Polar Orbiting Satellites

Artist's drawing of NOAA-18.
Credit: NOAA

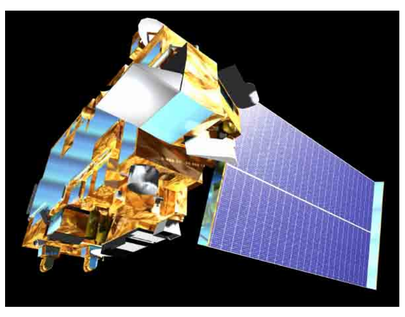
Low Earth Orbit (LEO) satellites are used to collect less frequent but more detailed information. An orbit is defined as LEO when it is at any altitude between 100 - 1,240 miles (160km - 2,000km). There are several types of low earth orbits but the most common for earth and atmospheric science is the polar orbit. Polar orbits can be synchronized to the sun so that the satellite crosses the equator at the same time of day during each orbit. This makes comparisons of changing conditions easier. The polar sun-synchronous orbits are between 435 - 1,056 miles (700km - 1,700km).

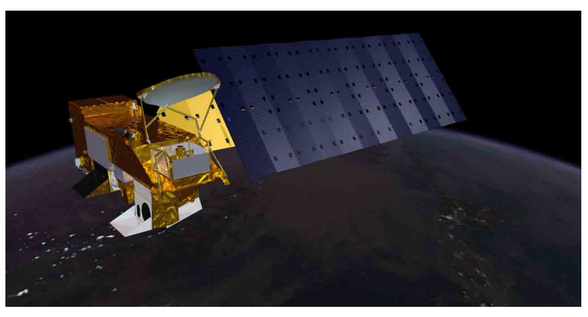
POES System

NOAA's polar-orbiting satellites provide data users with infrared and visible Earth images, as well as soundings of the Earth's atmosphere. They comprise the Polar-orbiting Operational Environmental Satellite (POES) system. "Operational" means the system is robust and dependable. These satellites circle the Earth every 102 minutes, passing near the North and South Poles on each orbit. The orbital period allows each POES satellite to view any point on the Earth at least twice per day. There are currently two operating polar-orbiting environmental satellites and several backups. The POES instruments provide a variety of meteorological, oceanographic, terrestrial, climate, and other specialized data collection services, supporting large-scale immediate and long-range weather forecasting. In addition, POES spacecraft employ space environment monitors, search and rescue instruments and a data collection system.

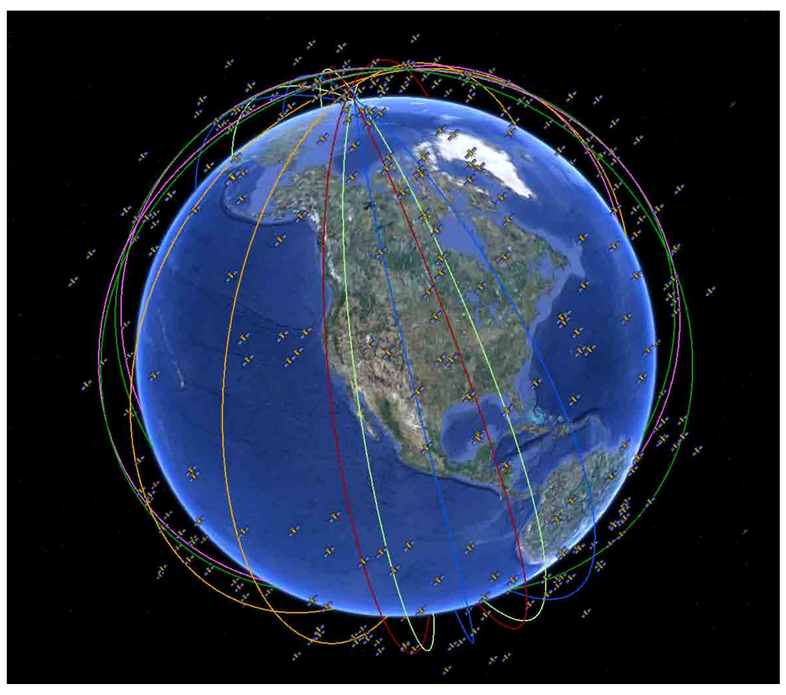
EOS Satellites

NASA's Earth Observation System (EOS) is comprised of research satellites including Aqua, Terra, Landsat-7, EO-1, CloudSat, CALIPSO, and many others. Researchers at the UW-Madison Space Science and Engineering Center make use of data from the multiple instruments on all of these satellites. SSEC receives direct broadcast transmissions of data from the MODIS (Moderate-resolution Imaging Spectroradiometer) sensor on the Aqua and Terra satellites.





