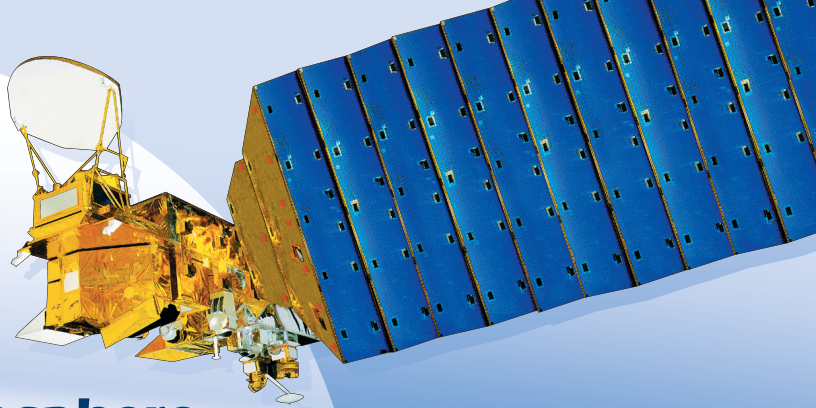


AIRS



Monitoring Earth's Atmosphere

About the Mission

The Atmospheric Infrared Sounder, AIRS, advances climate research and weather prediction into the 21st century. AIRS is one of six instruments onboard Aqua, a satellite that is part of NASA's Earth Observing System. AIRS, along with two partner microwave sounding instruments, represents the most advanced atmospheric sounding system ever deployed in space. Together these instruments observe the global water and energy cycles, climate variation and trends, and the response of the climate system to increased greenhouse gases.

The AIRS instrument measures the amount of infrared energy emitted from the atmosphere. On the

ground, computer programs transform these measurements into temperature, humidity, cloud properties, and the amounts of greenhouse gases. AIRS data even reveals land and sea surface temperatures.

To date, weather balloons have provided the most accurate information for weather forecasting. But these land-launched balloons leave large areas over the ocean unobserved. From the vantage point of space, the AIRS and microwave instruments provide global coverage every day with accuracy comparable to weather balloons. This highly accurate data, gathered over land and sea, ushers in a new era of atmospheric monitoring on a truly global scale.

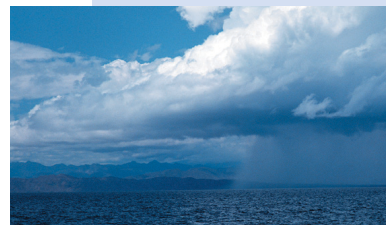
AIRS will:



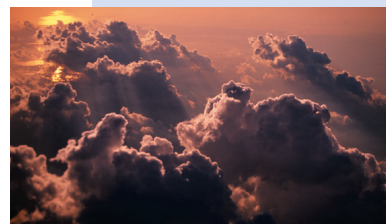
Improve weather forecasting



Establish the connection between severe weather and climate change



Determine if the global water cycle is accelerating



Detect the effects of increased greenhouse gases

The AIRS Instrument:

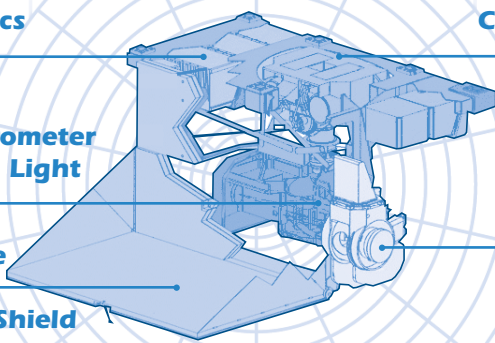
Electronics Module

IR Spectrometer & Visible Light Imager

Radiative Cooler & Earth Shield

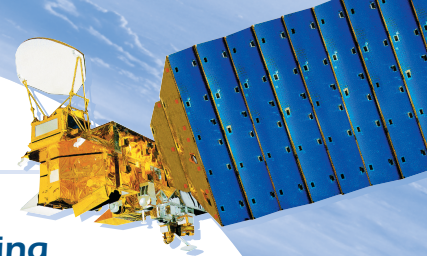
Cooler/Dewar Assembly

Scan Mirror



AIRS

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Infrared Sounding

When ancient mariners needed to know the depth of the water they were sailing in, they would use a weighted line to plumb the depths. They called this practice "sounding." From space, AIRS will "plumb" the atmosphere at multiple depths for temperature and humidity.

