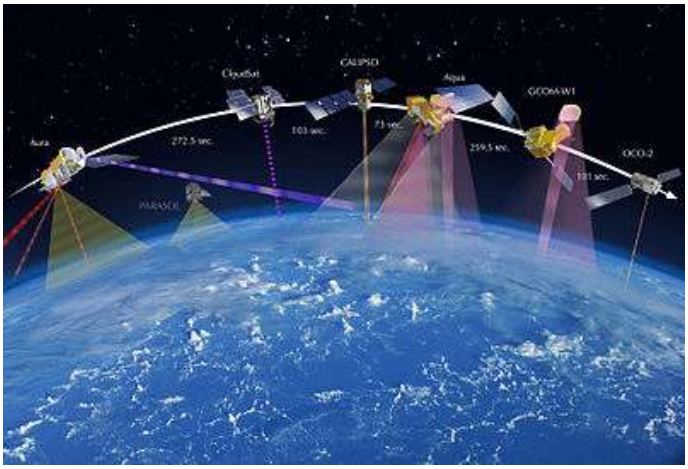
NASA Launches New Carbon Observatory

NASA has successfully launched its first spacecraft dedicated to studying atmospheric carbon dioxide. On Wednesday, July 2nd, at 2:56 a.m. PDT, the Orbiting Carbon Observatory-2 (OCO-2) raced skyward from Vandenberg Air Force Base, California, on a United Launch Alliance Delta II rocket. Approximately 56 minutes after the launch, the observatory separated from the rocket's second stage into an initial 690km orbit. Initial telemetry shows the spacecraft is in excellent condition.

A Delta II rocket leaps off the launch pad to begin NASA's OCO-2 mission at Vandenberg Air Force Base in California.

OCO-2 will begin a minimum two-year mission to locate Earth's sources of and storage places for atmospheric carbon dioxide, the leading human-produced greenhouse gas responsible for warming our world and a critical component of the planet's carbon cycle.

With OCO-2 NASA is uniquely qualified to take on the challenge of documenting and understanding Climate change, the challenge of our generation. It will take NASA's studies of carbon dioxide and the global carbon cycle to new heights. The mission will produce the most detailed picture to date of natural sources of carbon dioxide, as well as their "sinks" -- places on Earth's surface where carbon dioxide is removed from the atmosphere. The observatory will study how these sources and sinks are distributed around the globe and how they change over time. OCO-2 will produce exquisitely precise measurements of atmospheric carbon dioxide concentrations near Earth's surface, laying the foundation for informed policy decisions on how to adapt to and reduce future climate change. Carbon dioxide sinks are at the heart of a longstanding scientific puzzle that has made it difficult for scientists to accurately predict how carbon dioxide levels will change in the future and how those changing concentrations will affect Earth's climate. Scientists currently don't know exactly where and how Earth's oceans and plants have absorbed more than half the carbon dioxide **that human activities have emitted into our atmosphere since the beginning of the industrial era, Measuring the natural CO2 source and sink processes is essential for society to better manage carbon dioxide levels in our atmosphere.**



As of 2014, the A-Train consists of six satellites satellites:
OCO-2, lead spacecraft in formation.
GCOM-W1 "SHIZUKU", follows OCO-2 by 11 minutes.
Aqua runs 4 minutes behind GCOM-W1 NASA 2002.
CloudSat runs 2 minutes and 30 seconds behind Aqua (2006).
CALIPSO, follows CloudSat by 15 seconds (2006).
Aura, lags Aqua by 15 minutes to allow for synergy with Aqua

During the next 10 days, the spacecraft will go through a checkout process and then begin three weeks of maneuvers that will place it in its final 705km near-polar operational orbit at the head of the international Afternoon Constellation, or "A-Train," of Earth-observing satellites.

What is the A-Train? **The A-Train is the first multi-satellite, formation flying "super observatory" to record the health of Earth's atmosphere and surface environment, and collects an unprecedented quantity of nearly simultaneous climate and weather measurements.** Operated by NASA and its international partners this coordinated group of satellites is called the Afternoon Constellation, or the A-Train, for short. It is called so because the satellites, being in a polar orbit, cross the equator northbound at about 1:30 p.m. local time, within seconds to minutes of each other in the Afternoon. This allows near-simultaneous observations of a wide variety of parameters to aid the scientific community in advancing our knowledge of Earth-system science and applying this knowledge for the benefit of society.

The OCO-2 part of the operations will begin about 45 days after launch. Scientists expect to begin archiving calibrated mission data in about six months and plan to **release their first initial estimates of atmospheric carbon dioxide concentrations in early 2015.**

The observatory will uniformly sample the atmosphere above Earth's land and waters, collecting more than 100,000 precise individual measurements of carbon dioxide over Earth's entire sunlit hemisphere every day. Scientists will use these data in computer models to generate maps of carbon dioxide emission and uptake at Earth's surface on scales comparable in size to the state of Colorado. These regional-scale maps will provide new tools for locating and identifying carbon dioxide sources and sinks.

OCO-2 also will **measure a phenomenon called solar-induced fluorescence**, an indicator of plant growth and health. As plants photosynthesize and take up carbon dioxide, they give off a tiny amount of light that is invisible to the naked eye. Because more photosynthesis translates into more fluorescence, data from OCO-2 will help shed new light on the actual uptake of carbon dioxide by plants. AK fom NASA Notes