Terra (left) is often referred to as the "flagship" of the EOS program. It carries five instruments for measuring earth and atmospheric conditions, including the MODIS sensor. It has been collecting data since February 24, 2000. Aqua (right) carries six instruments including a MODIS sensor. Signals from both of these satellites are received at SSEC several times a day as they pass over UW-Madison. Credit: NASA



This diagram highlights the orbits of satellites in the NOAA-POES system.
Credit: Google Earth, AGI, Sam Batzli, Space Science and Engineering Center, UW-Madison

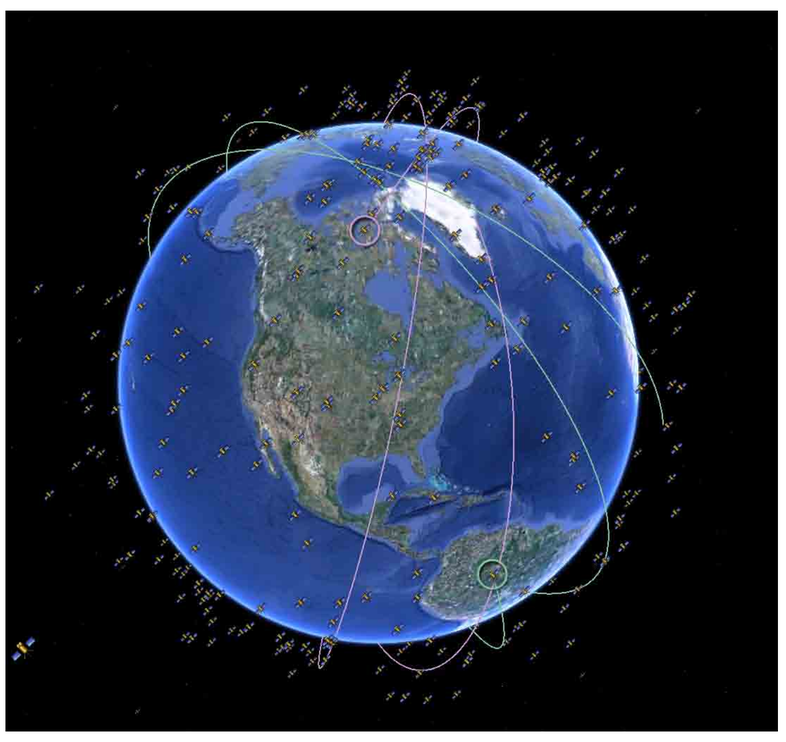
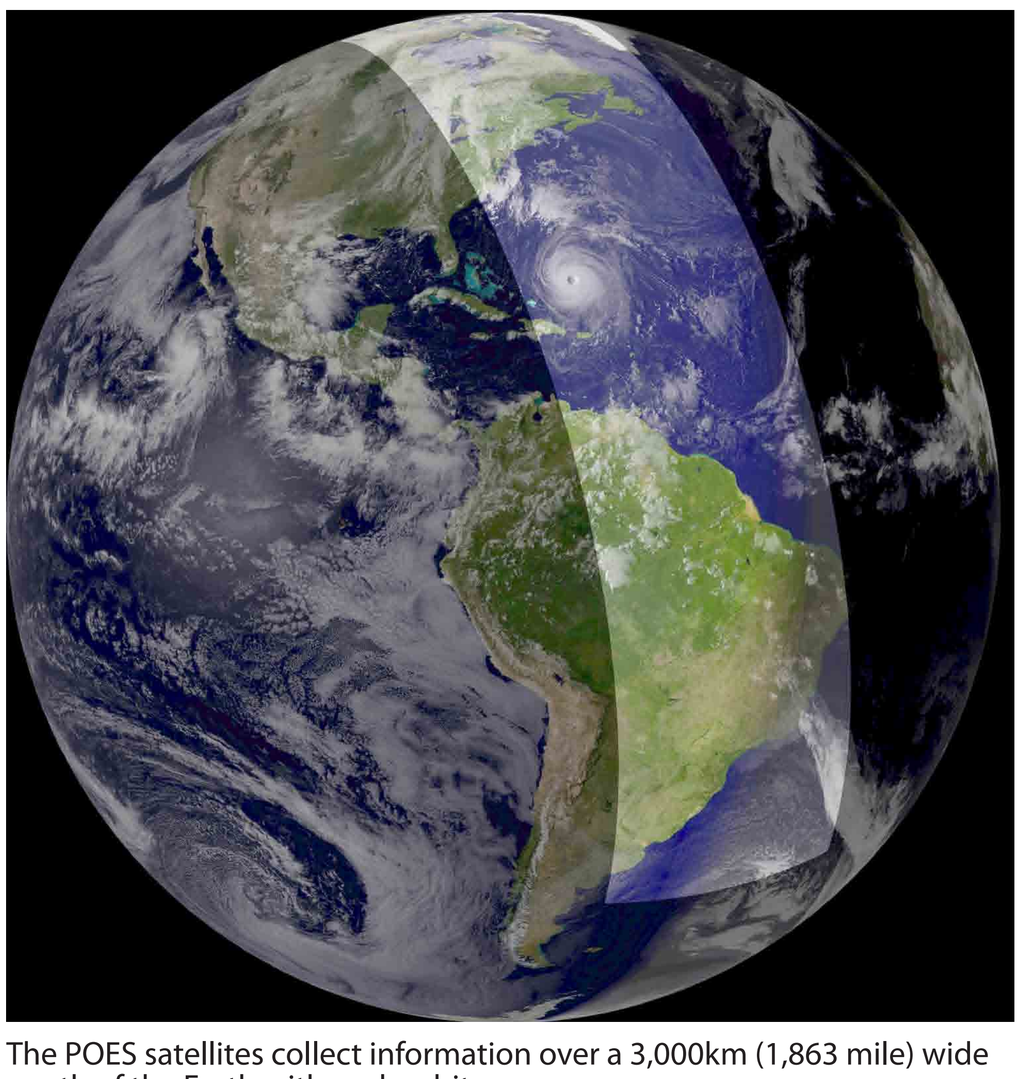
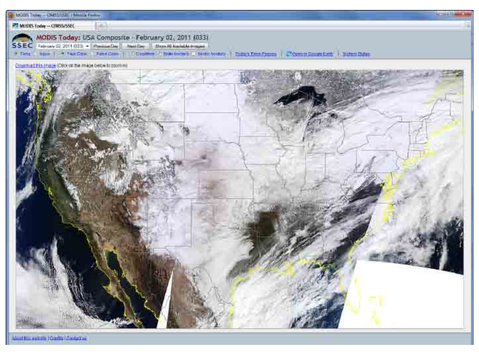


