NASA Facts

National Aeronautics and
Space Administration

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SAC-C Satellite

Mission Objectives

SAC-C is an international cooperative mission between NASA, the Argentine Commission on Space Activities (CONAE), Centre National d'Etudes Spatiales (CNES or the French Space Agency), Instituto Nacional De Pesquisas Espaciais (Brazilian Space Agency), Danish Space Research Institute, and Agenzia Spaziale Italiana (Italian Space Agency). SAC-C was developed through the partnership of its senior partners, CONAE and NASA with contributions from Brazil, Denmark, France, and Italy.

SAC-C will provide multispectral imaging of terrestrial and coastal environments. The spacecraft will study the structure and dynamics of the Earth's atmosphere, ionosphere and geomagnetic field. SAC-C will seek to measure the space radiation in the environment and its influence on advanced electronic components. The satellite will determine the migration route of the Franca whale and verify autonomous methods of attitude and orbit determination.

CONAE is responsible for development of the spacecraft and several instruments. The Brazilian Space Agency provided the testing facilities for SAC-C. The Italian Space Agency has partnered with CONAE to supply both solar panels and two GPS receivers. The Danish Space Research Institute provided the Magnetic Mapping Payload which carries a NASA Supplied Helium Magnetometer, and CNES is contributing an experiment to test the response of electronic circuitry to space radiation. The launch vehicle and some science instruments are provided by NASA. NASA's Goddard Space Flight Center, Greenbelt, Md. is responsible for overall project management.

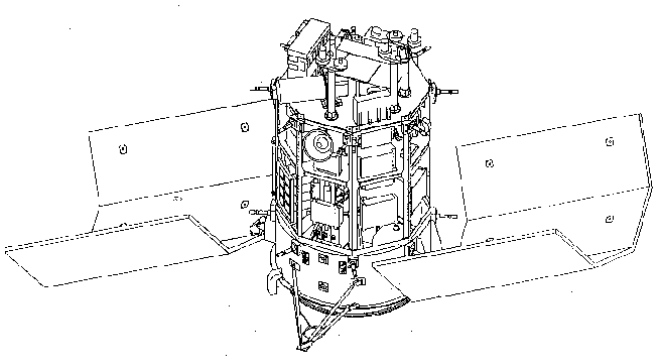
Artist concept of SAC-C in orbit

Launch

The SAC-C mission will be launched on a Delta 7320 rocket from Vandenberg Air Force Base, Calif. in November. The spacecraft will fly in a sun-synchronous circular orbit of 436 miles (702 kilometers) at a 98.2 degree inclination. SAC-C will share its launch vehicle with NASA's EO-1 spacecraft.

Spacecraft

The spacecraft weighs approximately 1,045 pounds (475 kilograms). The spacecraft's launch configuration is 6.8 x 6.1 x 5.4 feet (2.1 x 1.9 x 1.7 meters). The solar arrays are deployed in orbit and will span nearly ten feet. SAC-C will be three-axis stabilized in orbit with orbital maneuvers performed via an onboard propulsion system to maintain selected ground observing locations.



SAC-C General View
(Lateral Panels Removed)

SAC-C Science Objectives

SAC-C science objectives are:

- To provide multispectral images of the Earth in order to monitor the condition and dynamics of the terrestrial and marine biosphere and environment
- To develop and utilize new GPS based techniques to globally measure atmospheric phenomena for the study of weather, seasonal, inter-annual and long term climate change
- To enhance the understanding of the Earth's magnetic field and related Sun-Earth interactions
- To measure high energy radiation environment, trapped particle intensities and energy distribution and correlate them with the degradation of advanced electronic components

NASA Related Science Instruments

The instrument payload for the SAC-C mission comprises 11 different instruments. However, NASA is responsible for only two instruments of the SAC-C complement. The GPS Occultation and Passive Reflection Experiment (GOLPE) instrument, furnished by NASA's Jet Propulsion Laboratory (JPL) in Pasadena, Calif., consists of a TurboRogue III GPS and four high gain antennas, each facing in the up, down, fore and aft directions. The GPS will study the Earth's gravity field by producing post-processed decimeter-level SAC-C orbit measurements. GOLPE will demonstrate and utilize an innovative new GPS remote sensing to study weather and seasonal to long term climate change. GOLPE will measure the refractivity or bending of GPS signals hidden by Earth's atmosphere and ionosphere. At the heart of the GOLPE experiment is an advanced GPS receiver capable of automatically acquiring selected GPS transmissions that are refracted by the Earth's atmosphere and reflected from the Earth's surface.

The Scalar Helium Magnetometer (SHM) provided by NASA/JPL will be part of the Danish Magnetic Mapping Payload (MMP). The MMP is designed to better understand the Earth's geomagnetic field and related Sun-Earth interactions. The MMP will provide continuous field measurements for a minimum of 12 months with an accuracy of one part in 50000. The SHM will complement other MMP instruments and will be mounted at the tip of the Danish 26 feet (eight meter) extendable boom. The SHM electronics box will be mounted on the spacecraft's lower (propulsion) platform. The MMP will be shipped from Denmark to Argentina as a complete unit including U.S. supplied hardware.

Non-NASA Instruments

- Multispectral Medium Resolution Scanner (MMRS), designed and built by CONAE, will study the condition and dynamics of the terrestrial and marine biosphere and environment. The MMRS will be operational over Argentina during SAC-C's lifetime.
- High Resolution Technological Camera (HRTC), also built and provided by CONAE, will improve part of the MMRS scenes. The HRTC will be operational over Argentina during the lifetime of SAC-C.
- Influence of Space Radiation on Advanced Components (ICARE) experiment, supplied by CNES, will measure high energy radiation environment, trapped particle intensities and energy distribution and correlate them with advanced electronic components degradation. ICARE will be able to conduct regular environment characterization campaigns for ten days every six months and exceptional ones during solar events. ICARE will study the effects on components and their variations along the same time frame.
- Italian Star Tracker (IST) will test a fully autonomous system and orbit determination using a star tracker.
- Whale Tracker Experiment, another Argentine experiment, will track the migratory route of the Franca Southern Right whale. The experiment will be operational when the spacecraft is over the South Atlantic Ocean.
- Italian Navigation Experiment (INES) and its components will be the primary navigation sensor by the SAC-C attitude and orbit control subsystem and a secondary attitude determination sensor.
- Data Collection System will enable SAC-C to collect environmental data from low cost ground platforms.
- Digital Transponder for Radio Amateur Communications will allow radio amateur communications.
- High Sensitivity Camera (HCS), a CONAE supplied instrument, is a highly sensitive intermediate resolution camera. The HCS will be useful in forest fire and electrical storm detection.

Partners

- Argentina will supply the MMRS, Whale Tracker Experiment, HCS, and HRTC.
- NASA/JPL will contribute the GOLPE and SHM.
- Italy will provide part of the solar panels and two technological experiments for orbit and attitude determination, IST and INES.

- Denmark will contribute the MMP.
- France will supply the ICARE experiment.
- Brazil will provide its testing facilities for system level testing.

Project Management

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