earth's surface. Terra is the first in a series of major Earth observing satellites to study the environment and climate change and is part of NASA's Earth Science Enterprise.

Measurements:

Earth Science: Measure land parameters (cover type, cover change, vegetation dynamics, surface temperature, fire occurrence, volcanic effects, ice and snow cover), ocean parameters (phytoplankton, dissolved organic matter, surface temperature), and atmosphere parameters (cloud properties, radiative energy fluxes, methane, carbon monoxide, aerosol properties, temperature, humidity).

Orbit: Altitude to be 705 km, inclination 98.3 degrees.

Status: Launched on December 18, 1999. Fully operational.

EP-TOMS Earth Probe Total Ozone Mapping Spectrometer

Agency: NASA (United States)

Website: <http://toms.gsfc.nasa.gov/eptoms/ep.html>

Goal: The primary mission of the EP-TOMS spacecraft is to characterize total column ozone variations on a global scale.

Measurements:

Earth Science: Total column ozone, aerosol particulates (both tropospheric and stratospheric), and reflectivity measurements show variations as functions of time and latitude on a global scale. Erythemal ultraviolet (UV) exposure is also a product, which indicates levels of potentially cell-damaging solar UV flux for a particular day.

Orbit: Altitude 740 km, inclination 98.4 degrees.

Status: Launched on July 2, 1996. It is fully operational, but there are calibration questions because of optical degradation.

ERBS Earth Radiation Budget Satellite

Agency: NASA (United States)

Website: <http://www-sage2.larc.nasa.gov>

Goal: ERBS is part of NASA's three satellite Earth Radiation Budget Experiment (ERBE) designed to investigate how energy from the Sun is absorbed and re-emitted by the Earth. The process of absorption and re-radiation is one of the principal drivers of the Earth's weather patterns. Observations from ERBS are also being used to determine the effects of human activities (such as burning fossil fuels and the use of chlorofluorocarbons) and natural occurrences (such as volcanic eruptions and the solar cycle) on the Earth's radiation budget.

Measurements:

Earth Science: The SAGE-II (Stratospheric Aerosol and Gas Experiment) instrument aboard ERBS has provided valuable information about profile ozone, and other chemical compounds and aerosols, which affect ozone chemistry and processes, for over 20 years. The total solar irradiation from the ERBE (Earth Radiation Budget Experiment) instrument provides valuable information of large-scale solar radiation changes for climate change assessment purposes.

Orbit: Altitude 580 km, inclination 57 degrees.

Status: Launched on October 5, 1984. The ERBE instrument is still fully operational. The SAGE-II instrument is still operational, however, scanning problems on have decreased data collection by about 50%.

POAM III Polar Ozone and Aerosol Measurement

Agency: developed by Naval Research Laboratory (United States); launched on the SPOT-4 satellite by the French space agency CNES

Website: <http://wvms.nrl.navy.mil/POAM/poam.html>

Goal: The primary mission of the POAM spacecraft is to measure the vertical distribution of atmospheric ozone, water vapor, nitrogen dioxide, aerosol extinction, and temperature.

Measurements:

Earth Science: Ozone, water vapor, nitrogen dioxide, aerosol extinction, and temperature.

Orbit: Altitude 830 km, inclination 98.8 degrees.

Status: Launched on March 24, 1998. Fully operational.

SAGE-III Stratospheric Aerosol and Gas Experiment

Agency: NASA (United States)

Website: <http://www-sage3.larc.nasa.gov>

Goal: Observations from SAGE-III are being used to determine the effects of human activities (such as the use of chlorofluorocarbons) and natural occurrences (such as volcanic eruptions and the solar cycle) on the Earth's ozone.

Measurements:

Earth Science: The SAGE-III (Stratospheric Aerosol and Gas Experiment) instrument aboard ERBS has provided valuable information about profile ozone, and other chemical compounds and aerosols, which affect ozone chemistry and processes, for over 2 1/2 years.

Orbit: Altitude 1020 km, inclination 99.6 degrees.

Status: Launched on December 10, 2001. Fully operational.