The AIRS instrument looks down at the Earth and measures the infrared brightness in many wavelengths. Each infrared wavelength is sensitive to a particular height in the atmosphere. By having multiple infrared detectors, each sensing a particular wavelength, a temperature profile, or sounding of the atmosphere, can be made. While prior space instruments had only 15 detectors, AIRS has 2378. This greatly improves the accuracy, making it comparable to measurements made by weather balloons.

Thick clouds act like a wall to the infrared energy measured by AIRS. However, the microwave instruments

onboard Aqua can see through the clouds with limited accuracy. Using a special computer algorithm, data from AIRS and the microwave instruments will be combined to provide highly accurate measurements in all cloud conditions resulting in a daily global snapshot of the state of the atmosphere.

Instrument Operation

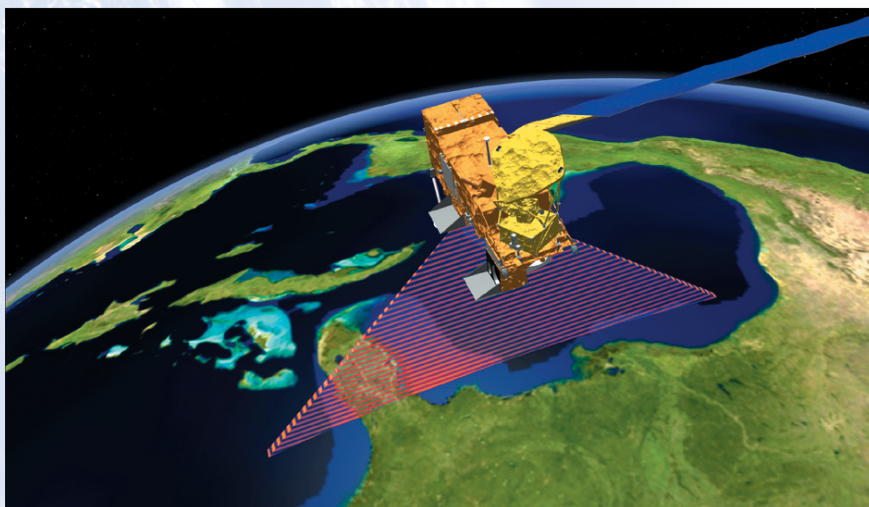
AIRS, built by BAE SYSTEMS for NASA/JPL, is a cross-track scanning instrument. Its scan mirror rotates around an axis along the line of flight and directs infrared energy from the Earth into the instrument. As the spacecraft moves along, this mirror sweeps the ground creating a scan "swath" that extends roughly 800 km on either side of the ground track. Within the AIRS instrument, the infrared energy is separated into wavelengths. This information is sent from AIRS to the Aqua spacecraft, which relays it to the ground.

Improving Weather Prediction

Today's weather forecasts rely on sophisticated computer models of the atmosphere. These models use wind, temperature, moisture and pressure measurements to make predictions about the weather. The accuracy of these forecasts is limited by the accuracy of the data they use. In current forecasting models, error in the data doubles every two or three days and the data quickly loses any informative value. AIRS data improves the accuracy by a factor of 2, increasing the useful range of weather forecasts by two to three days.

AIRS Data

The data collected by AIRS and the companion microwave sounders will be used by scientists around the world to better understand weather and climate, and by the United States National Weather Service and other international forecasting agencies to improve weather prediction.



Data are collected within the scan swath.

AIRS data is publicly available and can be accessed through the Earth Observing System Data Gateway at <http://eos.nasa.gov/imswelcome>.

AIRS Sounding System Contractors:
BAE SYSTEMS, TRW,
MATRA MARCONI SPACE, AEROJET

<http://www.jpl.nasa.gov/airs>



National Aeronautics and
Space Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

JPL 400-1008B 3/02