The SAOCOM mission

State-of-the-art technology to manage the planet's environmental emergencies and provide satellite information for the benefit of Argentinians.

The SAOCOM mission consists of putting into orbit two constellations, SAOCOM 1 and SAOCOM 2, the second series of which will incorporate certain technological advances resulting from the experience of the first. Each constellation is composed of two satellites, called A and B respectively, which are basically similar, due to the need to obtain an adequate revisit of the monitored Earth surface.

The SAOCOM satellites, together with four satellites of the Italian Constellation COSMO-SkyMed, belonging to the Italian Space Agency (ASI, in Italian), make up the Italian-Argentine Satellite System for Emergency Management (SIASGE, in Spanish), created by the National Commission for Space Activities (CONAE, in Spanish) and ASI for the benefit of society, emergency management and economic development.

An example of a collective construction

The Argentine Microwave Observation Satellite SAOCOM 1A has been designed, produced, tested and operated by Argentinians within the framework of the National Space Plan. The mission will bring into space a complex Earth observation technology and is one of the most challenging technological projects ever developed in the country.

The SAOCOM mission is led by the National Commission for Space Activities (CONAE), which appointed INVAP as the main contractor for the design, manufacture, integration and testing of the satellites. CONAE remains responsible for the design, manufacture, integration and testing of the main instrument, the Synthetic Aperture Radar (SAR), as well as for the operation and distribution of the images generated.

In addition to CONAE and INVAP, more than 100 technology-based and conventional companies have participated in it. Together with numerous institutions conforming the country's science and technology system, they contributed their knowledge, experience and efforts to ensure the success of this mission.

The development of the satellite's solar panels, needed to convert sunlight into electrical energy for the operation of SAOCOM 1A, was a joint effort between INVAP, in charge of the design and manufacture of the structure and deployment mechanisms, and the National Atomic Energy Commission (CNEA in Spanish), which designed and integrated the solar cells and the interconnection system of the three panels.

In addition to being responsible for the mission and the instrument, CONAE was in charge of providing the radar antenna, for which CNEA was commissioned to design and manufacture the structure and

mechanisms, INVAP manufactured the wiring and thermal blankets, while the integration and testing were performed by CONAE in conjunction with the companies VENG, STI and DTA.

- 80 Argentine technology-based companies
- 3,500,000 man-hours = 2,500,000 INVAP + 1,000,000 other institutions/companies

Highest performance

The SAOCOM 1A will become the SAR satellite in L-band with the highest performance that exists on the planet at the time; for this reason, it has aroused much interest in the international scientific community to make use of the data it will generate.

The sensors of the satellite's radar antenna are able to capture data both day and night. The radar also stands out for its possibility of "seeing" through clouds since the frequency used by the microwave signal passes through them; thus, unlike optical instruments, the radar can capture data in any weather condition.

One of the main objectives of the SAOCOM satellites is the measurement of soil moisture, and the L-band used can penetrate through the surface up to 2 m deep depending on the type of soil. Soil moisture maps will be obtained mainly for an area of interest of about 83 million hectares in the Argentine Pampean region.

The SAOCOM 1A will have a great impact on the country's productive sector and will be key to preventing and mitigating environmental disasters. It will provide accurate information for agriculture, forestry, hydrology, oceanography, natural and man-made disaster management, environment, cartography, geology, mining, oil exploitation, and health.

SAOCOM Earth Observation Satellite

Instrument	Polarimetric L-band SAR
Weight	3,000 kg
General dimensions	4.7 m high x 1.2 m diameter
Deployed antenna dimensions	35 m^2
Lifespan	5,5 years
Orbit	Heliosynchronous
Height	620 km
Sweeping width	20 to 350 km
Space resolution	10 to 100 m
Revisiting period	16 days (for one satellite), 8 days (for the whole constellation)
Launcher	Space X's Falcon 9
Launching date/place	October / Vandenberg, USA

Launcher: Falcon 9

The SAOCOM 1A will be launched on a Space X's Falcon 9 vehicle from the U.S. Air Force base in Vandenberg, California, USA.

Space X (Space Exploration Technologies Corporation) is a U.S. aerospace transport company founded in 2002 by Elon Musk. The SOACOM 1A will use the Falcon 9 launcher, a two-stage rocket powered by liquid oxygen (LOX) and dense rocket kerosene (RP-1), manufactured by Space X. The first stage is capable of landing for reuse, either by returning to land or on a barge.

Satellite uses

This mission will bring into space a complex Earth observation technology that will make it possible to prevent, monitor, mitigate and evaluate natural or anthropogenic catastrophes for agricultural purposes such as soil moisture, vegetation indexes and pest control; hydrological, coastal and oceanic uses; applications in snow, ice and glaciers; employment in urban, security and defense studies, among other areas of productive interest.

The mission will have a great positive impact on the socioeconomic system, since it can be used in several productive industries, such as mining, fishing, oil and energy.

At the same time, the SAOCOM 1A will contribute to the objective of a climate action for a sustainable development by generating information to improve the capacity to adapt to risks related to climatic conditions and natural disasters.

Some applications

- Generate soil moisture maps, with spatial resolution and coverage area available for the first time in Argentina and the world, so as to identify areas at risk of flooding and give the corresponding early warnings;
- Detect very dry soils with fire risk;
- Produce risk maps of crop diseases;
- Evaluate scenarios in sowing and fertilization decision making;
- Know the amount of water available in wet snow for irrigation;
- Obtain glacier displacement maps;
- Draw terrain displacement maps and maps of slopes and heights;
- Detect changes in infrastructure;
- Carry out ship monitoring.

Flight settings

Twelve minutes after its take-off the SAOCOM 1A is expected to be released in an orbit very close to the final one. After one minute, the satellite transmitters will be switched on, allowing the reception of telemetry signals to verify its status; and two minutes later, the solar panel will be deployed, permitting the satellite to prepare for its start-up phase.

Both in the release phase and in the following start-up operations, which will last several days, contact with the satellite will be maintained by means of several Earth stations communicating directly with the Argentine Earth stations of Falda del Carmen (Córdoba) and the remote station of Tolhuin (Tierra del Fuego), both of CONAE. There, the reception, processing, publication and storage of the satellite information generated by different Earth observation satellites will take place.

Learn more about INVAP

INVAP is a reference company in technological projects worldwide and a protagonist of development in Argentina. For four decades, INVAP has been developing high value-added technological systems, both to satisfy national needs and to enter foreign markets through exports. Its main activities are focused on the following areas: Nuclear, Space, Defense and Security, Industrial, and Communications. INVAP has designed and manufactured research reactors in different parts of the world, scientific satellites for Earth observation, telecommunication satellites, as well as radar systems for air traffic control, defense and meteorological issues, and nuclear medicine centers, among other important developments.

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