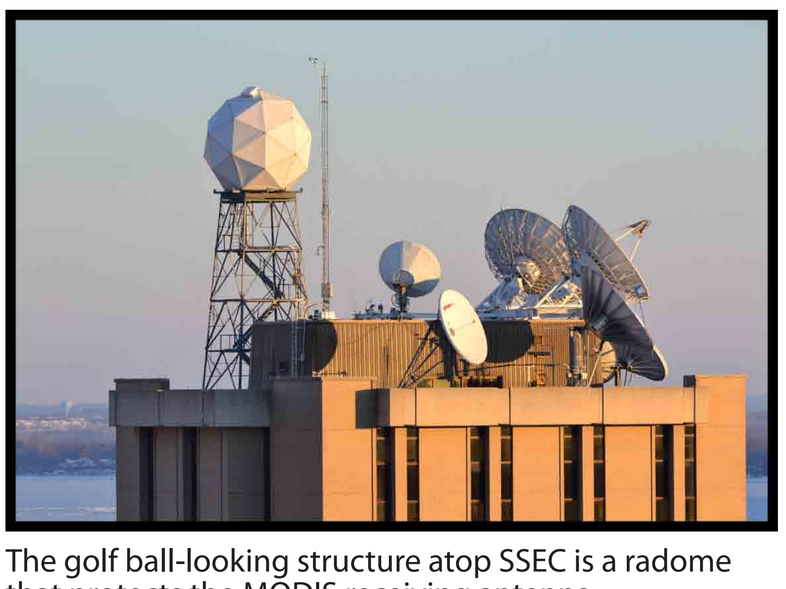
Diagram showing Terra descending over North America (purple orbit) while Aqua ascends over South America (green orbit). Credit: Google Earth, AGI, Sam Batzli, Space Science and Engineering Center, UW-Madison



The POES satellites collect information over a 3,000km (1,863 mile) wide swath of the Earth with each orbit.
Credit: Rick Kohrs, Space Science and Engineering Center, UW-Madison



The MODIS images collected at SSEC are updated several times a day on the MODIS-Today website. http://ge.ssec.wisc.edu/modis-today Credit: SSEC



The golf ball-looking structure atop SSEC is a radome that protects the MODIS receiving antenna.
Credit: Maciej Smuga-Otto

Poster by Sam Batzli, WisconsinView.org and SSEC